Design Education

Tradition and Modernity

Scholastic Papers from the International Conference, DETM 05

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Foreword

Design is now being increasingly recognized as a value adding link between culture and products, services and experiences and between businesses and customers. As a "problem defining and creatively solution seeking discipline" design has immense potential to foster partnerships with governments, target industries and other stakeholders' not only to provide a leading edge in the market place but also to develop a better quality of life.

The new Millennium has heralded sweeping winds of globalization, aided by converging technologies and "ideas driven" economy. Though globalization has opened doors of economic prosperity to the "majority world" it has also raised the issues of sustainability, appropriate technology, culture-centric preferences, survival of local arts and crafts etc., like never before. The challenge before design education is, therefore, to proactively respond with speed and imagination to the emerging contexts. This calls for introduction of innovative approaches to design education, collaborative practices, international linkages and partnerships, with focus on development of a fresh design pedagogy which draws upon the time tested traditions of design education and practice, while absorbing the convergent and ubiquitous new media and technologies.

The issues of tradition and modernity have therefore, perhaps never been more relevant to design education than in the 21st century where the dynamics of globalisation and its socio-economic consequences have prompted design educators and thinkers to critically appraise the role of design in enhancing and delivering the quality of life in a more accessible and inclusive manner.

The three-day International conference on Design Education: Tradition & Modernity (DETM) organised by the National Institute of Design under the leadership of Mr. Shashank Mehta and Mr. Vijai Singh Katiyar, faculty members was an attempt to bring together on a common platform eminent design educators, practitioners and senior students to address some of the issues in the context of deep-rooted design traditions on one end of the spectrum, and the need for a relevant and holistic approach to design education to meet the demands of the global economy, on the other. The Intent Statement on Design Education adopted at the end of the conference endorsed by the delegates from 27 countries from different continents not only reflects the intense deliberations that took place during the conference, but also encapsulates the vision of global design education fraternity and paves way for a healthy forward dialogue and sharing.

The National Institute of Design takes great pleasure in publishing the full-length papers presented at the path-breaking DETM conference. I am sure this publication will promote dissemination and discourse of diverse design knowledge and experience on a range of issues that are relevant to the design education in different parts of the world: the developed, developing and least developed. The concerns of design education may vary in details in different contexts and countries but the broad directions seem to be having a lot more convergence than anticipated as is evident from the presentations.

Dr Darlie O Koshy
Director, NID

Preface

Design education across the world reflects a diverse spectrum of economic, regional and social dynamics. Several great traditions in design education continue to reflect regional aspirations while striving to make them a part of the modern world. Today, a large number of design students and researchers are breaking the regional barriers and are crossing continents in search of new sensibilities, alternative methodologies, and collaborative opportunities. Rapid advancement in the field of information technology has led to the emergence of the knowledge economy as the new powerhouse. In this context, it is only natural that design education should address the new and emerging socio-cultural and economic aspects.

The world over, design educators and practitioners have appreciated the need for design education to address the demands of a qualitatively new global economy. This is aptly reflected in the content of the papers that were presented at the International Conference on Design Education (DETM 2005). Some of the papers reflect a deep study of the traditional models of design education in the modern context, the role of research, cultural approach to design, etc. At the macro level, a few of the authors take a critical look at the emerging socio-cultural and economic issues, and how design curricula should respond to them. As design educators seek to develop new curricula and adopt new teaching methodologies that transcend the regional barriers, we need to emphasise the relevance of well-established design philosophies, regional traditions, and cultural sensitivities.

The first ever major event of its kind to be held in the Indian sub-continent, the DETM Conference, was a part of National Institute of Design (NID)'s initiative to synergize global thinking on design and design education. The Conference received an enthusiastic participation from the fraternity of design educators, practitioners and design students from all over the world. The authors from over 27 countries covering all the continents and representing more than 50 Design Institutions across the world shared their diverse experiences and thought provoking concepts that we are sure will lead to new definitions of design. The book will help envisage the vision and actions to strengthen the quality of design education so as to create a qualitative paradigm shift in the Design Education practices of tomorrow.

We thank all the authors for their valued contributions and for their cooperation for maintaining the time schedules. We are grateful to Dr. Darlie O Koshy, Director, NID for entrusting us with this challenging task of leading this unique conference and its publication. The editors would like to extend their appreciation to all the members of the NID community who have contributed untiringly to the successful realisation of the conference and this book.

Vijai Singh Katiyar **Shashank Mehta**

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Approaches To Design Education

Design education has come a long way since its evolution at Bauhaus during the age of Industrial Revolution. Most universities and institutes of design education around the globe have evolved their curricula to suit the requirements of an ever-changing global and local scenario in which designers operate. Most papers presented at the DETM acknowledged the need for design curricula to be contextualised, and integrated with modern perspectives, while retaining the core strengths of design pedagogy that differentiates design as a discipline distinctly different from art and science.

The papers presented in this section provide a glimpse into several progressive approaches to design education by various institutes and universities with varying background. Some papers deal with approaches to specific domains. For instance, Alexander Bošnjak of Indian Institute of Technology, Guwahati, deals with a series of elementary design courses that have a great potential to build a solid base in form creation and development, and evolve the rational understanding required before students move on to 3-D modelling software. Other papers included in this section deal with issues such as curriculum integration, interdisciplinary and multidisciplinary approaches to design curriculum development. Elaine L. Pedersen and Leslie Davis Burns of Oregon State University share their insights into a departmental curriculum integration process across apparel, interiors and housing, aimed at minimizing curricular overlap and maximizing resources. Medardo Chiapponi of University of Venezia, Italy, emphasizes that the need to evaluate the effects of industrial products and processes on the environment makes it mandatory for product designers to involve themselves with all phases of a product's life cycle. Aniruddha Joshi of Indian Institute of Technology, Mumbai, shares his insights into the interdisciplinary approach at the Industrial Design Centre (IDC) and reiterates his belief that lack of a multidisciplinary approach could produce lopsided professionals.

Design curricula in a university system involve a strong interrelation between didactic studies, research, critical discussion and analysis of knowledge and information across several disciplines. Such an interdisciplinary approach makes it possible not only to teach design fundamentals to non-design students, but also enrich design students with inputs from other disciplines.

Design does not operate in isolation. As Peter S. Martin of Virginia Commonwealth University School of the Arts, Qatar puts it, "Designers do more than create beautiful or ugly products; they also contribute positive or negative influences in our lives." This makes it necessary for design curricula to provide interdisciplinary and multidisciplinary exposure to gear up students to tackle design problems with a holistic approach and to make things work within practical constraints. Poonam Bir Kasturi of Shrishti School of Art, Design & Technology, Bangalore, also calls for a design pedagogy that facilitates integrative learning through a multi-disciplinary process.

M.P. Ranjan of National Institute of Design, Ahmedabad, however, cautions that as new frameworks of design education process emerge in our changing times and new areas of specialization are introduced by design institutes and universities, and as digital tools form an inalienable part of design education, the time-tested wisdom of Basic Design as it evolved at Bauhaus and then at Ulm must not be lost. "Design thinking and design sensibilities are earned through hard practice and through a process of systematic induction training and these are distinctly different from the development of science based knowledge and attitudes offered through the university system of education," he says.

Lessons from Bauhaus, Ulm and NID: Role of Basic Design in Post-Graduate Education

M P Ranjan National Institute of Design, Ahmedabad, India

M P Ranjan has been involved as a faculty at National Institute of Design (NID), Ahmedabad for over thirty years and as a design professional advising government and industry on strategies for the use of design services in a number of sectors of the economy. He was responsible for visualizing the feasibility reports for the setting up of two new institutes of design, the Indian Institute of Crafts and Design (IICD), Jaipur and the Bamboo and Cane Development Institute (BCDI), Agartala, each focused on the needs of the crafts sector and the bamboo sector respectively. The work done by the author for the new curricula in the national design institutions NID and NIFT and the institution building experiences gleaned through setting up of the IICD and the BCDI provide a backdrop for this paper in the context of the need for fresh thinking in new design institutions and disciplines with particular reference to India at the turn of the century.

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Basic Design within Design Education has come a long way since its origins at Bauhaus and its evolution at Ulm. At NID it has found a place in the Foundation Programme offered to the undergraduate programme students but is not yet seen as either critical in the postgraduate streams. The assumptions seem to be that the mature students who enter these disciplines can pick up the concepts of design due to their qualifications or backgrounds. The other concern that surfaces with the widespread use of computers is the notion the traditional skills need not be offered since design too has become a knowledge driven discipline thereby obviating the need for basic skill training. The author argues that basic design as it is offered in the Foundation Programme has evolved from a need that was originally perceived and dealt with at Bauhaus and Ulm as a critical orientation to design thinking and action and this need has not changed in the information age. We therefore need to revisit the traditions of design learning and try to understand the role played by basic design and see how it should be woven into the process of inducting new entrants into the realm of design thinking and action. Design is also taking on new meaning and it is increasingly being separated from the skill base that it was originally married to due to the tools and traditional processes that are a fallback of various historical stages of evolution in a large number of disciplines. Design is being recognized finally as being distinct from both art and science and the search for educational processes that are distinctly designerly may not be a misplaced pursuit.

Keywords: *basic design, foundation programme, design fundamentals, design education, design history*

Background

Modern design education had its roots in the Industrial Revolution when changing modes of production displaced existing crafts traditions and apprenticeship processes through which design used to be transmitted to new incumbents within guilds, work spaces and educational settings which echoed the situations that existed in the realms of practice. The Bauhaus in Germany was the first school to formally create a series of assignments within a curriculum to prepare new students to enter a journey of design learning. Set up in 1919 after the end of the First World War, the Bauhaus was a center of creative expression that housed some of the greatest design thinkers of our times. The educational experiments of the school still find an echo in all design education across the globe. What the founders of the Bauhaus tradition formulated is of value since they were looking at those qualities that needed to be nurtured in the art and design student, both in the form of skills and sensibilities as well in their conceptual abilities and attitudes when dealing with materials and the real world of design action. Thankfully for us the Bauhaus pedagogic experiments were published by the teachers as 14 remarkable monographs that were edited by the founders Walter Gropius and Laszlo Moholy-Nagy. The work that was started in the Bauhaus continued unabated after the teachers were dispersed to new locations by the upheavals in Europe that led to its closure.

The Bauhaus Way

The Foundation Programme was, however, credited to Johannes Itten who was a master at the Bauhaus from 1919 to 1923 when he left due to disagreements with Walter Gropius. His book "Design & Form: The Basic Design Course at the Bauhaus" was published much later in 1963 but the seeds sown at the Bauhaus were durable and spread to most design schools across the globe. The focus of the Bauhaus Foundation was spelt out quite clearly by Itten and the core objectives and the teaching strategies employed are listed below.

Objectives

Liberate creative forces, open artistic talents, train own experiences and perceptions, create "genuine work", remove deadwood of convictions, develop courage to create own convictions, help make career choices, expose to variety of materials and media types, help discover comfort levels in materials and media, understand creative composition principles, explore laws of colour and form, develop ability to handle subjective and objective problems of colour and form, explore permutations of the interplay, build a vocabulary for art & design.

Teaching Strategy

Evoke individual responses from students, encourage variety of talents and temperaments, create an atmosphere conducive for original work, encourage the "Genuine", help student acquire natural self-confidence, help students discover the self and their talents, explore student strengths in the elements of design, categorise and diagnose student leanings and qualities, help students open these discovered talents or leanings, develop individual potential by directing teaching of media explorations.

Basic Premises

Liberate imagination and creative abilities, strengthen imagination and expression, build on these capabilities and set technical and practical goals later.

In the early years when it was implemented at the Bauhaus the various workshops were yet to be fully established. Several other masters — all painters and sculptors from the Weimer days — involved in the instruction of theory and method, were called 'masters of form', while the craftsmen heading the workshops were 'workshop masters' and were involved in technical instruction. The preliminary course called 'Vorkurs' was initiated by Itten and made compulsory a year later. Other masters contributed to its strengthening and in developing the core meaning that it held for the curriculum as a whole. What is significant about the Bauhaus Foundation course is the close interplay of theory and skill. The sensitive hand and the experience of doing structured assignments are used to raise awareness and to raise critical issues that lead to the development of convictions and conceptual understanding. The production and understanding of theory is, therefore, a direct outcome of numerous practical engagements within well-defined constraints of structured assignments that are mediated by the masters who use their diagnostic skills to advise and direct the learners to help discover their creative potentials.

The sequence of learning, therefore, went through the following stages: experience, perception, practical ability, intellectual explanation, comprehension and finally realization. The assignments for the Foundation courses explored three basic directions:

- Experience with the senses: sensory stimulation and training the senses.
- Objectivising these at an intellectual level: development of logic and understanding concepts.
- Realising these through synthetic means: ability to produce or execute with quality.

This three stage process is iterated numerous times with various design parameters such as contrasts, form, colour, texture etc till the learner develops his critical faculties and is able to make his or her own judgments.

The arguments that came up within the masters veered between theory and practice. Masters of form focused on theory and its application while the masters of workshops dealt with the practical. But in the early stages of the Bauhaus a lot of theory was perforce discussed in great detail at the Bauhaus, perhaps since the workshops were still to be formally set up as the school was extremely short of funds. This set an unusual trend for design schools where theory played a lesser role with most teachers being practitioners who wrote very little. The masters of form at the Bauhaus were an exception to this rule. After the departure of Itten the Foundation Programme at Bauhaus was influenced by Albers, Klee, Moholy-Nagy, and Kandinsky. Further development of the Foundation Programme took place in the United States by the masters, each at their chosen centers of learning.

The Ulm Experiment

One of the Bauhaus students, Max Bill went back to Germany to become the first Director of the new design school at Ulm, the Hochschule für Gestaltung, that was to continue the work begun at the Bauhaus on the basic design courses under his active guidance. Max Bill managed to bring back some of the Bauhaus masters and their teachings to Ulm and he set up a course similar to the Foundation Course at the Bauhaus incorporating the advances made by Albers at Yale and Peterhans at the Institute of Technology in USA. The Ulm school design pedagogy went through many critical stages of transformation under successive leaders who came after Max Bill. Otl Aicher, Thomas Maldonado, Hans Gugelot, Herbert Ohl, Herbert Lindinger and Gui Bonsiepe made major contributions to the design pedagogy and in particular to the evolution of the Foundation Programme at Ulm. The Ulm too shared the results of teaching systematically with the world at large through the publication of the Ulm Journals, which represents one of the greatest contributions that was made to design education in the fifties and sixties.

While Max Bill stood for an aesthetic tradition it was Thomas Maldonado who drew attention to the need for scientific temper in design education and its associated set of theory inputs. Maldonado understood that design needed to draw from many other disciplines and the sciences and he talked about an almost feverish and insatiable curiosity towards some disciplines that appeared on the time horizon in the late fifties. Cybernetics, theory of information, systems theory, semiotics, ergonomics and disciplines such as philosophical theory of science and mathematical logic were explored to bring a solid methodological foundation to design thinking and action for the first time. The focus on science and methodology was a Pandora's box that literally swallowed design thinking and sensibilities at Ulm for quite some time and it took great effort from the inner group of designers — Maldonado, Aicher and Gugelot — to reassert the supremacy of design at Ulm. The third and final phase of the Ulm pedagogy experiments brought in the use of the social sciences with Abraham A. Moles playing a critical role.

The Foundation course or "Grundlehre" focused on non-object-oriented design and the training of the hand and the eye and a number of assignments were innovated by the teachers. While Albers came back to teach colour at Ulm with a hands on approach, Itten who came later intellectually opposed Albers. Further, the teaching of colour theory by Helene Nonne-Schmidt upset Albers who withdrew from teaching at Ulm. Maldonado took over the Foundation Programme and brought in simplicity and precision to the core of the assignments. Drawing too was modified to focus on reflective visualisation. In a way Maldonado carried out a purification of the Bauhaus way in the teaching of the Foundation Programme; he made it interdisciplinary and brought in theory of symmetry, topology and Gestalt. None of the Ulm Foundation assignments had a practical basis and they were all abstract and non-object oriented in nature. The focus then could be on the understanding of principles and not on immediate application of the concepts. It was here that the Basic Design course got elaborated and evolved further to have a discipline focus. The assignments were developed to meet the needs of different disciplines such as graphic design and that of product design, industrialized building and information design. Maldonado stressed on the need for continued non-objective studies even in the senior years when students were dealing with real life design problems, however, with gradually reduced time allocated for such studies in the curriculum. The non-objective

assignments provided the students with critical abilities in the judgment of form when applied to real design situations. In the search for new capabilities a number of three-dimensional assignments were innovated to suit the needs of product design students and nature studies and bionics got integrated into the search for science principles that permitted new explorations.

This took the Ulm contributions well beyond the areas of explorations conducted at the Bauhaus since these were restricted to the application in small objects of low complexity and the Ulm designers were venturing out into the world of complex products and looking for means to deal with this complexity at the structural and formal levels. The Ulm teachers raised the understanding of design to a new level through their practical demonstrations in the fields of household products, electrical and electronic products, automobile and transportation systems and in industrialized building while establishing unchallenged leadership in the field of Graphic Design. Taken together, the live demonstrations of design success across disciplines and a systematic documentation of their design pedagogy helped create the Ulm influence across the globe and spread it to many centers of design education.

Otl Aicher's models for design education explorations at Ulm do throw some light on the difference in lecture based conventional education and the hands on experiential education seen in the Basic Design courses developed at Ulm and now in many design schools. I also see that while "Design Research" may be about the creation of "design knowledge" the use of this knowledge in "Design Action" would be in the form of an exercise of contextual judgment in design synthesis when numerous threads of factors from multiple knowledge streams get embedded into a particular solution. Design education needs such critical-ability forming processes and not just knowledge gathering skills and processes.

Transfer of Pedagogy to NID

At NID too we have been keenly interested in the design pedagogy of Ulm right through the seventies and later. We were fortunate to have had faculty members who spent a good deal of time at Ulm in the sixties and, therefore, our programmes too got a strong dose of the Ulm flavour in the early years. Prof. Sudha Nadkarni was a student at Ulm and Prof. H Kumar Vyas was deputed to spend 10 months at Ulm before commencing our first Product Design programme in 1966. Our library also had the full set of Ulm journals and these were a great source of inspiration. We have since been active in following the Ulm people having had contact with several of them over the years, Gui Bonsiepe and Kohei Suguira being the most prominent of these. Herbert Lindinger was a consultant to NID for the Product Design programme as well and his book is also in the library. The Ulm story never fails to inspire, since the achievements have been so stupendous.

The Ulm will have great significance for the international design community for many decades to come since so much was done by way of path breaking thinking and much of it was documented in real time and now we have such a fantastic resource created by Rene Spitz that it opens up the material for further contemplation by a wider audience.

My brief account (above) of the influence of Ulm on NID is far from complete and much new information will emerge if design historians subject it to serious research in the years ahead. Hans Gugelot from HfG Ulm was responsible for drafting the curriculum and then commencing the Product Design programme at NID. He visited NID in the early stages and he passed away soon after his return from India. He was followed by E. Reichl (Director, Institut für Produktuntwicklung, Neu Ulm) who was recommended by Gugelot and later Herbert Lindinger came from Frankfurt (Institut für Umweltgestaltung) to evaluate the Product Design course and to help formulate the proposed undergraduate programme that commenced in 1970 which included the NID Foundation Programme across all disciplines for the first time. The other prominent teacher to visit NID was Prof Herbert Ohl.

In the Visual Communications stream we had Christian Staub, HfG Ulm, who set up our photography department and commenced the education programmes in Photography. We also had a strong German presence (from outside Ulm) in Ceramic Design ((Zettler Lutz), Furniture Design (Arno Vottler, Braunschweig and his students Rolf Misol 69-70 and Max Janisch 70-72) and in Exhibition Design (Frei Otto). There were perhaps others who are not mentioned in the available texts since the NID's documentation and publication record is indeed very poor. Prof. Sudha Nadkarni's name is not mentioned in the list of faculty of Product Design in our 1969 documentation titled "National Institute of Design: Documentation 1964-69", NID Ahmedabad. I am surprised at this omission since I was personally interviewed by him and Prof H Kumar Vyas along with the consultant and teacher Rolf Misol when I first joined NID as a student in 1969 April-May. He left NID soon thereafter and set up the Industrial Design Centre (IDC) at the IIT in Bombay in 1969. He retired a few years ago and was then given the task of setting up yet another school, this time in the IIT Guwahati which is now the first undergraduate programme in design under the IIT (Indian Institute of Technology) fold.

So three schools in India were directly influenced by the Ulm doctrine and many friends of Ulm have connected with these schools in the years that followed which has not been documented as yet properly. The NID library had the only set of Ulm journals in India and I made a xerox copy of the full set (piracy admitted) for the IDC library at the request of Prof Kirti Trivedi, faculty IDC, and a few years later he re-published some of the papers in a collected volume called "Readings from Ulm" which was used at a seminar on the influence of Ulm on Indian and world design.

The NID Experiment: NID's Own Foundation

The NID Foundation Programme started with the first batch of undergraduate students joining NID in June 1970. The teachers were drawn from the various existing disciplines at the postgraduate level and at first the programme was an amalgamation of inputs from primarily Product Design and Graphic Design programmes. Freehand Drawing, Composition and Colour came from the Graphic Design stable and drew heavily on the Swiss graphic traditions implanted at NID by Armin Hofmann from Basel. The other courses of Geometry, Elements of Form and Space, and Basic Materials drew on the Bauhaus and Ulm models for assignments and pedagogy. Basic materials too faced pressure from downstream disciplines and the Textile faculty introduced linear materials as an input in addition to the traditional wood and metal workshop assignments. Colour quickly moved to the Textile Design teachers but a Product Design faculty always offered colour theory. The Foundation Programme was of three semester duration across one and a half years. The third semester was used for basic courses offered by the disciplines and these included Typography, Photography, Film Appreciation and Music Appreciation to provide media skills to all students and technical drawing and inputs in science, mathematics and liberal arts were offered as lecture modules. Design Methods was the final course at the end of the programme. The teachers freely experimented with Basic Design assignments and there was much discussion on the effectiveness of particular courses as feedback from the disciplines to the Foundation teachers. Individual teachers had access to a very rich library from the Bauhaus, Ulm and several other schools which had linkages with NID.

Mohan Bhandari was deputed to Germany to work with Herbert Lindinger for a year and on his return he was asked to coordinate the Foundation Programme. In 1975 he was given the task of reviewing the Foundation Programme with the teachers and the management consultant advising on inter-personal relations, Professor Pulin K Garg from the Indian Institute of Management, Ahmedabad. Through numerous meetings all the Foundation inputs were reviewed and discussed with a view to integrate these into a cohesive unit rather than as a collection of disparate inputs from the specialised disciplines. This process continued well into the late seventies beginning with a revised programme that was created and offered to the batch of 1976. This was the first time that the NID Foundation had a new look and an environmental focus that transcended the traditional inputs from the Bauhaus, Ulm and the Swiss and French schools of design. The Design Methods course was then called Design Process as the problem solving process in design and inputs in sociology, psychology and field exposure were offered as a preparatory set of inputs. The approach

in Space, Form and Structure too had an environmental bias and this had extended to Geometry as well. I recall that both G Upadhyaya and I had severely criticised the geometry course with excessive environmental bias during the first faculty forum meeting in 1976 and thereafter we were asked to develop the course and conduct the same, which we did for many years thereafter. By the end of the decade Mohan Bhandari set out to capture the revised NID Foundation Programme as a manuscript for publication. However he left the Institute in 1982 and unfortunately the book was never printed. It was a great loss for the spread of design knowledge.

At NID there was a discussion on teaching maths to designers at design schools. In 1976 I created a new course aimed at teaching math concepts to design students at NID. The course was called "Geometrical Construction" at that time and in later years "Geometry and Morphology" where we introduced design students to many exciting practical drawing and model building assignments including recreational maths puzzles. While I cannot claim that it is a complete substitute for formal instruction in mathematics, however, it provides students from non-math backgrounds sufficient conceptual tools to deal with complex structural and formal math and logic problems. We discovered that the domain of visuality is undervalued in most areas of formal education at the school level while the emphasis is greatly on textuality and numeracy and we set out to correct this imbalance.

The Space, Form and Structure modules exposed the students to concepts of semiotics and Gestalt theory of figure and ground relationships. A number of exploratory assignments are given and the results are discussed to help build an attitude of exploration and experimentation with visual language. The Environmental Perception and Environmental Exposure modules got the students out of their studios in an attempt to connect with society at large both to bring the real world concerns into the classroom as well as to help prepare students in the early stages of the Design Process. The Design Process course went through a number of cycles of development under different teachers. In the first cycle the problems had a distinctly scientific basis, and all introductory assignments had low technical complexity. Usually very simple products were chosen and these were redesigned using ergonomic and functional explorations. In the second cycle more complex problems from the environment were identified and these required more elaborate processes of information collection and analysis. The third cycle that began in the mid eighties took on a more systems focus and design tasks were treated as a process of understanding complex situations through which many potential solutions were explored. Today this course is called "Design Concepts and Concerns" and it is offered to students from all postgraduate disciplines at NID, in addition to the module offered at the undergraduate level.

This systems model of design that some teachers adopted for building courses and to conduct research and client interventions had over the years given us the conviction that design in India is quite different from that which is practised in the West. Notwithstanding the difficulty of defining a subject as complex as design, we were convinced of the need to use the power of this discipline to further the real needs of a huge population desperately seeking solutions to many vexing problems in a very constrained economic climate. It is our belief that design at the strategic level can be used as a catalytic tool to mobilise innovations and policies that can indeed transform the country in more ways than one. This ideological bearing has informed many initiatives of design action at NID and it was reinforced at several critical stages by confirmation of our methods and goals by the work of other visionaries. The UNIDO-ICSID conference on "Design for Development" that was held at NID in 1979 and the work of Victor Papanek, Nigel Whitely and Gui Bonsiepe, all of whom came to NID for brief or longer periods, left a mark on the thinking of the design teachers at NID. Design in India was being discovered as a whole new genre of action through the application of design principles through research and development to new areas such as the development of crafts, health communications, strategies for small industry, and in areas of social and economic development while working at the community level. Today we have an even broader definition of design, that is design as a vehicle for leadership as articulated in the "Design Way: Intentional Change in an Unpredictable World" by Harold G. Nelson and Eric Stolterman, who approach design as a form of leadership.

The Way Forward

To this new dimension and goal for design education we can add the impact of new tools that take us into the digital realm of performance in many disciplines. This raises many questions and many assumptions are made about the nature of design education in today's world. It is widely assumed by many that postgraduate students need less intensive inputs and resources to make them into "designers" and "design thinkers" when compared to the undergraduate group. The second category of "design thinkers" is seen as a real need today and as an alternative to "designers" in a knowledge driven world. It is particularly worrisome that it is assumed that design thinkers can be trained without the burden of learning skills through the adoption of digital tools and abilities. My reading of the Basic Design pedagogy of Bauhaus and Ulm shows that analog capabilities of "learning by doing" has been the historic vehicle for design education so far. We know that design thinking and design sensibilities are earned through hard practice and through a process of systematic induction training and these are distinctly different from the development of science based knowledge and attitudes offered through the university system of education. The methods of teaching adopted at the Bauhaus, Ulm and now in the NID experience have all generated huge success stories in the creation of the thinking and sensitive designer who is able to make critical judgments on complex issues and perspectives and then they are also able to act in ways that help solve these problems using creative scenarios and alternatives which reflect their deep understanding and empathy with the milieu in which the opportunity is located. This capability of effective design action is unique to designers who, by virtue of their training, are able to act on the real world and create future scenarios that can be embedded in the real world as analog solutions even if these were mediated by digital means.

This brings me to a series of linked statements by the founder of Ulm, Otl Aicher, in his book "analogous and digital" where he says, "…The culture of thinking requires the culture of the hand as a subtle, sensitive organ." He goes on to say "…We are rediscovering the domain of making as a prerequisite of thought." Many modern innovations have been produced outside the domains of large and organized industry, in garages and shacks outside industry with small teams of motivated individuals. "…Human ability to make anything, his ability to design anything is atrophying… we have become children of a thought culture that has disconnected thinking from making…the more we know the less we can do" and this is not the design way. There is much wisdom in the search for processes by which Basic Design evolved at Bauhaus, then Ulm and later at NID and these lessons must not be lost because we throw away the baby with the bath-water when we replace wholesale the analog processes of design education with digital tools sets that we see all around us. I am concerned that many of the new disciplines at NID that attempt to teach design as a narrow specialization at the post graduate level are not equipped to handle analog design processes, that is, to use the hand as a sensitive route to the inner recesses of the mind. We now know that in order to create the deep understanding that is the hallmark of Basic Design education the masters had invented assignments that have been proven and tested by time. Let us pay heed to the masters of design thinking who have created an alternative to science education and learn those lessons which we will need to take forward with new experimentation and testing based on new frameworks of theory that would inform the design educational processes in our changing times.

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Putting Design School in its Place

Contextualizing Design Education by Developing Understanding and Skill in Design Problem Definition

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Peter Martin has been teaching graphic design at Virginia Commonwealth University School of the Arts in Qatar since September 1999. His experience of working in design education within a multicultural context has inspired his particular interest in design problem definition, design education, and crosscultural information design.

Peter Martin's background includes a B.S. in Environmental Design and Analysis from Cornell University and an M.F.A. in Communication Arts and Design from Virginia Commonwealth University, as well as five years of professional design experience. Also, his travels and photography in over 40 countries have exposed him to the tremendous diversity of form, meaning, and context that is critical to the performance of design.

Previous use of Paper Title: The Title, Putting Design School in its Place; Contextualizing Design Education by Developing Understanding and Skill in Design Problem Definition, has been used as the title for a presentation given by this author at an ICOGRADA Educational Network Syposium on 28 January 2004 in Istanbul, Turkey. Although concerning the same topic, this paper for the DETM 2005 Conference (Ahmedabad, India, March 2005) is a much more developed discussion of the issue.

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Many changes we now experience in our environments, communities, identities, and requirements are an impact of globalization. Although driven by economic practices, globalization is to a significant extent enabled by design. While the debate of what the overall benefits and drawbacks of globalization are continues, we are faced with designed changes that challenge and celebrate our understandings of place and identity. These challenges have already shown destructive trends in cultural practices and perspectives while the celebrations have tended to be superficial and trivial.

If design education is going to assert that designers should have an impact on the development and performance of the design involved with today's markets and communities, then we must consider how designers can resolve the increasing tension between the global and local that is experienced in a growing number of communities around the world.

Design education programmes should continue to focus on preparing their students for productive careers in the new global market place. Yet, as it unfortunately happens too often, this must not limit the scope of design education to only developing the skills needed to produce products. This focus can easily lead design schools to neglect the development of student understanding and ability essential to defining the development and performance of design as relevant, responsive, and rich for specific places and cultures within our world.

Putting Design School in its Place establishes an argument as to why design education needs new curricular developments in the area of design problem definition. In making this argument, this paper provides definitions of design education, contextual design, design performance, and design problem definition. This paper also outlines an agenda of objectives, principles, concepts, and methodologies critical for a design education program to develop student understanding and ability needed to contextually define design problems. To support and illustrate these points the author utilizes examples and references to relevant experiences and accomplishments that he has had with his students over five years of teaching at an American university in Qatar.

Keywords: *design problem definition, design performance, contextual design, design education*

1 The Power of Design

People commonly understand an architect to be a person who designs buildings, and a graphic designer to be one who designs posters. The typical conception of design is the designed product itself. Much of the consideration that design receives is a viewing of the products. The majority of books and magazines about design that are published are portfolios of products with limited or non-existent explanation of the relation between the product and its context of use. The products are featured in isolation from the design problem.

It is understandable for us to focus on the product's appearance because that is what we can see; a product is visible and tangible. To understand a product's context of design process and use is more difficult due to the invisible and complex nature of design's development and performance. This is problematic, however, because confining our understanding of design to the product's form provides very little basis for understanding how people and products work together as a design's performance. This limited attention to the product's appearance distracts us from understanding what really affects the quality and condition of our lives.

To see how easily we can focus on a product's visual form, consider the situation of a person ordering a product from a merchandise catalogue. Here, the decision to bring a product into one's everyday life is based primarily on its appearance provided by a photograph in the catalogue. There is little thought or information sought about how this product will change their life.

The same occurs in a scenario of gift giving. The giver of the gift will choose an object because of its aesthetic without developed thinking about how it can change the life of the receiver. A beautifully fragile glass bowl is selected without consideration to whether the receiver needs a bowl, or if this bowl will cause jealousy among friends when it is displayed or fights within the family when the bowl is broken.

If we are going to be more responsible for the effect that design has on our lives, we need to understand more about its development and performance. We will be able to understand that designers do more than create beautiful or ugly products, but also contribute positive or negative influences in our lives.

Design is a significant part of everyone's life. Within urban environments virtually every space a person lives within results from design of one kind or another. Almost every accident ending in injury or death involves designed devices. Every ceremony or festival of celebration is carefully designed. All the invisible technologies we coordinate within our daily lives with have been designed. Design is an ever-present medium of our experience, understanding, belief, and meaning. The way design performs determines much of our environment, experience, behaviour, emotions, motives, desires, understandings, identities, etc. Design is not simply shaping the appearance of our world; it, in fact, is a process of shaping our lives.

2 The Practice of Design

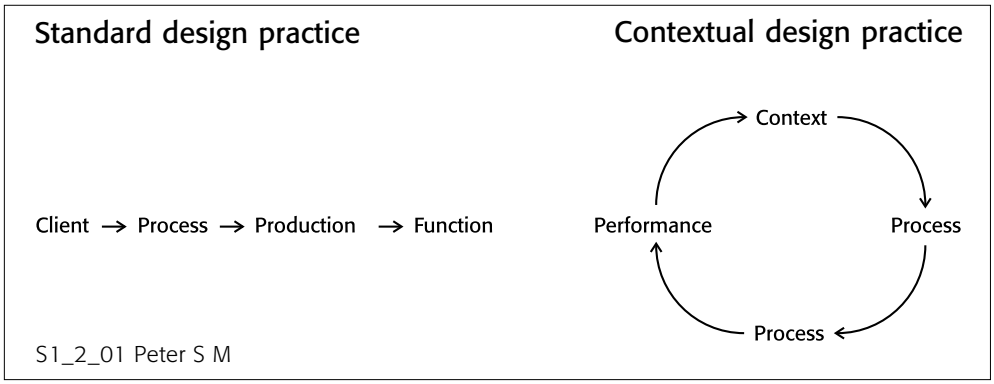
The standard practice of design needs to be different. A design project typically follows a sequential process of meeting with a client, establishing a project brief or program that specifies product requirements in accordance with the client's request, and designing the product for its delivery to the client. This process is mostly confined to the concerns and considerations of a conventional product-oriented discipline such as architecture or graphic design.

This model of design practice is dependent on the client's initiation of the process. This encourages a specific product-oriented approach to design because the client's understanding of design is confined to product form. The client initiates this process by seeking the services of a specific product-oriented discipline of design. The process will continue until the product has been delivered and the design is considered complete. However, this is where the design only begins to perform.

Awareness and understanding of the limits of this process are beginning to develop. Increasingly, design practices are developing design projects that are based upon careful consideration of who the end user of the designs are and how design can be a powerful agent of change, organization, stability, and identity. Design firms such as IDEO are cultivating methods and examples of how design is not a product, but rather a medium of influencing our experiences, understandings, beliefs, and meanings.

A new model (figure 1) of design practice seems to be developing. The contextual design process of practice begins with a context as opposed to a client. Even in the arena of professional practice where there is a client, the design process begins with an engagement with the context in which the product will perform thereby changing, adapting, or perpetuating the original context.

Figure 1: Models of design practice



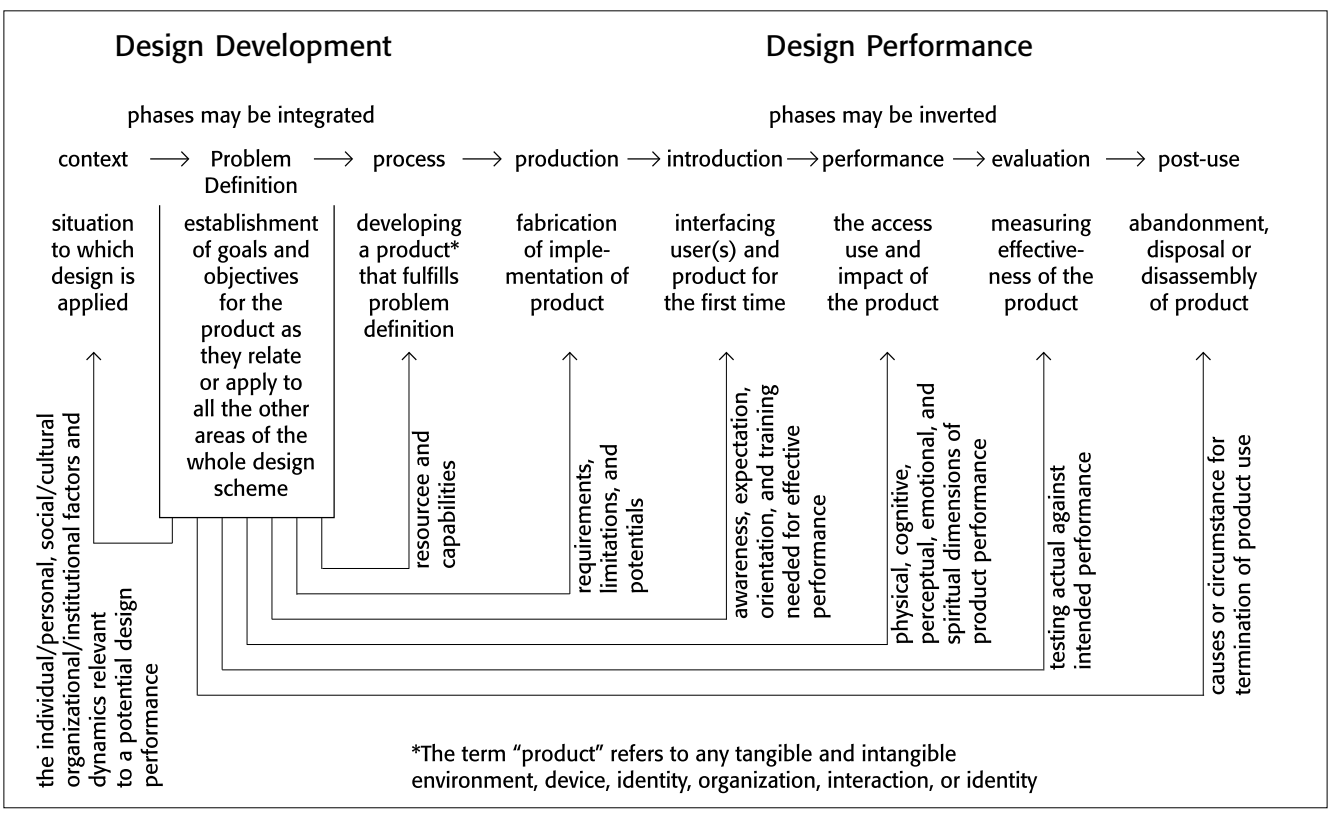
3 The Scope of Design Problem Definition

The basis of contextual design is a process of design problem definition (figure 2). This process considers all the phases of the whole design scheme to identify conditions and parameters for the development of a design product for a given context and establishes values and objectives for the performance of the design product in its context.

The design problem definition and process begins with a careful analysis of the context into which a designed product will be implemented. Various scales of conditions, dynamics, and components of a particular context are identified and organized into an effective definition of a situation's need and tolerance for design-supported change, adaptation, and perpetuation. This context definition ideally accounts for all physical, social, political, economic, cultural, psychological, and spiritual dimensions within the context.

This process then evaluates all the design problem solving and production phases of the whole design scheme. This includes establishing what resources and capabilities are available for the design problem solving phase, as well as what requirements, limitations and potentials exist for the design's production.

Figure 2: The Scope of Design Problem Definition



Outlining the context considerations, problem solving capabilities, and the production possibilities defines the development realm of a design. The design problem definition process then continues to define the performance realm of the design.

This requires a thorough exploration of the potential within the introduction, performance, evaluation, and post-use phases of the design in the given context.

The objective of design problem definition is to establish an understanding and guidance for a design problem so that decisions and considerations throughout the design problem solving process take into account the ways the designed product can affect the lives of those who will live with the design. The ideal pursued is to create a sustainable cycle of contextual design where there is a dynamic balance and harmony between design (products) and context. To achieve this cycle, each design problem must be defined with a comprehensive scope that accounts for the design, performance and post use of a product within a context.

4 The Global/Local Context of Design Performance

Although driven by economic practices, globalization is to a significant extent enabled by design. Design has been instrumental in making the networks of communication, finance, and transport that are essential to this global system more accessible, reliable, extensive, and rapid. The invisible technologies that support these networks are operated with complex but effective designed interfaces and systems. The larger more competitive markets rely on designed identities, brands, products and services to succeed over technologically equivalent competitors. Globalization relies on and encourages a consumerism driven by the design and packaging of lifestyles.

Design has been extensively employed to develop and implement the rapid and large-scale changes that globalization has brought to various regions of the world. However, these changes imported into many of localities of the world have created a new context of design performance. The overlap of the global and the local form an ecotone (figure 3) of global products performing within local contexts. An automobile is used within the Australian Aboriginal daily life. A cell phone becomes active in the communication of an Arabian Bedouin tribe. Glossy fashion magazines are adopted as the wallpaper within a mountain tea shack in Northern India.

This new context for design performance that occurs where the identities, aesthetics, processes, methods, and technologies from one place become present and active within another generate unfamiliar conditions of access, use, and impact of design within the lives of the native people. This global intrusion contributes to a growing complexity, flux, and fragmentation of the experiences, places, organizations, and identities in many local communities.

5 The Threat and Security of Different Design Performances

Design has become more powerful in its ability to impact the quality and condition of our lives. This is because of the capabilities of technologies incorporated, the speed of product development, and the extent of the systems constructed within the rise of globalization. However, this more powerful global design supports performances that do not necessarily promote order and sustainability within any given locality.

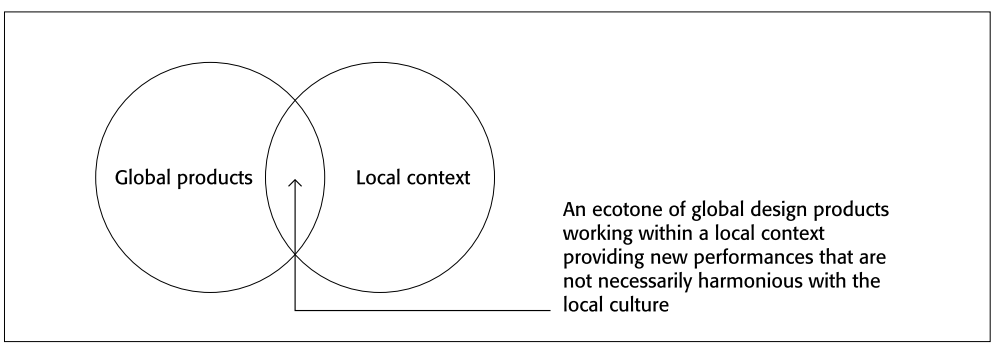


Figure 3: The Ecotone of Global Design and Local Context

Global design has a more arbitrary relation to local contexts with its typical characteristics of being from a remote source, working within systematic functions and networks, while being ephemeral and disposable. The meanings and identities encouraged within global design performances often are contradictory to traditional values and norms. This conflict unfortunately typically ends in the global influences displacing the local traditions. This is evident in the generational gaps that are opening up in localities all around the world where adolescents and young adults will abandon aspects of their heritage and tradition while embracing fashionable, arbitrary, and ephemeral trends. This impact of design is not sustainable and will eventually destroy the health of a culture and lead to neglect of the local natural ecology.

However, any design with a carefully considered performance potential can be a powerful and sustainable influence within particular local places and identities. With a developed understanding of design as a performance in context, designers can design for local context with a respect for its values, use of its resources, and knowledge of its various dynamics and patterns of change and stability. The practice of contextual design can provide a security for the health of local community and cultural proceedings. This protection from the arbitrary influences of globalization comes from contextual design's ability to perpetuate what is essential within a culture while adapting what is new into a relevant form that is beneficial for the local communities.

6 The Contextual Education of Designers

A Necessity

In order for contextual design to be practised, there must be designers who understand and are committed to this approach to design. This is why design education programs in all localities must develop contextual design understanding and skill within young designers.

Design education programs commit their curriculum to the development of capable designers. This requires a design education program to have a particular understanding of what a designer is obligated and capable of doing.

It seems that many design education programs orient themselves to the standard design practice model where the designer is expected to provide form to a product to be delivered at the request of a client. This approach is manifested in the curricula of these education programs where a majority of courses are dedicated to developing product-oriented techniques. A studio course will study publication design with careful attention to the development of grid and typographic systems with a presumption that clients will come to a designer asking to have a publication developed.

This product oriented skill and knowledge is essential for designers to develop products of a high production and function standard. However, in the current context of tension between the global and local factors, developing a contextual performance-based understanding of design is as critical, if not more so, for the success of design contributing positively to the condition of our lives, the health of our communities, and the strength of our cultures.

An Agenda for Design Problem Definition

This paper proposes an agenda for design education curricula to develop design problem definition understanding and skills among students as one method toward developing a contextual design education. Listed below are the agenda items:

Objectives

- Develop an understanding of the differences and relationships of design product, context, and performance.
- Develop an understanding of how a design problem is defined has a significant and unavoidable impact on the effectiveness of a design solution, and how this impact can be exploited to benefit the client, user, and their society.

- Establish a theoretical understanding of possible factors and interrelationships among the physical, perceptual, cognitive, emotional, social, political, economic, cultural, and spiritual dimension of any given situation that is addressed with a designed product.
- Develop a basis of awareness and skill necessary for a practicing designer to create a relevant and appropriate understanding of the critical and potential performance of a design solution for the client, user and their society.
- Develop a basis of skills necessary for a practising designer to appropriately define the objectives and parameters for a product's design, production, introduction, performance, post-use, and evaluation in a manner that provides an effective point of departure for the product design process.
- Introduce a perspective of design that expands the practice of design beyond the standard design practice model into an approach to design as a contextual practice that develops performances specifically for a given locality.

Principles

- Design is a cultural and contextual activity.
- The definition of a problem and the response influence the design solution.
- Design has a profound effect on the quality and condition of our lives.
- Culture is a method for people to live together in a given place within sustainable limits.

Concepts

- Values and Ethics
- Identity
- Culture and Mythologies
- Design Theory
- Sustainability
- Quantitative knowing in relation to qualitative knowing
- Ergonomics
- Dynamic ecologies in relation to static hierarchies
- Ecotonal interaction in relation to isolated conditions
- Systems in relation to circumstantial factors
- Context

Methodologies

- Contextual observation methods
- Self-reflection methods
- Contextual research methods
- Empathy training and role-playing methods
- Context definition methods
- Design analysis and evaluation methods
- Creative and innovative thinking methods

7 A Case of a Design Problem Definition Curriculum Initiative

Virginia Commonwealth University (VCU) School of the Arts in Qatar opened in 1998 in Doha, Qatar as an educational venture administered by VCU (USA) and funded by the Qatar Foundation for Science, Education, and Community Development. The Qatar campus of VCU offers the VCU Bachelors of Fine Arts degree programs in Graphic, Interior, and Fashion design. Currently, the student body is restricted to female students.

This design education project's most significant challenge and obligation is to contextualize an American design program rooted in Bauhaus modern and post-modern perspectives into an Arabic

and Islamic context where global forces contradict much of the local society and culture. One initiative that is being pursued in meeting the obligation of contextualizing this design education within the graphic design curriculum is to require a seminar course about design problem definition. The course, titled Problem Seeking, has been offered three times as a special topics seminar and has now been approved by the university as an officially endorsed course.

In addition to pursuing the agenda listed in section six of this paper, this course attempts to inspire the students with the prospect of having a direct impact on developing a contextual design tradition within Qatar. Because the practice of contextual design in Qatar has yet to develop, the students have this opportunity.

Through a sequence of exercises, field visits, readings, discussions, and research the students develop their understanding and skills of observation and perception, research and reflections, as well as analysis and definition. The course culminated in an exercise for each student to articulate in an essay (or even manifesto) format their own values and philosophies regarding the practice and performance of design should play in their society and culture.

Although the evolution of this Problem Seeking course is still near the beginning, there have been some successes. The first is that every graphic design major receiving a degree from VCU has developed some understanding of contextual design and its potential for Qatar's local place and identity. Also, this course is a significant step in developing the relevance of this American program to the context of Qatar. The last significant success to note is that this course has now established itself enough that it can begin to contribute to a research base concerning the nature, potential, and implications of design problem definition for design education, practice, and performance.

The initiative to contextualize the VCU design education program within Qatar continues to face a number of identified challenges. One is to continue establishing more curricular opportunities for developing design problem definition skills without compromising other concerns of the curriculum. A second challenge is to begin developing more concrete connections between the theoretical considerations and the application of design problem definition within the professional context of our alumni. And finally another challenge faced by this contextualization effort is to increase dialogue and collaboration with other design education programs with a focus on similar concern for contextual design education.

In conclusion, the efforts with this Problem Seeking class have been very productive in developing understandings about design as performance as well as contextualizing an American program in Qatar. We can be optimistic about design becoming more powerful in contributing to the sustenance of local place and identity of Qatar.

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Why Designer?
Designers' Roles, and Impact on Design Education

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Growing up in a machine shop allowed her to see the Indian Small Scale Industry from the inside. Fascinated by the issues of batch production, standardization, markets, technology, migration, urbanization, she watched as a whole generation of people struggled to make ends meet. A traditional society was coming to grips with change. A diploma in product design showed her a new world, but no answers. She then searched in traditional crafts and there again she came up against communities unable to either comprehend or deal with the rapidity of change and the erosion of identity.

Since then she has worked to find how a product designer using the vehicle of design thinking, production and products, can create alternative systems of production and create empowerment and build capacity in communities. She has worked extensively in the areas of teaching, crafts and design. Having been involved in founding and running two product/design companies and also a new school of design in India, she is convinced that design can help the Indian economy in different ways.

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This paper articulates a personal position as a design educator. It is the reflection of the past 10 years of wondering, experimentation and learning around the central question "What, how, and why do we teach design in India?"

Two important questions are discussed – (1) What are possible definitions of the role of the designer in India? and (2) Would a teacher's own definition impact the way she teaches design? There are many possible roles that designers currently play. In addition, there are many other roles that they could play. Further, there could be different positions on the desirable roles for designers in a society such as we have in India.

Some design education paradigms in India are based on a vocational definition of the designer's role – NIFT would perhaps be a good example of this approach. At Srishti, they have experimented with more organic definitions of the designer's role: definitions that include concepts like dealing with ambiguity, and co-creating solutions. Several examples will be presented to help illustrate what happens in reality when educators draw from their definitions of the designer's role – in terms of curriculum design; teaching methods, styles and structures; and contexting the teaching within the real world of the stakeholders in a design process, such as the customer and society.

Based on personal experience as a design educator, Poonam has suggested some tenets [or basic principles] of design education. To context these tenets, a comparison is made of how education has evolved in India across two disciplines – Design and Engineering.

Also presented as a case study is a course she has been involved in, initially called 'Design Lab', now called 'Design for Community and Self'. With this she hopes to contribute to the always-emerging body of knowledge on why we teach design, and some consequent hows of design education.

Keywords: *education, designer role, case study*

1 Introduction: The Role of the Designer

There are many different definitions of the designer. Whiteley (1993) suggested some years ago that "the mood is… right for a reassessment of the role and status of design in society." He draws from various designers, authors and thinkers to conclude that "…far from being the basis of the *solution* to society's *problems* … 'market-led' or 'consumer-led' design… (is) one of society's problems" [italics from the original].

Market-led or consumer-led definitions of design seem to be having high relevance in India's design scene today. In its 20th December 2004 issue, BusinessWorld magazine has quoted Professors Kumar Vyas of NID and Ravi Hazra of IDC [IIT – B] who both talk of how good design is related to consumer expectations of the product being designed. As Whiteley (1993) put it years ago – "To most people involved with design … good design is that which is commercially successful."

A scan of the various finalists in BusinessWorld magazine's *The Hottest Designs of 2004* will demonstrate the significance of this school of thought. Ranging from industrial products to consumer products, all entries clearly belong to the 'consumer-led' definition. Two non-typical entries – a flower vase in the Crafts category and a disposable mug in the Concept Design category – are also described highlighting the consumer [or user] end of the product; there is nothing of how they will fit into society, the links with the community at large and so on. One entry – systems design for a government bus stop – is different in that it is rooted in social relevance [because the customer is the public at large].

The society-led definition of design has been around for a while, although it has perhaps received less attention. Balaram (1998) has suggested, "The real challenge to the Indian designer is in making his design relevant to the development needs of India." Because the needs of 'development' and affluence are different, Balaram (1998) has asserted that the "Indian designer's approach should be capital-saving and employment-generative."

And yet, Balaram's definition of the designer still has embedded in it the primary role of *problem-solver*. Designers are asked to be relevant, and make their designs 'suit Indian conditions like excessive heat, lashing rains, poor roads, and rough handling/mishandling by illiterate users.' In this, Balaram's argument is an extension – in the specific context of the developing world of India – of Whiteley's (1993) earlier refocusing of design from style and economic success to need and human relevance.

There is a third, and subtly but fundamentally different definition. A little less than fifty years ago, Charles and Ray Eames (1958) recommended to the Government of India that designers from the to-be-created NID 'should be trained to help **others** solve their **own** problems. One of the most valuable functions of a good industrial designer today is to ask the right questions of those concerned so that they become **freshly** involved and seek a solution themselves.'

The Eames' definition seems more to do with the 'how' of design, rather than the 'what' of earlier definitions – but in this case, ends and means may not be easily separable. As with doctors, who are supposed to heal people, the way in which they approach the healing process could vary significantly, and in that could differentiate the excellent and holistic healer from the mere scientist/ problem-solver.

The Holistic Designer

There are three predominant definitions described till now – the 'commercially-led' definition of design, the 'socially relevant' definition, and the 'help-people-find-own-solutions' definition.

Rather than argue for one or the other definition, this paper suggests that it is necessary for the designer [and design educators] to accept all three as useful and necessary perspectives on what designers do, and how they should approach their work. Rather than get locked into debates of 'either-or', the design community should focus itself on cohesively integrating all three definitions.

Manzini (2003) has noted this evolution in the definition of a designer. "In the new scenario, the designer tends to be an operator who acts within a more complex network of actors (that may certainly include firms but not exclusively) where his main interlocutor … may be an institution, a local authority or any other social actor … he becomes a process facilitator who acts with design tools by generating ideas on possible solutions, visualising them, arguing them through, placing them in wide, multi-faceted scenarios …"

Many Indian design practices today hold organisations like IDEO as their role models. Young design students in India look up to people like Philippe Starck and Karim Rashid as the archetypes. However, they have to reconcile themselves to working within a societal and market context that is very different from the worlds that IDEO, Starck and Rashid inhabit. Their customers are different, the materials they use are different, the context within which their products are used are different – and all of these act to increase the gap between what Indian designers think they should be doing and what they actually end up doing.

To resolve this problem, it is clear that the Indian designer has to stop trying to be one or the other – what is needed in our country is for designers to encompass all the different definitions. They should focus on design that is creative and innovative, *and* which is relevant to our society and people, *and* which involves the community at large right through the research, design, testing and use phases.

Designers and Money

One of the often-heard woes of the Indian industrial designer is that there is no money in design in India. Viswanathan and Singh (2001) reported that "…Indian companies will need to change their mindsets – specifically, learn to pay for ideas."

This mindset change has not fully happened even now. At a recently concluded workshop [ID Catalyst, held at Srishti School of Art, Design and Technology, December 2004], one of the world's largest design firms [from Boston, USA] presented their best practices and methodologies to an audience of Indian practising designers. The Indian designers voiced their unanimous frustration that their services are not valued [read 'paid for'] as much as they were in other parts of the world. The American designers assured them that they faced the same situation many years ago; they had to educate their customers and thus facilitate the change in mind-set.

The bus-stop system design quoted earlier is a good example of this problem. The designer – Sandeep Mukherjee – has said that he made no money on the job, although he enjoyed it tremendously. Making a difference to people's lives was personally meaningful for him, but obviously there are limits as to how many such projects a businessman-designer can take up.

Even within the commercially led definition, designers can become the 'tool of the marketing profession – a clown, prostitute or stylist' [Whiteley (1993)]. To avoid this, it seems that the designer needs to be more than just a product-creator; she should be an educator, an evangelist, and a facilitator – to extend the understanding of design positively.

An additional factor to be considered in the Indian context is the small number of designers graduating each year. Between them, the premier design schools of India – NID and the IDCs at the IITs – churn out less than 250 designers a year. Compare this with the fact that 120,000 software engineers and 20,000 doctors graduate every year from Indian educational institutions. The miniscule number of designers means that the 'evangelist' role of Indian designers is of critical importance.

2 Educating Designers

Postman (1995) has talked of two problems to be solved in considering education. One is "an engineering problem… (that of) where and when things will be done, and how learning is supposed to occur." This problem, although complex, is, in Postman's reasoning, easier to resolve than the second problem – the 'metaphysical' one.

This second problem is the need for a reason, the *why* of learning and teaching. "…at the core of…schools (which have a clear reason why), there is a transcendent… idea that gives purpose and clarity to learning."

The vocational *why*

There are many possible *whys* that educational institutions can have. The 'vocational' logic is a powerful one for all educators across the globe; India is no exception. Of late, more and more educational institutions based on a vocational logic are emerging in India. In the design space, NIFT is arguably the more visible one.

NIFT's ideology seems to be to focus on creating a pool of vocationally skilled people [in the area of fashion/ textile design] who can feed the needs of industry.

'National Institute of Fashion Technology was set up in 1986 under the aegis of the Ministry of Textiles, Government of India. It has emerged as the premier Institute of Design, Management and Technology, developing professionals for taking up leadership positions in fashion business in the emerging global scenario. The Institute is a pioneer in envisioning and evolving fashion business education in the country…'

This is from their website; their leaning towards the 'commercially-led' definition of designer is crystal clear.

There are many arguments that support such a philosophy of design education. For one, it feeds the growing needs of an industry that directly contributes to the economy of the country, and for a developing nation like India such a contribution should not be undervalued. It boosts employment, since the vocationally skilled people who emerge from NIFT's portals quickly find jobs.

On the other hand, however, we must realise that "The god of Economic Utility is impotent to create satisfactory reasons for schooling" [Postman (1995)]. Postman does not believe that "One who learns how to be useful economically will have learned how to be an educated person." In the long term, "The making of adaptable, curious, open, questioning people has nothing to do with vocational training and everything to do with humanistic and scientific studies." Buchanan (1992) quotes Herbert Simon – "The proper study of mankind is the study of design, not only as the professional component of a technical education but as a core discipline for every liberally educated man." Clearly, design education has to be far bigger than vocational training to be really meaningful.

It is debatable whether NIFT's students 'taking up leadership positions in fashion business' will have the inclination or skills to be socially relevant, or involve communities in co-creating wealth. That is usually not the way of the 'corporate warrior'.

The professional *why*

As a counter-example, let us consider the Indian Institutes of Technology [IITs]. With the recent boom in Information Technology, and the number of Indians involved in this boom across the globe, the IITs have received much positive hype.

In contrast with an NIFT, the IITs are not explicitly concerned with the business side of engineering – their focus is pure and strong, on the discipline of engineering itself. They take pride in being best-in-class engineering teaching institutions, many of them having been ranked among the top five in Asia.

The following educational goals are taken from the website of IIT Madras, to illustrate the point:

The purpose of educational programmes in the IITs should be

- to develop in each student mastery of fundamentals, versatility of mind, motivation for learning, intellectual discipline and self-reliance which provide the best foundation for continuing professional achievement;
- to provide a liberal, as well as a professional education so that each student acquires a respect for moral values, a sense of their duties as a citizen, a feeling for taste and style, and a better human understanding. All these are required for leadership;
- to send forth men and women of the highest professional competence with a breath of learning and a character to deal constructively with issues, and problems anticipated in the next decade relevant to the programmes of development of our country.

Although these goals say all 'the right things,' a criticism of the IITs is that they create specialised, narrowly focused engineering professionals who are not entirely capable of working in areas that require people orientation and community involvement.

The Indian Institutes of Management [IIMs] face similar problems. The following words are from an unpublished paper titled 'IIM B – A New Vision' written by a reflective student as he left the institution:

> 'The education at IIM should help us evolve intellectually, emotionally, physically and spiritually. The more fundamental aspects of management training are "character" or "attitude" building, developing a mind-set for holistic, systemic thinking and recognizing skills for administration. However the current structure supports the development of only the professional dimension rather than the human dimension. It needs to address both these dimensions. Only then can we build a unique identity of an IIMB graduate'.

In all these examples, the schools concerned demonstrate their commitment to the vocational or professional theme in everything they do. The various stakeholders like students, parents, and industry understand this, and also align themselves and their expectations to the theme. This becomes a self-reinforcing system and there is little opportunity for critique and reflection, and little space for challenging one's own positions over time.

The *why* of design education

So, *why* should design be taught? Buchanan (1992) argues that design has grown "from a *trade activity* to a *segmented profession* to a *field for technical research*… to... a new *liberal art and technological culture*." More recently, Manzini and Jegou (2003) have said that "design activity… is a complex social learning process, a vast intertwining of initiatives in which we proceed through partial successes, errors and unforeseen effects, learning by experience. This *learning process* is also the result of… diffused design activity…"

Life has become complex. For example, even a small farmer in India is impacted by various forces from around the world – like global warming, global trade arrangements, the technology of genetically modified crops and seeds, global consumer patterns, shipping and storage systems and so on. Human activity now involves a multitude of disciplines; people who seek to work with this kind of complex activity as described above need to have an approach of integration across different skill sets, disciplines, sciences and so on. As Buchanan (1992) puts it, "The search for new integrative disciplines to complement the arts and sciences has become one of the central themes of intellectual and practical life in the twentieth century. Without integrative disciplines of understanding, communication and action, there is little hope of sensibly extending knowledge beyond the library or laboratory in order to serve the purpose of enriching human life."

This paper supports Buchanan's suggestion that design is one such 'integrative discipline' – and argues that this should be the underlying *why* of design education. Such a *why* leads to the emergence of design students who have an outlook that includes the practical, the creative, the social and the human elements so essential to the 'holistic' definition of the designer outlined earlier.

The *how* of design education

Design education, even in India, has historically taken very different forms from engineering education, or medical education. There is a genuine attempt by most institutions and individual teachers to build some level of integration, some multi-disciplining into the process.

For example, the NID website has the following to say about its courses:

> 'In the foundation programme, basic design courses are augmented by related studies of science and liberal arts, to help and develop an understanding of the Indian milieu and the relevance of design.
>
> The foundation programme is geared to inculcate the development of values, attitudes and sensorial skills necessary for any design specialisation. It aspires to create an awareness of the changing environment by constantly relating the students' learning to real life situations. The programme provides the necessary direction, stimuli, facilities and experience to foster creativity and thereby help individuals discover their own identity, ability and potential… It also makes students appreciate the multidisciplinary nature of design'.

This is clearly the 'right' direction to take [and the difference is perceptible between this statement and that of IIT Madras cited earlier].

Practically, however, the ground reality of design education in India is plagued by

- A paucity of good teachers;
- A very limited and shallow understanding of design pedagogy; and
- A lack of network among educational and other institutions that seriously limit [even prevent] any real multi-disciplinary exposure and learning.

If we were to consider a typical design curriculum – for example, from NIFT and NID – we would find a set of courses, subjects. Geometry, Environmental Exposure, and Type, for example, are discrete blocks that are supposed to tie in together, and it is then assumed that the student is a better designer. Skill building is usually the focus in the first year, and application through projects the focus in the later years.

As Buchanan (1992) has put it, "…Although these subjects contribute to the advance of knowledge, they also contribute to its fragmentation, as they have become progressively narrow in scope… and have lost connection with each other and with the common problems and matters of daily life from which they select aspects for precise methodological analysis."

In order for any institution to make real the idealistic picture of truly liberal design education, it must find and/or develop teachers who are passionate about the holistic *why* of design. It must also design curricula that foster learning through wide inquiry, not through narrowly defined subjects. And finally, it must network with a wide range of 'social actors' – business organisations, educational institutions from other disciplines, social organisations and perhaps even communities of people.

Postman (1971) clearly pointed out the importance of the teacher in the entire process – "Let us consider here the teachers, and especially the attitudes. We take it as axiomatic that the attitudes of teachers are the most important characteristic of the inquiry environment. This point is frequently passed over even by those who advocate the use of inquiry methods, but especially by those innovators who are in constant quest of 'teacher-proof' programmes and methodologies. There can be no significant innovation in education that does not have at its centre the attitudes of teachers and it is an illusion to think otherwise." The passion and philosophy and personal meaning that a teacher has are an integral part of the education process. This implies that design schools must, instead of advertising their courses, talk about the teachers, their philosophies, passions and interests.

Some principles of design education

Because design needs to be taught as an integrated discipline, a design institute must consider the following principles both for implementation internally, as well as for communication to the external world:

- It is about the individuals who are the teachers. For vibrant diversity, design teachers cannot be neutral; they must evolve for themselves their beliefs and values. Further, these beliefs must be transparent to the students and the institution. The institution must encourage, support and celebrate true diversity of beliefs and values within the teaching community.

- Design pedagogy must facilitate integrative learning. There are many changes that design institutions must take in their pedagogy, for example (a) create a culture that is not about right answers but about questioning, (b) must insist on students dealing with and being comfortable with ambiguity, (c) create programmes that facilitate co-creation of knowledge rather than a teacher-tells-student model, (d) focus on the method of inquiry using design tools/ skills more than the syllabus, and (e) realise that structure has limited use.

- The process must be multi-disciplinary. Learning must take place from different disciplines, contexts, and methodologies. The institution must network with agencies in other fields, so that students are presented varied experiences to learn from.

- Self-assessment. Students' work must first be assessed by themselves, and only then assessed by juries and expert faculty.

3 Design for Community and Self: A Case Study

With all of these issues as part of the background, a programme was launched at Srishti School of Art, Design and Technology three years ago. This programme was titled 'Design Lab' for want of a better name, and the first batch had five students. The author herself was the primary faculty; her beliefs, values and philosophies underpinned the entire programme.

As a designer, the author had to first verify whether it was possible for design skills to be learnt by students without recourse to structure. Whether truly a statement like "his lessons develop from the responses of students and not from a previously determined logical structure" [Postman (1971)] is possible in a design classroom. With the five Design Lab students, it was only partly true.

Perhaps if the students were exposed to this style of education from their schooling onwards, it would be possible to follow a similar methodology with design education. However, as de Bono has once said, "Our children enter schools as question marks and come out as full stops." There is too much focus on structure from junior school onwards, and it was difficult to get the students to abandon their past patterns of learning entirely.

A balance was required between structure and a thematic approach based on student interest. While a student of the same year [but not in the Design Lab] was doing a course on Type in Visual Communication, and a Furniture Design student was doing a course on Storage Design, Design Lab students were working on a strategy for engaging crafts communities in developing new designs.

The Design Lab students had to create visual material that was structured to teach craftspeople design principles and then had to engage with the craft community and actually help co-create new products for them to produce and market.

Both the process and the end product of this exercise were not pre-determined. There was a lot of ambiguity; the students experienced frustration and challenge but the learning was authentic, significant and 'their own.'

Usually design students are sent out for an internship in their third year of study. The Design Lab students were placed at different locations of their interest in the first year itself. This helped them get a first-hand understanding of the real world early in their education; as their teacher, one had to get over the fear that they would mess up their internship as they were too young and inexperienced. Of course, the people they worked with had to be briefed that the students were in their first year, and therefore adapt their expectations suitably. It worked.

To help create multi-disciplinary learning environments, we did two things:

The Design Lab students attended a course at the Centre for Society and Cultural Studies [CSCS]. This course gave them inputs on liberal arts, and because it was not a part of Srishti's structure, they were interacting with students of a completely different background, which in turn significantly helped their thinking quality. Even within Srishti, they took courses but with students of other years – both junior and senior to them in vintage.

They also worked with a post-graduate design school [NTTF] and the Indian Institute of Science [IISc] on designing products that were of social relevance, like a solar water purifier, an energy-efficient stove, a composter and so on.

This was a logistical nightmare for the teachers – matching timetables, transportation, classrooms, assessment and other elements of teaching were very difficult. The experience, however, was extremely beneficial to the students because they had to learn to work across disciplines, with unfamiliar team members, and yet co-create knowledge.

In the second year, Design Lab students were asked to evolve their own [individual] lines of inquiry, and set up their own timetables and their own deliverables. Although this is not traditionally seen as a viable undergraduate teaching practice, but with the Design Lab students the results were very positive. They took complete responsibility for their own learning, did not whine about the system, the institution, lack of resources and so on that are so often heard in the cafeterias of undergraduate schools. These students were hugely passionate about the area they would like to immerse themselves in further. We introduced film making as a discipline simply because three of these students had identified this as an area of passionate interest.

A final point about the Design Lab was that students assessed their own work, in addition to the conventional jury processes of design teaching. This resulted in the students acquiring an ability to be self-critical with integrity and no loss of confidence – an ability that will be essential for them as practitioners later on.

We achieved certain breakthroughs with the Design Lab, but we also realised that we could not completely abandon structure. More importantly, we realised that because we had not articulated our position on the role of the designer and the philosophy of this course with total clarity, students were unable to give up their notions of designer-as-product-creator, or designer-as-stylist. They felt safer and more comfortable with more traditional notions of learning skills and mastering techniques although within this relatively more 'open space' of Design Lab.

So, the next year a modified version of Design Lab called Design for Community and Self [DCS] was introduced by the author. The big difference now was that process, context and sustainability were emphasised over traditional notions of skills and techniques. The attitudes and values related to dealing with ambiguity, inquiry, and engagement with multiple dimensions of design and community and the individual student.

DCS students – allowed to join this programme from different disciplines – worked on a project called the Tamarind Tree Project. This project needed them to research, create content and visualise a website that would help people build eco-friendly homes in Bangalore. Skills on web design and layout were provided through courses but the project was the contextual anchor. Students worked with NGOs, architects and homemakers to discover the real stories behind decision-making in this process. They interviewed people, collected samples of materials, researched eco-friendly practices especially related to buildings, and then designed the website.

They contrasted this process with a sub-project in which the content was clearly defined and easy to deliver, again with the same web medium. This gave them a feel of the traditional perspective of design and the role of designer, and helped them clarify for themselves where their individual preferences lay. As Handy (1997) has said, "It is inadequate to borrow beliefs… we have to work them out for ourselves."

Some of them, as a result, chose to take the conventional path by opting for the Visual Communication course the following year, while others wanted to continue with the inquiry method of constructing their own timetables, their own projects. Some of these students were part of a project to create an 'Eco Directory' for Bangalore, along with four new entrants from the first year.

4 Conclusion

Clearly, students come in all shapes and sizes. Their abilities, expectations, beliefs and values must be taken into account by any responsible educational institution. While an institution may seek to challenge the educational status quo, it must also provide space for people who are not yet ready to make that change.

At Srishti, although we offer the risk-averse students a more traditional approach to design education, we would like to believe that we are engaging with new ways of teaching design, to a breed of designers whose role we believe will be very different from that of the past.

Our approach to design is that it should not be fossilised, and that design education should not be a monoculture. By exploring new ways to teach design, we are learning better ways to help students, teachers, practitioners and the community at large balance and integrate the various interpretations of design – whether *market-led, society-based* or *to help people find their own solutions.*

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Curriculum Integration in Design and Human Environment

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Curriculum integration enables students to understand connections among disciplines and to begin to develop a holistic knowledge base. The purpose of this paper is to discuss a departmental curriculum integration process, its results, and its effectiveness as evaluated by faculty and students in the department. Pedagogical and administrative goals influenced the curriculum integration that took place in both graduate and undergraduate curricula. Integration resulted in minimizing the department's curricular overlap and created a stronger department both visually and politically. It provided the opportunity for faculty and students to understand more about the other subject areas. Integration was least successful in a process oriented course and among process oriented students. It is suggested thinking about integrating courses for departments will be most successful when faculty are supportive and enthusiastic about the integration process. Two case studies are presented.

Keywords: *design curriculum, human environment*

1 Introduction

Academia has often separated ideas into somewhat arbitrary divisions of knowledge or disciplines (Thornley & Graham, 2001, p. 32); however, in the world that academicians study, phenomena exist "as a complex system of interdependent parts" (Bubloz & Sontag, 1988, p. 4). Neither a fully specialized nor fully holistic approach is the optimum solution. Both specialized inquiries and integrated approaches are necessary to understand how the world works, how the parts relate to the whole. There is national recognition that learning is fragmented, and a holistic approach to curriculum development provides a positive benefit to students. Integration enables one to relate "discoveries in one's own field to the greater body of knowledge" (Kellogg Commission, 2001, p. 29). Curriculum integration provides the ability to "see the connections with and between disciplines . . . to develop increasingly sophisticated understandings and make better sense of [the] world" (Thornley & Graham, 2001, p. 31). Compton (2002) reports that when curriculum integration "is done in parallel or in collaboration with other disciplines, a sort of synergistic effect occurs: students begin to make meaningful connection between fields and form a holistic approach to knowledge" (p. 449).

In academic departments in the United States apparel design, textiles, interior design, housing, and merchandising have frequently been combined into academic departments, particularly in colleges of human ecology, family and consumer sciences, and related colleges. When these subject matter areas are administratively combined it is often in name only. However, these four areas are related both theoretically and practically. Cultural influences are limited to neither dress nor built structures; all areas of the human environment are influenced. Human behaviour does not only take place in interiors, individuals make behaviour decisions about all aspects of their environment. In the fashion business industries often produce both apparel and home fashions. As Hudson (1978, p. 2) states, "There are overall trends and phenomena affecting industry as a whole, not individual sections of it." The purpose of this paper is to discuss a departmental curriculum integration process, its results, and its effectiveness as evaluated by faculty and students at one institution.

2 Curriculum Revision

In the early 1990s the Department of Design and Human Environment at Oregon State University in Corvallis, Oregon, USA, revamped its graduate curriculum. This occurred as part of a revision of the graduate program and development of a doctoral program. This occurred during a period of tight budgets. The faculty realized that they would not be granted additional faculty positions and developed a graduate curriculum that, while not placing an undue burden on faculty workloads, had pedagogical merit. In the late 1990s the department revamped its undergraduate curriculum because of a perceived need on the part of the faculty to update the curricula. In both revisions department faculty developed an integrated core of undergraduate and graduate courses (i.e., courses that covered specific subject matter areas across the three product areas of apparel, interiors, and housing). While resources were not expanding and students' numbers were staying steady or increasing slightly, the decision to consider and then to implement the undergraduate integration was not economically based. This department-wide integration was completed for both pedagogical and administrative reasons and was fully supported by all faculty. The department-wide administrative goals were to minimize curricular overlap, to create a stronger department visually and politically, to unify department content visually for political purposes, and to maximize teaching resources to reduce teaching loads or enable other subjects to be taught.

While the curriculum integration was administratively a politically strategic move, without pedagogical merit it would not have been a wise curriculum change. However, since apparel, textiles, interiors, and housing are all part of the material near environment, the decision to integrate across these subject matter areas was logical. The pedagogical goals were to integrate multiple courses taken by apparel, interiors, housing, and merchandising majors that covered the subject matter areas of aesthetics and design, cultural aspects, historical perspectives, and human behavior. The using of selected foci, problems or themes, such as aesthetics and design or a human behavior, is an approach suggested by Bubolz and Sontag (1988, p. 4) in which central themes are used to build an overview. In each of these areas the goal was to help students understand the commonalities across the subject areas (i.e., across apparel, textiles, interiors, and housing). At the graduate level the integrated courses[1] are Aesthetic and Perceptual Theories of the Near Environment, Human Behavior in the Near Environment, Historic/Cultural Theories and Methods of the Near Environment, and Theory Development. At the undergraduate level the integrated courses are Introduction to Aesthetics, Cross Cultural Aspects of the Near Environment, Research in the Cross Cultural Aspects of the Near Environment, and History of the Near Environment (the last two courses are cross listed for both upper division undergraduate level and graduate level students).

All of the faculty in the department were involved in the development of the undergraduate and graduate level integrated courses. Specific faculty indicated they were willing to take the lead in the development of the individual courses. These faculty members contacted the other faculty in the department for their input and also for suggestions on specific resources such as slides and other illustrations, books, review articles, and seminal research articles in each of the fields or readings. Involvement of the department faculty is ongoing. Faculty members continue to share resources

and other ideas relevant to the integrated courses. Additionally, when the individual graduate courses are taught discussions are initiated with faculty in the various areas to make sure that the most recent research is included.

3 Case Study: History of the Near Environment

Pre-integration

Prior to the undergraduate curriculum revision the department had seven Euro-American history courses: history of textiles, history of apparel (ancient times to the end of the 19th century), twentieth century fashion, two history of interiors courses, and two history of built structures courses. Across time periods one can find similar or identical influences shaping built structures, apparel, interiors, and textiles. And, not infrequently, a specific part of the near environment shapes another part. During the curriculum revision the idea of integrating the history courses was discussed – offering two sequential history of the near environment classes. While there was not initial unanimous accord, eventually the faculty agreed that the pre-20th century history courses should be integrated leaving one 20th century apparel course and one 20th century interiors and built structures course. This resulted in the number of history courses being reduced from seven to four.

Course Development

In order to meet the needs of each area directors of each major were contacted and asked what historical learning outcomes their students needed. A number of history books in each area were reviewed to determine design periods and important designs of the sub-areas of the near environment.

A chronological outline was developed to fit two 10-week term courses. The Renaissance became the dividing point. The first course begins with a discussion of the Mesopotamian near environment and ends with the Early Renaissance (defined as Italy through the 15th century). The second course begins with the Early Renaissance and ends at the termination of the 19th century. The students take an additional course either in apparel or interiors/built structures on the 20th century and early 21st century.

The Courses

One of the main learning outcomes desired by the faculty was that students would come away with an understanding of some of the forces driving design, adoption, and use of near environment products. A socio-cultural framework was used to organize the course. This framework is part of the initial course discussion for each of the two courses. The framework is also applied across time. Students learn about societal institutions and processes and cultural ideology for each time period and the resultant influence on the near environment using a modification of the ideas proposed by Hamilton in 1987.

Additionally, during the first week of the first course historical methods are discussed. Periodically, throughout the term, methods and historical resources are discussed as relevant to the time period under discussion.

Results

In addition to the reduction of the number of history courses offered in the department, a specific perceived benefit of the integrated history courses is an appreciation on the part of most students for learning about history across the near environment. Not all students share this appreciation, generally, for any one term there have been a few students who expressed their frustration at not having a "pure" history course devoted specifically to their major area.

To try to alleviate this frustration, subject-matter specific term projects were developed. Different projects have been used over the several years the courses have been taught. Projects include developing a time-line of a specific product across time (e.g., a chronology of garments, chairs,

staircases, textile motifs, etc.); poster presentations on specific areas for specific time periods (e.g., 17th century interior furnishings, early Renaissance apparel, etc.); and notebook portfolios containing outlines of historical influences and illustrations of the resulting designed products. Department faculty are invited to the poster sessions, which keeps them in touch with the course content.

One difficulty that remains unresolved at present concerns the course textbooks. Currently, students use three individual books: history of apparel, history of interiors, and history of built structures. The cost is high, and some repetition in the discussion of socio-cultural influences is inevitable. However, since history of the near environment is not a common topic, this particular problem may not be resolved in the near future.

4 Case Study: Human Behavior and the Near Environment

Pre-integration

Prior to the integration of courses at the graduate level, the department offered a one graduate level clothing and human behavior course. As the instructor taught and conducted research in clothing and human behavior, she became aware of related research in the interiors and housing fields. Many of the general theoretical frameworks (e.g., social cognition, symbolic interaction) that guided the research were the same.

At this same time, two department administrative strategies further encouraged the integration of the courses. The first strategy was the redefinition of graduate level areas of concentration across subject matter areas as the department expanded its graduate offerings to include a doctor of philosophy degree. The four graduate level areas of concentration were: historic/cultural aspects of the near environment, human behavior and the near environment, design, and merchandising management. With the redefinition of the graduate areas of concentration, courses that supported each area were developed.

The second strategy was to explore ways of increasing enrollments in graduate level courses. Enrollments in graduate level courses were being reviewed, and there was pressure to drop low enrollment courses. Integration of graduate courses would increase enrollments as students from across subject matter areas enrolled in them.

Course Development

The outline for the existing graduate level clothing and human behavior course was used as the beginning outline for the master's level integrated human behavior and the near environment course. Faculty in the various subject matter areas were contacted for books, review articles, and seminal research articles in each field. Research in all of the fields was organized around social theoretical frameworks (i.e., symbolic interaction, social cognition, impression formation, social comparison, role theory, social identity theory, conformity theory). A readings packet of theoretical and research articles was developed.

An overview of each theoretical framework is presented with research in each field included for students to read, review, and present. Students have the option of reading and reviewing research articles specific to their field or of reading work across fields. The formal project is a team research project. Students are provided with a consumer behavior research issue that can be applied to apparel, interiors, or housing (e.g., colour names in catalogs, celebrity licensing of products). They develop a research question, collect data to address the question, and present their results.

The doctoral level integrated human behavior and the near environment course focuses on research methods applicable to various subject matters and "hot topics" in each of the fields. Students write and present a research grant proposal. Students are encouraged to write a proposal specific to their subject matter area. Topics for the proposals have included affordable housing, non-store retailing, material culture research in archeology, categorization related to consumer behavior, and ethical decision-making.

Results

As with the history courses, the primary perceived advantage of the integrated human behavior courses is students' increased awareness, appreciation, and interest in human behavior research across subject matter fields. Students often comment on their expanded knowledge and application of the social science theories presented in the course.

The biggest challenge with the courses is for the instructor in keeping up with the research in all of the fields. This process has its disadvantages in that the instructor is not as well-acquainted with the literature in all of the fields, and important research articles in fields in which she is less acquainted may be missed. To meet this challenge, each time the courses are taught, recent issues of select journals in each of the fields are reviewed and discussions initiated with faculty in the various areas to make sure that the most recent research is included. In addition, development of a readings packet that provides a balance of general theoretical articles and subject matter-specific research articles has been a challenge so that students in each of the areas read and review similar number and type of research articles. This challenge is met by using other faculty members' suggestions and a careful review of the packet.

5 Curriculum Evaluation

Faculty, graduate, and undergraduate students in the department were the appropriate purposive sample to evaluate the effectiveness of the curriculum integration. It was important that participants have experience either as a faculty member who teaches or who had been involved with the curriculum development of one or more integrated courses or as a student who had taken one or more of the integrated courses. All department faculty were invited to participate; 5 faculty were interviewed (N = 6, 83%).[2] All graduate students who were currently enrolled were invited to participate; 8 graduate students were interviewed (N = 12, 66.7%). Students in a senior level, capstone course were purposively selected and invited to participate in the study. Forty-one undergraduate students participated in the study.

An initial email announcement was sent to the faculty and graduate students inviting them to participate in the study. Interviews were arranged for those who responded and expressed an interest in participating. Individual faculty and graduate students who did not respond by email were contacted in person by the researchers and invited to participate. Interview times were arranged for those who wished to participate. Undergraduate students in the capstone course were invited to participate in a focus group session during a class period.

The goals of the evaluation were to reveal (a) the degree of perceived integration and (b) the perceived success of integration regarding minimizing curricular overlap, maximizing resources, and development of a stronger department. Semi-structured interview and focus group questions were developed to measure the goals.

Faculty were asked the following questions:

1 Do you feel we have been successful in maximizing our resources via offering integrated undergraduate and graduate courses?
2 Is the department stronger and more integrated as a result of the integrated courses?
3 Have we been successful in minimizing curricular overlap?
4 Are there other benefits to our curriculum integration? If yes, please discuss.
5 Are there disadvantages? If yes, please discuss.

Graduate students were asked:

1 What are the integrated courses that you have taken as a graduate student?
2 Did integration take place? How?
3 Did students understand the commonalities among the areas?
4 What do you see as the benefits of the integrated courses?
5 Are there any disadvantages? If yes, please discuss.

Undergraduate students were asked:

1 What integrated courses have you taken? (Note. Students were provided with a list of integrated courses and the following definition to help them answer this and the following question: Integration is the bringing together of parts into a whole. In the context of the apparel, interiors, and housing separate subject areas, the bringing together of the different major areas to demonstrate the commonalities among the areas, all of which are parts of the near environment.)
2 In your opinion did integration among the housing, interiors, and apparel content areas take place in the course(s) you took? If so, how?
3 Did you understand the commonalities among the areas?
4 What commonalties among the content areas were highlighted in the course (s) you took?

6 Evaluation Results

Degree of Perceived Integration

In general, graduate students who have taken one or more of the integrated courses are able to understand the commonalities across apparel, interiors, and housing. For graduate students who had taken two or more of the integrated courses they felt some were more successfully integrated than others. Part of the reason for the variation in success was attributed to the specific instructors. In discussing the integrated courses, one graduate student discussed a benefit she gained was that upon graduation she would have a broader knowledge base. Graduate students who had taken integrated courses in which both undergraduate and graduate students were enrolled felt that the graduate students were more successful in understanding the commonalities among the areas than were the undergraduate students.

Undergraduate student comments varied regarding the success of the integrated courses. Many of the comments were course specific. In the CAD course (a process-oriented course) generally students did not feel integration had taken place. They found it difficult to see common needs between apparel design CAD needs and interiors and housing CAD needs. This feeling was also echoed by one of the design faculty members. In the aesthetic, cross cultural, and history of the near environment courses (content-oriented courses) many students felt that integration had taken place, and they were able to see the commonalities. In one case, a student stated that the integration had been successful, but "it seemed like killing four birds with one stone, and not very beneficial to us." Other students did not see the integration and did not understand why they had to learn about other subject matter areas: "Why do we need to know about houses . . . when we're merchandising [students]?" These last two comments reflect a definite difference between undergraduate and graduate students. Many undergraduate students are very career-focused and intent upon their specific major. They expressed dislike at having to take anything that they did not perceive as directly and specifically relevant to their specific career goal be it housing design, interior design, apparel design, or merchandising. Such comments came mainly from the merchandising majors (a process oriented major).

Perceived Success of Integration

The faculty and department-wide goals related to curriculum integration were met. All five faculty members felt that the department had been successful in minimizing the department's curricular overlap. While a few faculty thought there might still be some curricular overlap, they felt the current curricular overlap was minimal and resulted in the reinforcing of critical ideas for the students. One faculty member thought that it was still possible to further integrate the graduate curriculum.

While all five faculty members felt that department resources had been maximized regarding the integrated courses, several faculty members commented that the department still offered too many courses. Further integration may be possible in the future. With regard to the maximizing of resources, a graduate student commented on the maximizing of faculty time.

Regarding the success of creating a stronger department both visually and politically, generally the faculty responded in the affirmative. The names of the courses and the course descriptions create visible evidence of the links across the department's subject matter areas which in turn add political strength as the department is more easily seen as coherent and as maximizing resources. The integration created new relationships; one faculty member stated, "I think it created some relationships, we have further to go." These new relationships add political strength both within the department and to the department's interactions with other university units. Another faculty member felt that the integration had strengthened the students' understandings of the different majors, which adds strength to the department. A third faculty member commented on the ability for the instructors teaching the integrated courses to be spokespersons across the four major areas due to their increased breadth of knowledge.

Graduate students also commented on the benefits of the integrated courses to themselves and the department. Several graduate students commented on the benefits they received beyond the pedagogical goals. One student commented on the availability of a variety of subject matter areas in poor economic times. Several graduate students felt it was a positive experience to get to know the graduate students in the other major areas. One stated, it "allows interaction with peers, doesn't hurt to learn other areas; may find new research areas due to interaction and learning about another field."

7 Conclusions and Implications

Integration is viewed by both the faculty and graduate students as successful. Although there were some undergraduate students who both appreciated and understood the pedagogical reasons for the integrated courses, the general undergraduate reaction was a desire for more focused one subject-specific courses. This was particularly true for one integrated process course, CAD, and for the more process-oriented major, merchandising. This is an interesting finding. While design majors in general were more favorable and accepting of the integrated aesthetics and design, cross cultural, and history courses, it is design majors who take the CAD course. Merchandising students are in a process-oriented major; they were least accepting of the integrated subject matter courses. It appears that for specific tasks, actions, or operations such as one finds in CAD and merchandising learning these tasks or operations is less comfortable and possibly less successful when a broader student body is present and the task is thus presented with broader, less specific examples. This is a finding that deserves further study.

In general, undergraduates found the integrated courses less successful and desirable than either the graduate students or the faculty. Given that undergraduates are focused on their specific career goals this is not a surprising discovery. It is not, however, a finding that should lead us or other departments to re-think the benefits of integration. Alums often remark on the benefits of certain courses that they only perceived after several years of working in their profession. It is our feeling that the same will be true of the integrated courses.

In our department there was a buy-in from the faculty concerning the development of the integrated courses even though some faculty were more understanding of the nature of the integrated courses than others. Integration is not something that comes naturally to all; some individuals appear to naturally see the linkages among subject matter areas more than others.

There are a number of motives for integrating courses. Curriculum integration is not easy, and for it to be successful the primary reason for curriculum integration needs to be pedagogical. In our department we were interested in creating a stronger curriculum, enabling our students to see the linkages among the subject matter areas, maximizing resources and minimizing curricular overlap. Though there were economic benefits, this was not the primary goal. If curricular integration is perceived to be the answer to economic troubles it is still important to look for pedagogical links prior to developing integrated courses.

For departments and colleges thinking about integrating courses it is important to recognize the individuals who are not comfortable with the idea of integrating across subject matter areas. These individuals should not be asked to develop or teach an integrated course. Even for those who understand the benefits and can see the linkages and rewards, integration of subject matter is difficult and time consuming.

One process that might be used would be to begin by identifying the areas in which there are links between the subject matter areas, looking for what they may have in common. For example, there may be courses that include discussions of design elements and principles or courses that focus on cultural aspects. As part of the discussion on curricular links individuals need to be identified who can easily see these links, are comfortable thinking outside their traditional subject matter area, and are willing to develop integrated courses. "Integrated does not mean that one needs detailed information about every specialty… What integration does imply (or requires) is that we possess the means to take information from various specializations and place it with a coherent framework" (Moran & Imig, 1988, p. 22). Asking an individual who is not comfortable with integration to be involved in the process will result in a less than successful course.

All faculty need to be involved in the process at some level. The course developers need to be able to work with faculty from other subject matter areas, so an additional step would be to receive from each faculty member their willingness to help the course developers in understanding the various subject matter areas. All faculty can be part of the process, and curricular integration will be most successful when faculty are willing to share ideas and resources both in the development stage and after.

In 1988, McCullers stated that if we wish for better integration, "We will clearly need to increase the flow of theoretical and research ideas across the subject matter areas" (p. 20). While he was advocating for a single theoretical framework across the family and consumer science subject matter areas, his quote is relevant to the subject at hand. Academic integration is not only being advocated for its administrative benefits, it is being advocated because it is a way of placing one's subject matter area within the whole that makes up our world. While this is generally a goal of most programs, we believe that students who are provided the experience of integrated courses will, via these courses, see linkages that are not always easy to see. It is not only our students who will benefit by integration across the subject matter areas. We as faculty and individuals will benefit as will our research and theory and the world around us.

Notes

1 *Integrated courses* are individual courses in which integration has occurred across several subject matter area – the case studies are an example of this. *Integrated curriculum* is when a department/academic unit has several integrated courses.

2 The total number of faculty in the department is 8; this includes the two manuscript authors who were the interviewers, not the interviewees.

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Education of Interaction Design – an Interdisciplinary Approach

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The field of interaction design is multidisciplinary in nature. A professional interaction designer needs to take the central responsibility towards all creative aspects of an interactive product. This alone can ensure that well-designed interactive products will emerge with conceptual integrity that proceeds from the thinking of one mind. Education of interaction design therefore needs to be multidisciplinary.

The Industrial Design Centre (IDC) in IIT Bombay has had an interdisciplinary approach towards design education for several years. The results of this approach have been very effective for the field of interaction design. In this paper experiences of this approach are shared and an agenda for future work towards strengthening the multidisciplinary nature of interaction design education is suggested.

In the past few years we have seen the emergence of institutes dedicated to interaction design. We have also seen some universities starting programs in usability or information architecture without sufficient inputs from design. We believe that both these approaches are not appropriate and have the danger of producing lopsided professionals with a limited view of the possibilities.

The future will see the birth of a new profession, based in design, but drawing additional strengths from several fields. Design schools offering programmes in interaction design will do well by becoming more interdisciplinary and finding ways of developing well-rounded professionals for this future.

Keywords: *interaction, design, education, multidisciplinary*

1 Introduction

Interaction design is a multi-disciplinary field.

In the context of design schools, interaction design is informed by two fields – visual communication design and product design. Additionally, it draws from many areas that have been traditionally allied with design – ergonomics, human factors, cognitive psychology, writing and rhetoric, advertising, anthropology and ethnography.

In the industry, this field is also influenced by and depends deeply on fields that have traditionally not been close to design – computer science and engineering, software engineering, electronics, library sciences, information sciences, operations engineering and business process re-engineering.

In job listings, interaction design is often confused and used interchangeably with overlapping disciplines – usability engineering and information architecture. Other job titles appear occasionally, with expectations very similar to those from an interaction designer – user interface designer, usability designer, GUI specialist, user experience designer etc.

2 Design by Committee – Taming the Interdisciplinary Beast

"Conceptual integrity [of a product] dictates that the design must proceed from one mind, or from a very small number of agreeing resonant minds." [a]

An analogy has been drawn between the making of a film and the design of an interactive product [b]. Both fields are inter-disciplinary and require creative people with varied backgrounds to work together. Film-making is a mature field with a language of its own that has evolved over a hundred years and many generations of film-makers and film-viewers. There is a lot that interaction design can learn from its mature cousin.

How do film-makers avoid the problem that plagues interdisciplinary fields – the design-by-committee phenomenon? The answer lies in a 'central creative ownership'. The director of a film has absorbed enough of at least four professions – script writing, cinematography, acting and editing. Script writers, cinematographers, actors and editors are all creative professionals and do make significant, at times brilliant, individual contributions towards the success of a film. But essentially, the director is the person responsible for all creative aspects of a film during its production. He is the *film-maker.*

Such central characters have evolved in many mature fields where multidisciplinary teams of creative individuals need a way of working together – the surgeon in an operation theatre, the captain of a sports team, the captain of a ship, the conductor of an orchestra.

There is a need for a profession, a role, which takes complete creative ownership during the development of an interactive product. When the field of interaction design matures, such a central character will emerge. Conversely, when we start getting well-designed interactive products with conceptual integrity that proceeds from the thinking of one mind, we can say that the field of interactive product development has matured. For the purpose of this paper, let us call a person with central creative ownership of an interactive product the '*interaction designer*'.

Please note that just like in films, creative ownership in interaction design does not imply legal or financial ownership. Nor does it imply a position of authority or management – the authority to determine the salary of an individual for example or the capability to manage conflicting schedules.

Such an interaction designer needs to work with a multidisciplinary team. He needs to understand enough of each discipline, to make sure that each individual in his team has the freedom to flower. He has to ensure that the overall product is emerging fine, with the desired impact on end users and with a central creative vision. Education of an interaction designer, therefore, also needs to be multidisciplinary.

3 The Interdisciplinary Approach in IDC

In the 1980s, people involved in the design of interactive products typically came from training in cognitive psychology and human factors for many years. This was particularly so in the USA and Europe. Only recently have designers ventured into this area. In India, by contrast, the professional community in this field was clearly dominated by designers, even from the early stages.

One reason for this can be attributed to the design education in India – it has been largely broad-based and in a multidisciplinary atmosphere. As an example, I cite below the multidisciplinary approach of the Industrial Design Centre (IDC) to design education in general and specifically to the education of interaction design in recent times:

Location

To start with, location of IDC plays an important role. IDC is based in the Indian Institute of Technology, Bombay – a leading technology university in India with all leading branches in engineering. IIT Bombay also has a leading management school and an active department in humanities and social sciences. Future designers, engineers and managers rub shoulders regularly – in the library, in the hostels, at extra-curricular events.

Input

The post-graduate programme in IDC invites graduate students from engineering, architecture and arts – so each class is necessarily made up of people from multiple disciplines. In group activities, students learn work with each other's strengths. In individual activities, students learn a lot about the alternate approaches from the discussion of their classmates' work.

Education

In IDC, design is considered to be goal-driven, creative problem solving process. Emphasis is shared between design process, concepts, sensitivity and execution skills. In addition to design, students get inputs in allied areas such as ergonomics, cognitive psychology, semantics and communication theory. Students are encouraged to work in areas of unmet demand, to explore new and emerging areas. After a grounding in theories, the education in IDC is driven by assignments and projects. Open discussions are held during and at the end of the projects to invite criticisms from multiple perspectives on the decisions taken in the design process.

Combined Course

Since the year 2000, IDC has been conducting an elective course in human-computer interaction design [c]. The course is jointly attended by postgraduate students of design, engineering and management and undergraduate students of engineering. The course requires students to execute assignments and projects as multidisciplinary teams. In the last five years, the elective has grown in popularity.

Inter-disciplinary Research Collaborations

The research activities in IDC draw upon collaborations with technology disciplines that a leading university like IIT Bombay offers. The work in interaction design in particular has collaborative projects between IDC and the Kanwal Rekhi School of Information Technology and the Department of Computer Science [d]. Design faculty members have also supervised projects of students from computer science and information technology disciplines.

Interaction between Students and Professionals

IDC organizes workshops on human-computer interaction design where professionals from the industry and design students work together on design problems. In other workshops they explore techniques such as contextual inquiry and usability evaluation methods. Such workshops have been mutually beneficial for students and the working professionals, as they gain multiple perspectives on the same task from each other.

4 The Experience

The experience of the interdisciplinary approach to interaction design education in IDC has been encouraging. The interdisciplinary exposure enabled IDC students to enter early in this emerging field. By 1987, some IDC students were already selecting their masters' thesis project related to user interface design. These graduated to become some of the early professionals to make a mark in Indian and international scene.

The multidisciplinary exposure gears up students to tackle design problems with a holistic approach and to make things work in the practical constraints of industrial situations. It also helps in spreading design awareness among other disciplines within IIT Bombay and among the industry professionals. Research benefited as projects that could not have been carried out independently in either disciplines became possible.

However, there have also been some speed bumps in this experience. Interdisciplinary activities are usually outlines to mainstream activities and, at times, tend to fall in cracks. Progress in research or academics in an interdisciplinary activity may not always count as progress under the yardsticks of either of the mainstreams. Progress is harder and slower, as researchers from both sides try to

understand each other. These barriers however were not too hard to overcome. On the whole, the experience has been positive and rewarding for both research and academics.

In the past few years we have seen the emergence of institutes dedicated to interaction design. We have also seen some universities starting programs in usability engineering and information architecture, expecting the graduates to be responsible for the design of interactive products, but without sufficient inputs in design.

Our experience shows that both these approaches are not appropriate and have the danger of producing lopsided professionals with a limited view of the possibilities. Students learn a lot within the class as well as with interaction with other students. I believe that a one-dimensional input may be inadequate to enable a person to take on the entire creative responsibility of an interactive product.

Some of the turf-wars recently witnessed in the industry and on professional forums remind one of the story of the six blind men and the elephant. These turf-wars seem to have their roots in the 'purist' approach to education of interaction design.

5 Future Work

While there have been some achievements, a lot still needs to be done. Here are some of the things that are on the agenda towards more multidisciplinary approach in interaction design education in IDC:

- We are working towards a dedicated post-graduate program in interaction design. The proposed curriculum in this new program is an attempt to conduct a specialized program while retaining the multidisciplinary character. This is being attempted by retaining the core courses in traditional design, specialized inputs relevant to interaction design and a greater flexibility of a large number of electives.
- We seek additional inputs to interaction design students in the areas of computer science and software engineering, with a particular emphasis on boundary objects and techniques between software engineering and interaction design.
- We seek additional inputs in the areas of management. This pertains not only to project management, but also areas like service design, system design and entrepreneurship.
- In addition to more combined courses across disciplines, we seek joint masters level thesis projects between design, technology and management students.
- We seek buy-in from more participants – faculty members, researchers, students and industry professionals – towards the advantages of interdisciplinary approach to interaction design education.

6 Conclusion

The future will see the birth of a new profession, based in design, but drawing additional strengths from several fields that inform the development of interactive products. Experience with a multidisciplinary approach to education in design has been fruitful so far. Design schools offering programs in interaction design will do well by becoming more multidisciplinary and finding ways of developing well-rounded professionals for this future.

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New Design Curricula for a Changing Artefact World

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Today design theory and practice are faced with new and old questions which need to be examined in a new light. The questions primarily concern changes to the context in which design operates (technological, social, cultural, economic, and environmental). In many cases these changes have taken place very rapidly. A few examples are: widespread diffusion of information and communication technologies; changing global economic conditions and deep intercultural connections; worldwide diffusion of production locations; increasing importance of environmental problems. At the same time all these changes make up and take part in the existing and lasting world of artefacts. Therefore, we must deal with the new design problems without disregarding the old ones and with the use of traditional design tools.

The consequences of this new design view deeply affect issues such as: the relationships inside the design field (product, communication, architecture); the relationships between design and other neighbouring fields (arts, technologies); the substance and suitability of emerging design sectors (service design, components design, interface and interaction design); the relationships between design research and education; the relationships between design schools and local industries and production systems; the significance of local design traditions and their renewability.

How can design curricula prepare future professionals and scholars with the ability to understand the changing world and to "learn to learn by doing"? To what extent are important models in traditional design education like Bauhaus and HfG Ulm still helpful? What are the present day roles of design education's milestones like "basic design"? This paper is an attempt to answer some of these questions and shows a series of case studies of the new integrated design curricula developed by the Università Iuav di Venezia (Bachelor, Master, PhD, professional training degrees).

Keywords: *design education system, changing artefact world, persisting design tools and models*

Introduction

Industrial design's main mission continues to be that of designing industrially produced artefacts and helping to define the contemporary material culture. In other words, a principal goal of the design field is to give concrete form to the most important problems and solutions presented by artefact users through the definition of the formal, cultural, performing and symbolic characteristics of artefacts, as well as of those features defined as technical-economic, technical-constructive, technical-systematic, technical-productive and technical-distributive. On a general level there is not much that is new and one can presume that the conceptual and methodological "tools" a designer need possess are valid still today. Valid also are the results from academic experiences in the design field and the teaching models presented by such important design schools like Bauhaus and HfG Ulm.

Nonetheless, this is only a part of the whole truth. Significant and rapid changes are clearly taking place in certain design frameworks. These changes signify daily challenges for design innovation and the respective academic studies. Today's design curricula must pay close attention to these changes and must avoid the occurrence of naïve scenarios such as the hypothesis that states that since all things change, there will be no more fixed points of reference. In reality the important changes taking place fit into artefact systems that have a strong physical and cultural continuity. Well-formulated design curricula must have solid roots in the best design traditions and be capable of preparing students to confront future realistic and unforeseeable problems. The curricula must provide students with practical tools, a capacity for analyzing, and incentives and stimulus for continually learning how to learn.

1 New Design Topics

The most relevant variations regarding industrial design today are not those happening within its own field; instead they refer to changes that occur in the contexts in which it operates.

1.1 Technological change

In the recent past and at present, events of extreme importance for industrial design are taking place in the field of technology. One only has to think of the progress made in materials science, the fields of laser and ultrasonic, the diffusion of microelectronics and, more in general, information and telecommunication technology. Information technology has opened new ways for production processes and products themselves. The most evident and widespread consequences of those changes in the field of products are the extreme reduction in size (down to miniaturization), the reduction of weight and the decreasing energy consumption. Another effect is that together with miniaturization there are less components accomplishing only one function (as this was instead the case with mechanical and electromechanical products). To put it simple, in microelectronic products we find components such as microchips that deal with very differentiated tasks. It is even becoming a reality that a designer is able to decide and program the performance and behaviour of a product. This increases enormously a designer's possible impact on reality and as such his responsibility. His duty in some areas is already not anymore limited to the design of variations within established product typologies but instead to contribute towards the creation of product typologies non-existent until then.

One way to proceed in this direction is to combine in one product features that appeared separately before. The best known examples are found in the transformation products of mass consumption (home entertainment,…), but perhaps more interesting and meaningful are changes in products with an elevated instrumental character. For example, in the field of medical devices these technological innovations have paved the way for totally new products in the field of diagnosis. Furthermore they enabled the combination of diagnostic and surgical features in one single product.

1.2 Socio-cultural change

In the socio-cultural context we have seen profound changes over the past years and on a micro as well as macro-sociological level. Individual and collective lifestyles change and means of communication are at the very centre of the transformation of these ways of living and their underlying values. But that is not all. We are witnessing epochal phenomena such as the fall of socio-political systems, mass migration or the globalization of markets and production sites. This creates noticeable variations in the system of requirements that need to be satisfied by products. For example, at the global level, homogenization of demand type increases and as a consequence, solid market niches for certain products tend to disappear progressively. Equally the materials equipment of the world population, including the poorest and most dependent spheres, tends not to be considered as a local question anymore. Out of this emerge new topics to reflect upon for industrial design, and increased necessity to rethink the relationship between need and product and to develop new products and product systems that satisfy new (and old) needs.

Change in the Production and Supply Chain

One of the most important tasks in this field is the location of the different phases in product design, production and distribution cycles. The phenomenon of industrial globalisation has significant effects on certain fundamental aspects of the design field. Greater and more improved organization is called for when setting in place and arranging design activities, such as component production, assembly and long-distance distribution. It also calls for more formalized and better-structured communication and information protocols to be devised. Furthermore, it implies, from an industrial design perspective, concentrating on component design in particular. In a context in which the productive and logistic assembly of finished products, with respect to component production, tends to be increasingly differentiated, one can note that the latter has increasingly more autonomous design and production processes, wherein components assume the actual status of "products". Next to simple components with either singular or universal functions, there are others which are reversely complex, multi-functional and expressly designed for a specific finished product, and which do not only interface with other mechanical parts but also with users. Often the novelty of a company-made product is the outcome of the innovation of one or more components realized by other companies in the system. This is particularly evident in high performance products like Formula 1 cars or racing vehicles whose innovative and high performance components are assembled, used and adjusted according to standard regulations; a process that we can call "combinatory creativity". The ability that component manufacturers have in triggering innovative processes, together with the contribution industrial design brings to these processes, can be seen as one of the new bonds and main characteristics of industrial/production globalisation.

Environmental Issues

Environment is another important issue for industrial design. Industrial design can offer important contributions in finding real solutions to some of the environmental problems of the modern world. One such example is the rapid increase in waste and the vast problems connected with waste control and disposal. These problems call for new solutions in creating and designing objects, which requires on the one hand, reduction of waste-producing sources, and on the other, differentiated waste collection to include recycling. The interest that the field of design has in environmental problems has also produced more general results. For example, it is increasingly accepted that product design must involve itself with all phases of a product's life cycle: supply and treatment of primary (or secondary) materials; realization of semi-finished products, components and finished products; distribution and sales; product use and maintenance; management of product disposal; transport and storage. The awareness and acceptance of design's greater responsibility to the full life cycle of products was incited by the urgent need for evaluating the effects industrial products and processes have on the environment. This need is at times voluntary, and at others, propelled by national or international regulatory standards. One need only think of the consequences of certain European directives concerning the *manufacturer's extended responsibility*, founded on the manufacturer's continual interest in its post sales products, and its economical and operational responsibility for a product's end life. This principle led to the establishment of European regulations on packaging, and inspired successive regulations in the automotive, electrical and electronic industries. On the other hand, the LCA - *Life Cycle Assessment* and the *Life Cycle Cost* are instruments widely used throughout the industry. The effects of such instruments, however, are much more general in character; they transcend the same sensibility for environmental problems and are capable of profoundly changing design philosophy and initiating a complete rethinking of logistic and industrial processes. A *reverse logistics* is developed for the recuperation of used packaging and discarded products: alongside the idea of the "assembly line" appears the idea of a "disassembly line"; products are designed with greater consideration for the quantity of material and components, as well as for their separability.

Perhaps the most interesting aspect, and the one offering the greatest number of design prospects concerning product life cycle, is the shift in perception of product sales - where a set of services is

added to the product offer. This is made possible at the moment when subsequent manufacturing and marketing phases (for example, product use and maintenance or disposal/recycling) are considered a constituent part of a company's mission, fully complying with the parameters that appraise the overall quality a product offers to a possible buyer. Companies that offer not only quality products, but also efficient and convincing services, build privileged and long lasting client relationships and bring about an indubitable competitive advantage, particularly valuable for the exclusivity of the product and the difficulty in imitating it. Other opportunities also arise for entrepreneurs as post-sales services are established both inside and outside the manufacturing company.

2 Design Education and Curricula

In the light of what has been said up to now, it is necessary to rethink the concept of professionalism in non-traditional terms and to revise the didactic organizational structure. The revisions include the adoption of widespread Anglo-Saxon didactic model which consists of three levels: the Bachelor degree, the Master degree and the PhD degree. This model offers the indubitable advantage of a well-organized didactic structure that is capable of responding to the most varied of needs in the most efficient of manners (i.e., the cultural and professional profiles of the design field). It is also essential to examine certain foundations of the present-day design curricula. In particular, the international experience has put Foundation courses at the beginning of the educational system, not the immediately applicable design practices. This leads us to think of such important examples as "Grundlehre", "Basic design" or "Grundkurs" which belong to the didactic tradition of industrial design. Only in the last section of five-year study programmes was the professional training aspect really considered. The importance today of advancing this type of training, in order to provide job opportunities at the end of a three-year (bachelor) programme, leads us to re-examine this method. Foundation and applied educational programmes can no longer be seen sequentially, but rather as parallel programmes. It is also important to distinguish here between a "restricted" professionalism (know-how), and a "wide" professionalism (knowing also how to critically evaluate one's professional skills and activities in connection with the changing contexts of the field in which they are practised).

A common characteristic of all the study programmes is their association with a university system that involves a strong interrelation between didactic studies, research and successive job placement, as well as a capacity for critical discussion and analysis of knowledge and information. This means, among other things — and from the point of view of the study curricula — a confirmation of the fundamental and irreplaceable roles that theoretical, historical and critical disciplines hold in the field of industrial design within the university. An important role of these courses is, in fact, typical of university studies and distinguishes them also from the most accredited extra-university educational programmes.

One of the decisive features of such a study curricula is the distinctive cultural and professional profile of each educational level. These profiles are determined during the passage from Bachelor degree to PhD degree, by the progressive rise in certain distinct parameters: the complexity of the problems dealt with; the formal, structural, productive, systemic and performance-based levels of complexity of the designed products/artefacts; innovative capacity and research contribution (variation in the relationship between routine interventions and heuristic interventions, capacity for producing innovations); abstraction/conceptualization ability; students' level of autonomy and freedom in making decisions concerning their educational careers.

As regards the academic and didactic goals, the three degree levels can also be described in terms of acquired capabilities. The 3-year (bachelor) degree involves the ability to professionally analyze products/artefacts, translate client and project needs into design briefs, design single products, and produce incremental product innovations starting with given technological-productive situations. The graduate degree (or master) involves the ability to coordinate, to innovate products (even radically) and trigger cross-fertilization processes by transferring solutions and innovations from one

sector to another, and to plan product/artefact systems for different clients (production companies, distribution companies, public and private consumers). Finally, the PhD programme is characterized by the capability to think in theoretical terms about the crucial problems existing in the industrial design field, to be able to autonomously organize and manage research projects, to interact with other specialists on complex research projects and to make innovations on typologies of processes and products.

3 Case Study - Venice

The Università Iuav di Venezia has initiated a well-organized educational programme in Design with the scope of uniting solid methodology and well-established tools with the capacity to grasp and appraise the newest innovations, including the most radical ones. In practice this means that the educational system is structured in two parallel programmes, with the option of changing from one to the other according to the established methods (evaluation and recognition of formative credits upon admission) and at fixed times during the academic path.

The first programme, a more institutional education based on university standards, comprises the bachelor degree (three-year undergraduate programme), followed by two master degrees (two-year graduate programmes) and by a PhD degree. The educational goal is to provide effective and lasting interpretive tools for a changeable reality where each single didactic project has eminently the value of an example. An integral part of the undergraduate programme is the integration of product design and of communication design. Students have the option after the first year of choosing between theoretical courses and project courses (workshops) within a detailed academic program of product and communication design. They also have the choice of personalizing their educational program by selecting different intensification courses.

Specialization takes place with the master degrees in product design and in visual and multimedia communication. These programs focus on giving students a great deal of autonomy as well as ample freedom in individualizing their program. Students are allowed to organize each didactic period by choosing the courses they wish to take from amongst those offered. Students have the choice of selecting one of the three workshops offered in each of the three didactic periods throughout the academic year and are also allowed to attend courses offered by the other faculty master programs.

The PhD program is based on theoretical, critical and historical study and research as well as experimentation, providing students with the opportunity to affront themes that strongly integrate product design and communication.

The second program includes thematic master degrees (for instance in Medical Design), specialised courses and professional training-based courses. With a strong formal structure, these degree programs have a prominent thematic focus and deal with the specific needs found in social, economic and industrial contexts. These programs can also have a set or given time limit as they serve to train students for specific professional careers that may change in time as industry and job market needs fluctuate. On the other hand, the Bachelor, Master and PhD degree programs are structured to form cultural and professional profiles with more fixed and long-term stability.

Trends in Design Practice and Curriculum Development

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He started Onio Design seven years ago with classmate at NID, Prakash Khanzode who is also an engineer and a product designer. At Onio, as founder director Manoj's areas of interest border a melange of design, management, philosophy and science ie. Branding, Trend research, Interaction Design, Futurology and Design Management. Trekking, Zen, Sufism, Travelling and study of commonalties in various faculties of human knowledge (i.e.Tao of Physics) are some of the other interests.

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As the information technology pours over the faster production and faster transportation facilities, a different picture of consumption and consumers emerge. Technology, speed of life, growing urbanization, need for distinction in the information-clutter, need for closer networking, evolution of new materials and evolution of 'strategists' in the industry, together present an anchor for design education to ponder over the content in the new age.

The paper discusses the new 'virtues' or 'skills' that a designer needs to be equipped with in the new scenario. While basic tenets of design education don't change, what definitely changes is the boundary conditions for design application. Design education needs to gear up to the new challenges posed at this juncture that would amplify in the years to come.

Keywords: *design practice, curriculum development, information clutter, designer skills, new challenges*

Branding: Part versus Whole, Logo versus No-logo

Often we hear the 'no-logo' noises. Also more detailed thoughts on branding and the way it is progressing are there in the designers' minds. A Yahoo group, where majority of Indian designers meet digitally, has seen lots of comments from active designers on branding v/s no branding. If for a moment we leave aside the ongoing clichés and 'understood' the connotations of branding, a basic distillate of 'distinction' remains. Let's explore that.

As we are slowly sinking deep into information glut, our memory is failing us. One needs PDAs and digital diaries to remember names and telephone numbers, not to talk of addresses and anniversaries. Thousands of companies take birth in the economic eco-system worldwide and unleash in the market thousands of new products or services. Not all affect the entire population. Nor do we remain completely unaffected by them. Compared to the last decade, we can see that media impounding of names and images of the new products and services has gone multifold. Even a four-year old child now speaks brands and not the product or category (i.e. McDonalds and not Burgers…). Thus in this crowd, if one has to launch a new service or product, it has to be genuinely differentiated to be sold or consumed. Once there is effort in differentiating the function, there is equal effort in naming the same. Things that are not distinct from each other would be thrown into oblivion by the turbo-memory of new age masses. Not only is the creation of a distinct identity important, but more important is the continuous nourishment of that in the public mind.

There is another way to understand branding. Electrical engineering differentiates the 'noise' and the 'signal' very clearly. It also says that for a signal to be a 'signal,' it has to be a) of certain characteristics that is different from noise; b) it has to be consistent on those characteristics. Our brain can only register a signal and map it if it has been distinct and also repeatedly occurs with the same distinction. A little 'mindshare' in the glutted minds today may cost enormous care in 'distinction'

and 'consistency.' Dimensions of 'branding' may change, not the concept itself. 'No distinction' is the state of boring, drab and machine-like race, which, in the near future, does not seem to be a possibility.

Rule of consistency of 'message' finds a more visible application for itself in company branding. If a company wants to be known for smart and high-tech products, it can no longer afford to receive guests in a rundown office with a lethargic receptionist. If a company wants to be known as an honest transparent service company; yes, its name, logo and tagline would say that. But in the holistic sense it would have to pull down all the tall partitions and cabins in the company for a subconscious reinforcement of the germination brand thought.

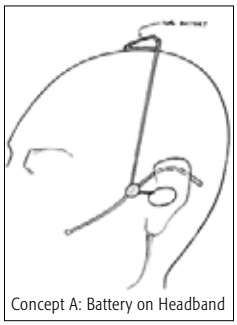
Now this very thought of 'consistent messaging' has brought into being the 'brand strategy' which forced design studios to shift their gears from 'graphic design.' A more intense thought needs to be put before a designer gets down to even think of shapes and colours for a company or a product. Entire interaction of the new entity needs to be mapped in the psycho-economic realm, before the doodling happens. Graphic design does start appearing as the last line 'applied-end' of 'branding'. Here is where the new challenge lies for the young designers and the education; to effectively morph the 'strategy' with 'execution.' At times it may go at loggerheads with the established monoliths of 'strategy' i.e. management consultants or advertising agencies. Yet, this is the new hybrid reality that requires a brisk absorption and constant rejuvenation.

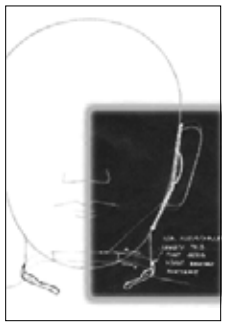
Technology Driven Design

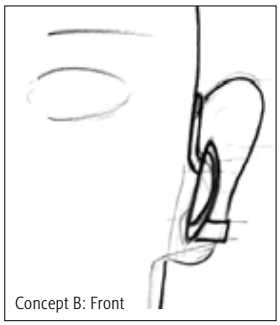
When I put this title, many thoughts are in my mind. Something that resembles one of the final projects at NID called Technically Complex Project. I am sure that there was a specific motive behind separating out a 'Complex Project' that is technology intensive. Somehow, a craft design or a simple gadget design or even a brand identity design is far away from a technology driven design i.e. design of a robot pet. 'Robo' design is an electro-mechanical engineering exercise while making it a 'pet' is a typical designer's job. I can just wonder at the product promo as to who would be able to design it the best; an ad agency which has been selling toys or a design agency which takes up complete branding for techno-gadgets and their companies.

The robot-pet AIBO (successfully made and sold by Sony) is an indication of things that would be on our way soon. While Philip Starck simplicity would be one side of the design corridor, the robots or semi-intelligent, interactive, electro-mechanical gadgets would be the other side of it. They would need less of form tweaking, more of interface/interaction design, a highly evolved engineering knowledge in close co-ordination with the product designer and many aspects of sturdier and lighter materials. Number of interacting agencies and expert groups would spiral up. Psychologists would have a new task at hand in terms of designing the cognitive responses from a machine. Though it may sound a bit like part of fiction, one can already see the trickles of such projects landing in design studios across the world.

There is another aspect of 'technology driven design' that is pushing the process to limits. Taking up a patented/patentable technology and building products that are marketable or in another words, productising a technology has been a mainstay of many industrial designers and design houses. It poses the challenges, which are more of 'integration' challenges of the distant elements. Nano-technology is still far from being amenable to commercial production around it, one can only see 'applied' technologies doing rounds. No 'disruptive' technology is foreseen in the near future. This means products would continue to emanate from applied technologies, which don't throw the form-function relations out of gear. Still miniaturization is one significant trend that is visible today and would be fiercely visible tomorrow. When at Onio we sat down to design a blue-tooth ear-phone three years back, we started feeling that we are toeing the line of a jewellery designer. Contortions in form required for the ear-phone to be comfortable to ears were better done by a doodler than an automobile designer who is used to tight aerodynamic digital curves. It was faster to make a shape in clay and put it on the ears to check out how it feels wearing it, than to wait for the 'rapid protos.'


Concept A: Battery on Headband




Concept B: Front

Coping with Rapid Product Development Cycles

Speed is the name of the new age. Only thing moving slowly is, payouts to designers…. What exactly is the impact of speed? Do serial thinking and serial design processes of yesteryears hold good today? Faster consumption demands faster new products and better new products. No one has time for a perfect masterpiece that may take twice the time.

Four agencies working overnight across the globe to conceptualize a new product that is to be launched in one month… it's not something that is taught at design schools. Co-creation is being discussed; tools are still in their formative stages. More than the tools, it is the orientation to create new ideas collaboratively in remote locations, is making the difference. It is as if one has been travelling in bus all this while and suddenly, has been handed air-tickets; the whole understanding of travel changes. One has to get adapted to the system of elaborate boarding procedures, emergency landing procedures, systematic transfer of belongings and strictly guided behaviour during the flight. So the majority of the travel becomes hyper-fast while after landing one is still free to explore things around on ground at more comfortable pace. Design too is quickly reaching a stage where design schools are still teaching ground travel (yes, a firm footing while walking is surely the first step of movement), while the world is ready to fly. Remote collaboration, rapid-prototyping, faster research modes, faster manufacturing and of course faster consumption needs faster design. Product development cycles have crunched like never before. Non-Destructive Testing and Accelerated Testing methodologies are being increasingly preferred. How to say to a remote (distant geographic location) collaborator that 'all three concepts shown by him are totally off the mark,' is a protocol that probably needs to be taught to budding designers or design managers. In our own experience, Onio had designed an MP3 CD player in 1999 (when world was just coming to know what MP3 means) for a Hong Kong based company. The product concept was created in three days and we could manage to make a mock-up in next four days at a Chinese model-making shop without any drawings.


Model prepared in 3 days with Chinese Model Maker, without any drawings, 1999, Onio

Circumventing the communication problem, sans drawings, I used a rough foam model, a Corel-rendering, instant cross-sections drawn on-demand and lots of hand gestures to explain the concept to the Chinese model-maker. The concept was showcased at the Consumer Electronic show, two days later in HK. That was sort of a prelude to issues global designers can face in times to come.

Personalisation in the age of Mass Manufacturing

Personalization is one big trend that is being seen on the world horizon. Personalized cosmetics or beauty care is passé; coming home is now personalized medical services (even micro-surgery at home is not far behind, if one goes by what USA based trend spotter Faith Popcorn predicts). Handylab, a company run by an ex-IIT Mumbai student in USA, has been funded for development of portable pathological test lab (one does not need a room full of equipments after that). Miniaturization is a key ingredient to personalization, apart from whole lot of emotional content. Miniaturization also indicates the full maturity of technology. This means that technology has reached a level where it can be spun into elements that suit a particular living need.

CNCs that are traditionally known for sample batch or proto machining (or at the most some high quality machining of key components) could reach a stage where they might be vending out

customized products. Each product coming out of a machine or machining centre would be custom programmed as per the needs.

In such a scenario the traditional constraints of mass manufacturing are diluted to a certain extent and product shapes would only be constrained by the limits of the machine.

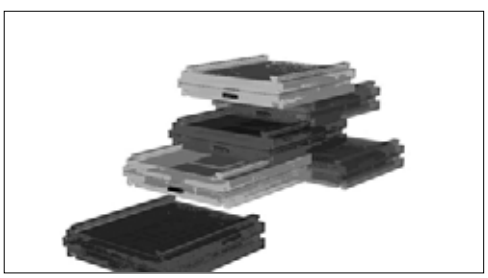
Internet content industry has been toying with the idea of personalized content for quite some years by now. Algorithms for faster and accurate delivery are evolving day by day. Google is a living example of what technology can do for a user's convenience. The 'context' brought in by Google has left others far behind struggling to find a match.

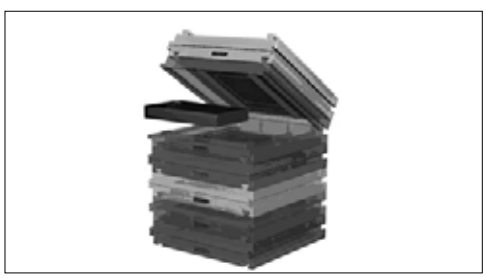
In the world of peaking multiplicity of choices, personalization of product and services within the realm of production would set new demands for design profession.

Networking and Speed - a Core Virtue

The world gets smaller every day. Resources once considered 'inaccessible' are at arms length now. The customer is moving closer to the seller, the seller is cozying up to the manufacturer, and the designer, along with R&D department, is in conference with manufacturing. They all might be located thousands of miles apart, collaborating electronically in a common language. New softwares are evolving on collaborative working, sharing files, information, referencing or editing. An assignment is being handled not by an individual or a company but a network of companies. In our own experience, a project originated from a supplier to Nintendo in Taiwan. Project was to design a new cartridge case for Nintendo, in such a way that cases could be attached to each other like Lego blocks, to make interesting shapes. The project was to be completed in four days. Involved agencies were the supplier (the originator), his designer in USA, a mechanical design company in Mumbai and Onio at Pune. At the break-neck speed, concepts were made and shown to Nintendo. One chosen concept was taken to the detailed solid modelling and usage illustration. Although there were no collaborative file sharing or video-conferencing in this project, yet the intensity of the experience was one precursor to things that await designers in the future.

In some cases network is a pre-condition built into the project like our experience with Nintendo, while in other cases network of associates working with areas of expertise becomes a speed-mechanism for the project. A design company equipped with better speed mechanisms gets better with each project pitched for.





Networking with similar minds, special interest groups, expert infrastructure entities and common social goals are some key focal points of networking in the new age. Alumni of IIT Mumbai (Indian Institute of Technology, Mumbai) in Pune, are forming special action groups for better infrastructure in the city. Individuals with experience in areas of waste management, public utilities, education etc. are going out of their way to hold hands with other alumni for an unprecedented thinking for a better living for all.

Strategy or Design?

Emergence of management education or rather its popularity has put designers against a new competitor. Earlier, a client or an owner of a business would have directly talked to the design company or a designer. Now designers often get a roadmap and in-process-audit from brand-managers, corporate strategists and product managers. To ascend or transcend the formal levels now take years of rapport with the company and the management. The paradigm shift from 'design a logo' to 'design a corporate identity' is a welcome sign; however, shifting reins is creating jitters in the designers. New generation of designers has to learn the corporate language early. ROI (returns on investment), the single factor, most effectively understood in the corporate world has to be learnt and mastered to prove the case for design. PLM (Product Life Cycle Management) is being widely used now-a-days in some software offerings where it deals with product creation, process documentation, collaboration and sharing. But this domain does not deal with important part of the product life i.e. its cognitive life, 'branding.' Thus a maze of new words coined by marketers that diffuse the paradigms into a clutch of activities is a new challenge for young designers. Broad understanding of the 'system' i.e. how the businesses run in modern times, is as primary an understanding as 'form' and 'function.' It is appropriate that a significant time (almost half a semester) be dedicated to business management as an integral part of design curriculum.

Summary

As information overload is increasing, 'branding' or 'focused communication' is becoming the founding fractal of design process. How to suppress 'many' and bring out 'one' is becoming a core virtue. The 'whole' seems to be hidden in the 'part.' Celebration of the 'part' without losing 'whole' is a virtue. From product design to communication design, the need for 'messaging' is taking over the perennial 'form-function' dilemma.

With global centres of specialization emerging, like China for manufacturing, India for engineering and software, there is always a cost-effective yet efficient way of working globally. A strong network comes handy like a magic-wand. Networking across the shore is becoming a core virtue.

Design for global users is unthinkable without software or technology in general. In order to use the technology effectively in a way that it delivers up to the expectations, it has to be mastered by the designers. Mastering it means understanding the nuances without giving-in; the ability to 'conceal' the inheritance of 'technology' and reveal the 'product.' Technology is becoming an equal virtue.

As the population steeps north and global products compete locally, local energizers are needed. Designers seeking an 'insider's view' of the local market need to undertake 'ethnographic studies' in addition to the reliance on 'statistics only' information from the market research.

New technologies are also bringing the 'crafts' back. Individualistic customization is coming in, within industrial production scenario. The 'made-to-order' paradigm needs technologies that can parameterize the needs of human beings and cater to customization orders. We are talking of 'middleware' designers, who would help the machines understand the human needs in parametric form. An eclectic mix of cognitive sciences, sociology, psychology, ergonomics is emerging.

Increasingly, designers are finding their position in the industry shifting towards 'executors', which once was poised to become 'strategist'. Clear understanding of modern business paradigm is one crucial input missing in the design education today.

Teaching Form Generation Principles

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With this paper the author shares his experience in teaching basic 3 dimensional design. He shows how the traditional (Bauhaus and Ulm) methods of teaching principles of form generation could be remodelled and updated to suit today's context (especially, yet not only, in terms of formal repertoire and technology). If organized in a structured and stringent way the teaching of fundamentals of design can still shift further towards a rational scientific research process. Intuitive aesthetical awareness and sensitive perception is essential for qualitative form generation at the same time this experience needs to be expressible and communicable.

The change from conventional design drawings and manual model making towards parametric 3d modelling software and rapid prototyping calls for new thinking patterns and requires much strengthened form-imagination skills. This makes it all the more important for the novice to work with tangible traditional models. He suggests the introduction of the computer as 3d form creating tool not in the beginning but only at an advanced stage, after the fundamental base has been established through manual experience and analytical inquiry. Examining and comprehending morphological elements (e.g. geometric relations, form transitions, dimensional values) and processes (such as symmetry operations, modular combinations, transformations), which constitute a form can lead a long way in understanding how form can be developed and communicated (to other humans and to modelling software). Developing a rational approach towards form generation and gaining topologic understanding will be of great use for today's generation of designers. To give an example how such a new approach could be shaped, one needs to think of defining a set of form constituting parameters (for example radii and chamfers), formulating an experimental set of rules for their application and permuting the combinations of changing variables.

Keywords: *basic design, form generation principles, 3 dimensional design, elements of form, design foundation studies*

How to Generate Form

To find in-depth answers to this question I am experimenting with a series of four consecutive courses. I have started this activity as a member of the faculty of Industrial Design at the National Institute of Design (NID) and am currently continuing my research at the Department of Design, Indian Institute of Technology Guwahati. At NID I used the existing structure of "Elements of Form" Courses I to IV as working and development space. In this context thinking of what could be a meaningful quartet to teach Basic Design the following division was evolved: 1) form development, 2) application, 3) movement, 4) semantics. The time given to each of these courses was approximately 100 hours; mostly they were conducted as coherent three week blocks in which we would be only working and concentrating on the respective course. Depending on the course structure they can also be held on a weekly or biweekly basis, but in my experience it helps for such fundamental courses if they can be condensed into one stretch of time. I recommend such a series of courses to be offered in consecutive semesters.

To begin with it is always helpful to give some rational reference frame to a budding designer. Geometry and geometric relationships can be useful starting points. Important parameters are: the path of the assignments, the degrees of freedom and the space for individual interpretation. The optimum blend of the above parameters has always newly to be discovered with every new group of students. For keeping the classes alive and exciting I prefer constantly developing new exercises. To illustrate varying approaches I am showing here three different examples of how the EoF I Course has been taken with different batches. Each example is illustrated through selected work of one representative student.

Elements of Form I

Though I am experimenting with different paths and assignments while working on this course with different batches, the main learning objectives for this course remained constant. They are: a) methodical ways of form development, b) different classes of lines, planes and solids, c) various dimensions of space, d) understand - apply - articulate, e) sensitise perception, f) aesthetical sensibility, g) form and context.

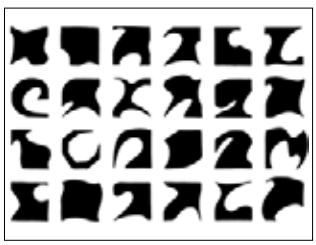


Fig.1: shapes with a square reference

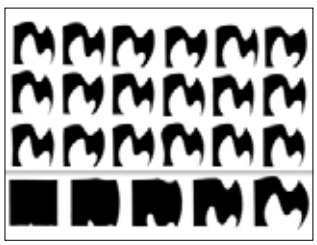


Fig. 2: refinement of the selected shape (top); five-step transformation (bottom)

Fig. 3: three-dimensional interpretation

In the first example the initial task was to develop two-dimensional shapes taking a square as the frame of reference. The degree of freedom was very large; each student could have many sheets with very individual solutions of this task (figure 1). As second step one shape had to be chosen and, for further refinement, the form constituting parameters had to be varied. Here the judgement was mainly based on aesthetical sensation and enhanced modes of perception less on rational reasoning. Then a transformation in five visually equal steps starting from a very slightly modified square to the finalised shape had to be worked out (figure 2). Taking off from these two-dimensional assignments, the next task was to interpret the selected two-dimensional shape, in a way that supports and enhances its formal quality, as a three-dimensional object (figure 3). This exercises helped to sensitise the students to form and how minor modifications can have drastic implications on the aesthetic experience a form can create. With the help of many group and individual discussions as well as some formal lectures a vocabulary was built to enable the student to understand, describe and talk of various elements constituting form (convex, concave, single curved planes, double curved planes synclastic and anticlastic, form transitions, etc.). The most exciting part in this course was the transfer from two dimensions into three dimensions for which each student discovered his unique method.

In the above example the student interpreted his 2d shape as elevation, the shift from a solid base to a pointed tip has been intensified by starting with a circle which transforms into fillets of decreasing diameter, into converging edges and finally in a pyramidal peak. The learning through the intensive 2d explorations clearly reflected in the high degree of form imagination achieved in the three dimensional interpretation.

Elements of Form I, second example

In the second example of EoF I, the path was more methodical and the steps were more defined. First one square had to be divided into two pieces, any contour line (straight, curved, kinked or combined) was allowed as long as it remained inside the square, starting and ending on the edge of the square. The two pieces had then to be joined in different configurations and tested in various

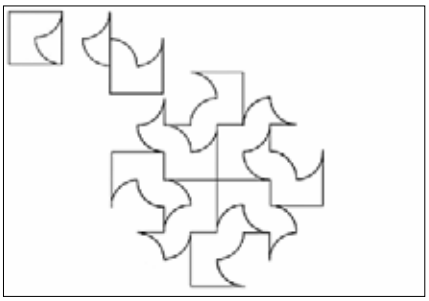


Fig. 4: tight packing

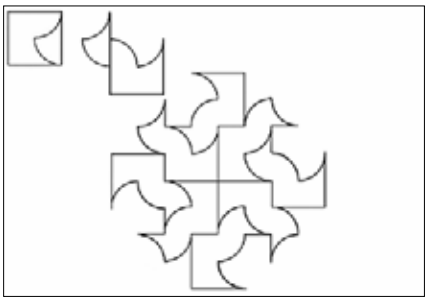


Fig. 5: loose packing, variation 1

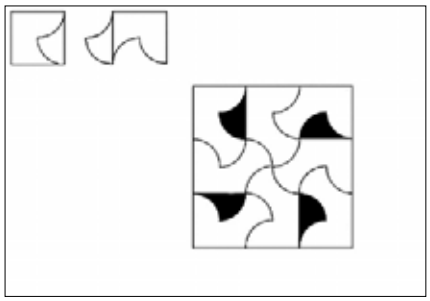


Fig. 6: loose packing, variation

tessellated, tight and loose packings (figure 4-6). For the translation into three-dimensional space the division had to be transferred onto sides of a cube, the number of sides could be chosen between two and six. The students were also free to choose the orientation on each side (eight possibilities, 4 directions and 4 mirror images). The challenge was to explore variations how the form transits from one division-edge-contour on one side to another on another side. In the work shown here, the student chose to apply the cut on all six faces. In one set of three adjoining faces the bigger part of the cut square is left positive, in the other set it is the smaller figure that remains on the surface plane. Each of both the plane set arrangements is threefold point mirrored. Several of these cubes can be arranged in various modular combinations (figure 7-8).

These studies gave the students the experience and confidence that one can achieve advanced results by following a systematic path in small steps. It helped in establishing a strong understanding of geometric relations and modularity. In trying to understand the potential possibilities of form transitions (from one dividing line to another) imaginative visualisation skills were applied and trained. Many pre-models were made before the final stage was reached. These helped the students to train their spatial sense and verify if or how it was possible to materialize their imagined forms.

Fig. 7: modular combination variation 1

Fig. 8: modular combination variation 2

Elements of Form I, third example

In the third example of EoF I the assignment was to develop a transition area between two meeting poles. The positional relation as well as the cross sections of the poles could be freely chosen. After understanding the matrix of possible spatial relationships (crossing, one pole end touching the other pole in between the ends, both ends touching / perpendicular, angular, collinear) and exploring various possible interactions between cross sections one configuration was selected. Then a large variety of possible transitions was explored (fig. 9). Handling elements of different dimensional values extending in different dimensions, joining them, developing ways to formulate the areas of form transition were the key activities to be experimented with, to be understood and experienced in this course. At the end one selected pole - pole transition was further refined and executed as final model (fig. 10). In the here illustrated example the student chose a perpendicular end / centre relation between a cylinder and a t-profile of equal width.

The transitions happen in a tangential way, the lower and middle part in a planar manner, the top part in a crater form.

We started this exercise almost directly exploring 3d forms without preparing much ground through prior 2d exercises. Initially this approach was a bit tough but since the poles had fairly simple cross

Fig. 9: t-profile joins cylinder perpendicular, explorations and final model

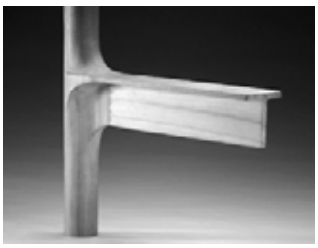


Fig. 10: t-profile joins cylinder perpendicular, final model

sections (square, rectangle, circle, T-shape, L-shape) and the task was straightforward the students caught up and got into the assignment quickly. This course proved to be very useful to sensitise the students towards the perception of aesthetic phenomena. The very focused and defined area of form examination helped the students to become more innovative in the sum of their explorations.

Elements of Form II

Again, three examples, of how this second course was approached, are shown here. All of them had following consistent objectives: a) elementary design transfer, b) structured form search, c) specific form generation, d) application and use, e) object functions, f) applied - constrained, g) constructive - functional, h) colour - transparency, i) texture - haptic.

How to take the experience, insight and understanding gained during an EoF I course forward towards an application, how to bridge the gap between basic design exercises and the design of a functional product? Utilising principles of form generation to develop a form, which now also serves a utilitarian purpose and has some manufacturing constraints.

The topic of the first example of an Elements of Form II course was: "Casing for a portable receiver device." The idea was to take up a simple product with only few display and control elements and little ergonomic complexity so that form development can be the focus of this exercise. Right from the beginning the students were given all internal elements (circuit, aerial, speaker, batteries) of a cheap transistor radio. The assignment was to design a casing made from two vacuum formed parts (which needed to have draft angles). The main struggle was that on at least three sides elements (OFF / FM / AM switch, volume and frequency control, antenna, earplug plug point) had to protrude through this shell. For the speaker area another special manipulation of form namely perforation was introduced and explored. The meaning of the parting line was yet one further constituent, which required to be understood, its movement needed to be thought of (figure 11).

The definition of the spatial relationships between the individual internal elements, which could be freely composed, helped the students in finding indications for developing their external forms (figure 12). The hands on experience of actually making a prototype gave a very valuable practical experience, enhancing the understanding of the interrelation between form, function and manufacturing.

Fig. 11: transistor radio development: formal explorations, varied parting lines

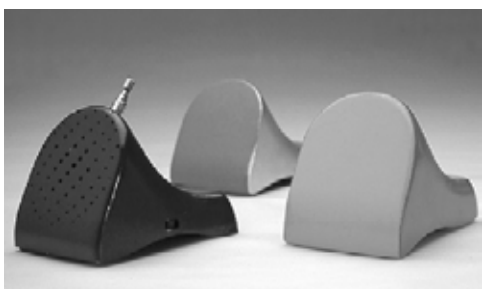


Fig. 12: transistor radio, formal variations, colour explorations

Elements of Form II, second example

A more controlled way for guiding the form development aspect in an application oriented assignment was followed in example two of EoF II. The functional aspects were still further reduced. The theme of this course was soap-cakes. The final pieces needed to be cast (so, again draft angles were a constraint) and the exact volume (175 cm^3) was given. The formal repertoire in this exercise was restricted to fillets and chamfers. We went a very systematic way by defining sets of rules in which the manipulation of cuboids would only happen by applying fillets or chamfers onto its edges or vertices. First, trying to visualize the formal effects of these operations we selected aesthetically promising rule sets and tested them in three-dimensional matrices in which along each axis one variable was stepwise altered (figure 13). This so acquired formal repertoire was then taken forward and applied in the design of a soap-cake (figure 14).

Fig. 13: 3d matrix exploring a continuous circulating fillet in two sizes (small, big); in three different standard orientations (top, side, front); perpendicular interacting with a radius (which starts tangential and ends non tangential), of three varying sizes (zero radius, small radius, big radius).

Fig. 14: soap-cakes derived from the previous matrix exercise, using tangential, semi tangential and non-tangential fillets.

This exercise was very useful to make the students aware of the unending potential that lies in a narrowly defined research area such as fillets and chamfers applied on a cuboid. The matrix assignment proved to be a very powerful tool to train the imagination of a virtual form before its physical existence. If it is too difficult to visualise how an object (e.g. a rectangular block with fillets of different sizes along adjoining edges) would look like one can make the neighbouring ones and with their help then again try to stretch one's imagination.

Elements of Form II, third example

This example is a combination of the two previous approaches. Taking the transistor radio as theme, we again restricted our field of exploration on fillets and chamfers as the core form constituting means. This course was conducted at the Department of Design, Indian Institute of Technology Guwahati (under the actual title Product Design and Prototype). The main objectives were to give hands on experience in form development and model making. Further learning objectives comprised perforations and colour.

After a good amount of initial explorations of what could be done with fillets and chamfers (figure 15), three dimensional Matrices were worked out for a systematic understanding of form creation. In the example below the variable parameters for the 3d matrix were: Left-right axis: circulating fillet, non tangential fillets, no fillet along left and right edges of top surface; Front-back axis: the same as for left-right axis but along front and back edges of top surface; Top-bottom axis: the four vertical edges have conical, linear increasing fillets, the top ones tangential, the bottom ones non tangential (figure 16). Considering all the given spatial and vacuum forming constraints prototypes of radios were developed (figure 17, 18).

This batch of students only slowly became more sensitive to the aesthetic quality and its distinction. Many discussions, analysing the explorations, understanding degrees of order and disorder, means to cultivate structure (e.g. symmetry) were necessary. Practising different uses of various possible fillets (tangential, non tangential, constant, circulating, changing value / conical) and chamfers (different angles, constant, changing value / tapering) made the students aware of these parameters and created an understanding which was quite helpful for the visualisation of form. This exercise was a great success as at the end all the eight participating students succeeded in developing very satisfactory solutions.

Figure 15: initial explorations manipulating a given cuboid of constant size, using only fillets and chamfers.

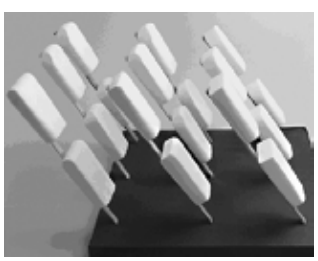


Figure 16: 3d matrix

Figure 17: transistor radio, prototype, opened

Fig. 18: right: prototype "display view" left: variation in colour and perforation

Elements of Form III

The learning objectives for this course were: a) static - dynamic, b) time as fourth dimension, c) unfolding of one dimension into the next, d) point - line - plane - solid - time, e) change of form through movement, f) defined transformation.

As an advanced step in understanding form development, this course introduced time as the fourth dimension. The aim was to familiarise the students with the idea of a dynamic form, an object that has the capacity to transform its form in a controlled, comprehensible way. Initially the students were asked to find answers to questions such as: How does something straight become curved? What means are there for changing something convex into something concave? What ways are there for a volume to collapse into a flat state? How can a form transform from small to big? How do you make a plane grow into a solid?

In a few brainstorming sessions many very simple models (using materials such as plastic straws, wood sticks, card board strips, rubber bands, pins, cello tape, etc.) were built as possible answers to these questions. With this three dimensional library of kinematic principles at the back of their mind the students had now to visualize a form transforming into another form along a defined series of intermediate steps. Once the student discovered a form transition concept, kinematic link chains to create the desired transformation sequences were evolved. A useful method to approach this task it to start from very flexible linked structures and constrain stepwise unwanted degrees of freedom of movement, allowing only movement along the desired sequence.

The study of movement was very useful to let the students experience the meaning of dimensions, how the movement of a point creates a line, a line spreads into a plane and a plane unfolds into a solid. This exercise is an eye opener into the world of kinematic mechanisms and how to control movement.

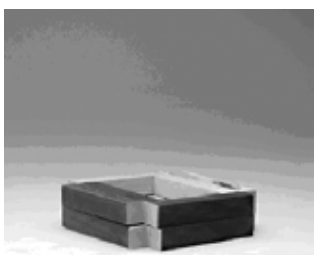


Fig. 19: square frames

Fig. 20: blossoming out

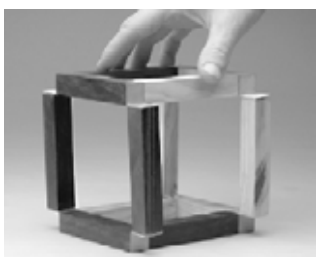


Fig. 21: into a cube

Elements of Form IV

Learning objectives: a) semantics of form, b) transmitting information through form, c) envisioning information, d) photographical and allegorical representations, e) abstraction - reduction.

The last course of this series deals with the semantic aspects of form. How can form be used to transmit message? How does form communicate the intended meaning? How to envision information?

Taking off from studying the laws of form creation in nature, first each student had to choose any locally available plant and analyse its structure, geometry, proportions, rhythm, repetitions, growth pattern, macro and microstructure. The individual observations had to be recorded in graphic images, which should range from “photographical” to “allegorical”, “iconographic” and “diagrammatic” representations, depending on what was most suitable and useful for maximum concise expression (figure 22, 23). The results of this study had to be compiled and envisioned into one comprehensive blueprint. Using this acquired understanding, the exercise culminated in evolving a three dimensional form, which reflects the chosen plant in an abstracted, simplified way, expressing selected main features of the same (figure 24).

This series of assignments proved to be very instructive on many levels. It was a good training for observation and analytical skills, it helped a great deal in instilling the concept of varying iconographic

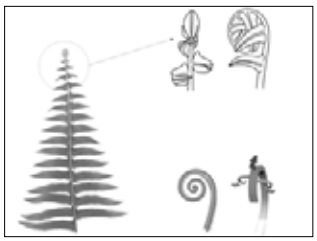


Fig. 22: part from blueprint of a fern: visual representations ranging from photographic (left) to graphical illustrated (right top) to schematic (right bottom)

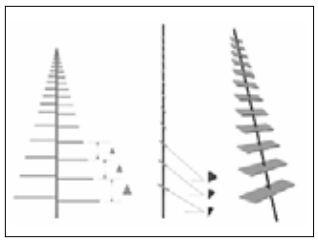


Fig. 23: part from blueprint of a fern: diagrammatic (left), schematic (right)

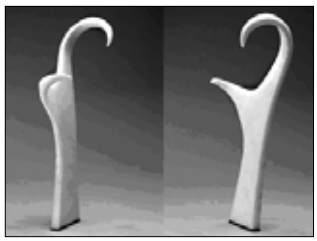


Fig. 24: object depicting the simultaneous uncurling of primary and secondary spiral

levels of representation, from pictorial reproductions (of nature) to allegorical mental images (of the abstract principles which act behind the visible). It made the student aware of various possibilities for abstracting meaning and form, and led through this awareness stepwise to an understanding of semantics of form.

Summary and Conclusion

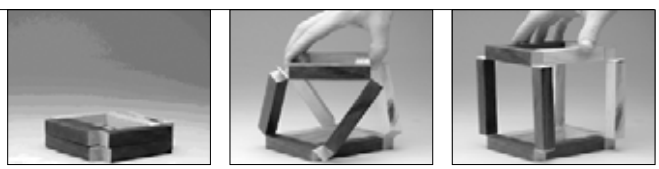
The experience of conducting this series of elementary design courses while simultaneously also guiding a good number of the same students in their project work has given me great confidence to believe this suggested path (table 1) has great potential to build a solid base for a design novice. During the event of going through these formative experiences budding designers can accumulate a rich formal repertoire, gain in-depth understanding of various means of form creation and development, and evolve the required rational understanding to be prepared to slowly move on to 3d modelling software. They have gained the required knowledge and experience, which makes them capable of mastering such software through their imagination and visualisation skills, instead of being led and constrained by its syntax and command structure.

Table 1: The objectives of the presented course series:

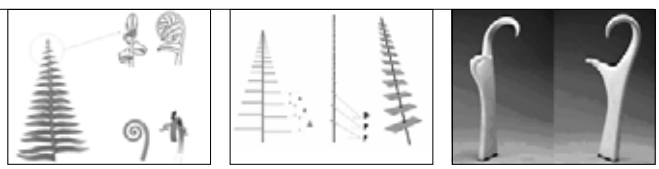
Elements of Form I: principles of form development
- different classes of lines, planes and solids
- understand - apply - articulate
- sensitise perception
- aesthetical sensibility
- various dimensions of space
- form and context

Elements of Form II: application and use
- structured form search
- elementary design transfer
- specific form generation
- applied - constrained
- object functions
- constructive - functional
- colour - transparency
- texture - haptic

Elements of Form III: time as fourth dimension
- unfolding of one dimension into the next
- point - line - plane - solid - time
- change of form through movement
- static - dynamic
- defined transformation



Elements of Form VI: semantics of form
- transmitting information through form
- envisioning information
- from photographical- to allegorical-representations
- abstraction - reduction



Acknowledgement

All the courses except EoF II (third example) were conducted at National Institute of Design, Ahmedabad. EoF II (third example) was conducted at the Department of Design, Indian Institute of Technology, Guwahati. The majority of courses presented in this paper were conducted in tandem with another faculty. In most of the courses namely all the EoF I courses, EoF II first and second examples and EoF IV (second of two courses), it was Shri Manu Gajjar, a constant source of inspiration, who accompanied me in guiding the students. EoF III was done together with Shri Gaurang Shah and EoF II second example with Prof. K. Ramachandran. I want to thank all the students with whom I had the chance to work with for their struggle and contribution, which made this course series a very enriching and successful experience for me. I also want to thank all my teachers who taught me the foundation of design, especially Mr. Hermann Sieber and Prof. Roland Knauer without whom I would not be what I am today. The examples shown in this paper were works of the following students: Fig. 1-3: Gagandeep Singh, Fig. 4-8: Sreejith Kumar, Fig. 9-10: Sumit Saini, Fig. 11-12: Shivani Mohan, Fig. 13-14: Farah Deba, Fig. 15: Ankush Dixit, Gautam Bhargava, Naveen Kumar Sethia, Nitin Pande, Puneet Mathur, Shravan Kumar Mukhopadhyay, Sumeet Gupta, Varun Niti Singh, Fig. 16: Naveen Kumar Sethia, Ankush Dixit, Fig. 17-18: Naveen Kumar Sethia, Fig. 19-21: Dava Pakimo, Fig. 22-24: Amogh Chougule. The work shown in Fig. 15-18 has been produced at Department of Design, Indian Institute of Technology, Guwahati. All other works were created at National Institute of Design, Ahmedabad. The photographs of works made at NID were shot in collaboration with Shri M F Jadliwala.

The Introduction of Service Design within Industrial Design Curricula:

Comparison of Three Design Approaches and Educational Experiences

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His design works were published by several design magazines such as Modo, Domus, Abitare, and Interni, and his writings have been published by Electa, Scheiwiller, Abitare Segesta, Editoriale Sole 24 Ore, Lupetti, Eleuthera, Alinea. His current research and work interests are: theory of innovation, design driven innovation in local productive systems, activity system design, design for local development, ethnographic research methods, action research methods.

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Nicola Morelli is associate professor at the School of Architecture and Design at Aalborg University. He works in the Industrial Design program. Nicola Morelli's interest in service design is the logical consequence of his involvement in several research projects on design and sustainability in his past positions at the Centre for Design at RMIT University (Australia) and at Politecnico di Milano (Italy). His most recent work, however, shifted the focus from the contents (design for sustainability) to methodological aspects related to the design and development of innovative, service-based solutions in a systemic context.

As a coordinator of a cooperative research project with industry, he had the opportunity to transfer and adapt some methods and techniques from other disciplines (engineering, information technology) to the design discipline. Such methods and techniques have been further developed in his recent activity as a coordinator of a semester on System Design at Aalborg University.

In the last few years, Nicola Morelli has disseminated the results of his research through several papers on journals and international conferences.

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As service and interaction designer at DARC, she developed research projects for the European Union and design advice for governmental and private agencies in Italy. She has coordinated the activities of DARC for research projects such as Presence, Campiello projects, within the EU Esprit-I3 (Connected Communities), Klee&Co and MILK, under the ITS framework. Since 1998 she is Contract Professor at the Faculty of Industrial Design at the Polytechnic University of Milan, where she teaches interaction and service design. Since 2001 she's the director of Domus Academy Research Center (DARC).

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She currently works as a researcher by the SDI research Agency (Italian Design System) of Industrial Design Department (INDACO) of Politecnico di Milano, doing research and educational activities in the field of service design applied in different sectors like hospitality services and services for the territory. In particular she is researcher within the European research MEPSS Product Service Systems Methodology. Development of a toolkit for industry and she teaches service design within the Master in Design Strategico of the consortium POLIdesign by Politecnico di Milano.

During the PhD studies she carried out an action-research project by the Mads Clausen Institute of the University of Southern Denmark in collaboration with the Danish company Danfoss on the theme of Service Design for the supermarket refrigeration. She worked in national researches on the relation between design and Local Productive System and she has been co-editor of the related book Milano distretto del design. Un sistema di luoghi, attori e relazioni al servizio dell'innovazione published by Il Sole 24 ORE.

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This paper describes and reflects upon an emerging phenomena, which is the introduction of service design courses in traditional industrial design schools. Through the description of three examples of educational experiences, the authors stress the existence of complementary approaches to service design that could be integrated for the development of a common methodology and educational platform.

Keywords: *service design, system design, interaction design*

1 Introduction

For several decades now, the debate about new industrial models has been focused on the shift towards a *postfordist* paradigm, in which mass production is replaced by individual solutions that better satisfy the high complexity of lifestyles. In this scenario, companies are requested to address both the requirements of global markets and the needs for local and individual demand. The solution to such a contradictory situation comes from networked initiatives, in which companies are able to generate local solutions, combining global production and localized services. The relevance of service activities in new industrial models is also emphasized by the ongoing shift of many basic personal activities from the informal economy to the formal one (Normann 2000). New highly customized services are now emerging in the market place, which address new emerging needs of families and individuals with new requirements concerning time and social interaction. According to Rifkin (Rifkin 2000) this phenomenon represents an epochal shift, for which services are becoming the center of economic and social activities.

The design discipline has followed this epochal change since the earliest phases, with contributions discussing an extension of the design domain to activities, services, and organizations (Morello 1995, Margolin 1995, Manzini 1993, Buchanan 2004). This debate, however, did not eventuate in a complete methodological discourse. In curricular activities the evolution of industrial models and cultural patterns has often been addressed within the boundaries of product design. The existence of a more complex system of services and infrastructure to meet such an epochal shift is often given for granted or considered as part of the work of other disciplinary areas.

In fact the role of design in the definition of the new solutions can be fundamental, as several innovative activities can be originated on the basis of design scenarios. But this role implies that designers' competencies should include the definition of new elements: designers should not limit their activity to the development of new products but rather extend their activity to the development of new services, organizations and activities. The question arising then is whether the methodological toolbox provided in design schools is adequate to this new role for designers. The traditional focus on product design provides a good insight on creative processes and, possibly, on interdisciplinary cooperation. However the definition of design solutions within the paradigmatic landscape of new industrial models requires that designers develop a new methodological toolbox, or an *operative paradigm* (Arbnor and Bjerke 1997).

The first curricular activities in this area come from different kind of schools with different design background and approaches. Engineering schools have introduced service design as part of a wider definition of the concept of product: if the product is the material and immaterial output of an organization, the process of product design should include the development of immaterial components, such as services. From another perspective, interaction design schools have introduced the service dimension as a constituent part of the development of interactive media. Here service design is seen as a process that organizes activities and interaction between actors involved in a

service situation. Other schools focus on the design curriculum as an autonomous discipline, thus considering the multiple aspects of service design practice. This approach leads to a wider definition of the design discipline, in which service design assume its own specific profile.

2 Three Service Design Approaches

This paper compares the service design approaches and educational experiences of three design schools representing the described modes of service design introduction within existing design curricula: School of Architecture and Design of Aalborg University, Domus Academy of Milano and Faculty of Design of Politecnico di Milano.

2.1 System Design

The School of Architecture and Design of Aalborg University (Denmark), is part of the Faculty of Engineering at Aalborg University. Unlike other design schools in Denmark, which depend on the Ministry of Culture, this school depends on the Ministry of Science and Technology. This condition crucially shapes the focus of design activity. Here the focus is indeed on the relationship between products, technologies and industrial production, rather than on the artistic and aesthetic aspects of design activities. The school aims at proposing an integration of cultural and aesthetic aspects of designed products with technical and operational aspects related to large-scale production. Like all the other departments at Aalborg University, the school adopted the problem-based learning (PBL) model. Such a model proposes that students work on one main project in each semester, using all the available knowledge (lectures, literature research, experiments and supervisor's indications) to address the requirements of such a project. This means that all the subjects taught in each semester are examined through this project. The model is also based on group work. Students are grouped in groups of 4 to 6 and are, since the very first project, trained to understand and manage group work and the related social dynamics.

The students involved in this semester have previously worked on the definition and the integration of technical and aesthetic characteristics of industrial products in two earlier semesters. In such design exercises, though, systemic aspects had emerged in relation to the context in which industrial products would be used. The seventh semester focused, instead, on the systemic aspects around the product, in order to describe them, to represent their main physical, socio-cultural and time-related implications, and to organise sequences of actions, technologies, actors' contributions and material products in a consistent way. In other words students were required to design a product-service system (PSS). The outcome of this exercise was open — it could be a product family or series or an immaterial component of a product/service mix. The assessment criteria for the project referred to the capability to understand and demonstrate the link between each product/service and its specific production/consumption system.

2.2 Interaction Design

Domus Academy of Milano (Italy) is a postgraduate school of design established in 1983. DA was born as a unique experiment of teaching the Italian way to design at a postgraduate level. At that time, the Italian universities offered neither degrees in design nor specific faculties, while Italian designers were playing an important role worldwide. The theoretical assumption was promoting a social responsibility for designer that goes beyond the design of objects and single artifacts, through the investigation of all scales of intervention on the world and the ability of foreseeing and visioning possible future developments for society (Falabrino 2004). The approach — that still characterizes the school — was linking teaching to continual research in design, investigating on borderline themes such as: the humanization of technologies, the connection between design and fashion, from sociology of design to environmental matters, from city design to service design.

Service design introduction followed the interest DA had been showing in the evolution of artefacts toward electronic and digital tools and later toward ICT interfaces. This evolution asked for new

design competencies among which the capacity to describe the service and relational dimension with objects and tools. Nevertheless, the electronic content of industrial products and the introduction of ICT in everyday life tools and services have dramatically changed the work and skills of designers. The theme of interfaces was created out of the need to transfer the functional capacities of the objects onto their surfaces. From electronic objects towards interactive media and systems, the interaction design was growing as an autonomous discipline helping designers to introduce in their DNA the understanding of technological potential for new performances, the need for a cognitive dimension of ergonomics (HCI), the need for new design tools, criteria and sensitivity in order to shape the "aesthetics of relationships" with complex products and systems.

The first intuition in service design was to refer to the emerging interaction design field and to take inspiration from its design tools and criteria as effective tools for designing the relationship between users and services (Pacenti, 1998). The original contribution of design to the world of services, seen as complex interfaces between an organisational back-office and the users, was bringing the interaction design culture and methods and also the integrated brand culture dimension. The focus of the design in the service field became the ability to direct all the aspects (physical, material, organisational, behavioural, psychological) into a unique integrated aesthetic dimension that must be consciously designed (Manzini, 1993).

The research on the field of electronic products first (smart tools lab), on ICT and on interactive media and services later on produced a specific knowledge that became part of the curriculum of the participants of the Master in Design. In 2001 the Master in I-Design started, wherein students from different design backgrounds address new research areas. Service design is a strong component of this curriculum.

2.3 Service Design

Since 1993 the great Italian tradition in industrial design gave birth to the first Italian university course in industrial design at the Politecnico di Milano. In 1999 the Facoltà del Design was borne. Since then the faculty has grown and now has over 400 teachers and about 4000 students enrolled in the two campuses of Milano and Como. Following the evolution and the peculiarities of the national production system and the progressive division of the design profession, the design curriculum within the Politecnico di Milano has been developed into specialised areas from the original nucleus of product design. The two degree levels, the three-year undergraduate Course and two-year Master Course, have been therefore divided into different design curricula representing the multifaceted reality of design (product design, communication design, interior design, fashion design, design & engineering).

In line with this development strategy, in the academic year 2003-2004 Service Design has been introduced as an experimental curriculum within the Industrial Design Master Degree Course. This further step is the result of an existing stream of industrial design project research which has, for the past ten years, focused its attention on the question of service planning (Manzini, 1993; Pacenti, 1998; Morelli 2002; Jegou et al., 2003; Maffei e Sangiorgi, 2003) and which has found in Politecnico di Milano some of the main upholders. The common element present in this research has been the awareness of there being a lack of an organic and autonomous service design culture in contrast with the dominance of an economy of services and the consequent demand for more conscious design approaches. Since then Politecnico di Milano has been treating the theme of services within three main research streams: strategic design, design for sustainability and interaction design.

Lately, in the general aim of developing service design as an autonomous discipline, there has been an effort to better define a distinct design approach proposing an interpretative model of services and a specific design language and methodology. A research direction (Sangiorgi, 2004) has been the one to interpret services as *human activities*, going beyond the *service interface* as the only design object and introducing, besides the aesthetics and functional dimensions of services, the social one. The analysis and design of activities requires widening of the design object from the visible *service interface* to the overall Activity System, as the single service performance or element can be understood or planned only considering the wider social context where it happens. Designing

activities means also to enrich the traditional (product oriented) design language and existing (market oriented) service design techniques with the main conceptual tools and descriptive elements that support the analysis and representation of human activity. Activity Theory[1] has been proposed as potential research framework, using its main concepts and analytical model (Activity System) to interpret service performances and organisation. The current effort has therefore been to translate the described theoretical approach into a complete and coherent service design methodology. The derived design methodology has been the translation of the main activity elements and levels into the main service design contents and phases: in particular the description of an activity in terms of "*who* is doing *what, how* and with what kind of *artefacts*" has been translated in the corresponding service contents – service *system* (who), *offering* (what), *interaction* (how) and *evidences* (artefacts).

3 Three Service Design Training Experiences

The following educational experiences represent an example of application of the described different service design approaches to specific design curricula.

3.1 Aalborg University: service design and systemic contexts

The aim of the semester was to provide students with an *operative paradigm*, i.e. a toolbox including methods and techniques, possibly adapted from other disciplines to develop concrete design solution in a systemic context. The methodological approach proposed at Aalborg university was based on a paradigmatic assumption: that *the systemic context for products and services can be seen as a network of actors. Their interaction in time and space shapes the PSS*. The methodology to be used followed three points suggested by this assumption:

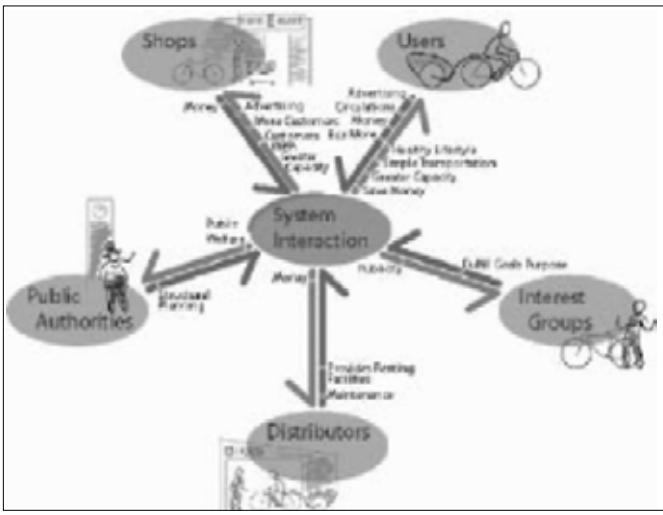
- The view of the systemic context as a network of actors requires analytical methods for recognising and describing the actors that shape the systemic context and the influence each actor has on the system configuration;
- The need to coordinate and control the logical and time dimension of a PSS requires that operational tools are used to design sequence of events and interactions defining the PSS;
- The need to generate a blueprint of a PSS, i.e. a graphical representation of the PSS, that would make it possible to unequivocally communicate its characteristics to other actors and companies.

The systemic context as an actors' network: The development and selection of new solutions is strongly influenced by the actors participating in such process (Bijker, Hughes and Pinch 1987; Bijker 1995). In this context, designers should analyse the socio-technical context and propose solutions that interpret and address the different logics converging in the system (Morelli 2003). The identification of relevant social groups is critical to the definition of the PSS. The students were proposed to map the actors' network and generate a profile of the more relevant social groups, borrowing methods and analytical criteria from Bijker (Bijker 1995).

> Example from Students' Work: "My Way": *The actors' network shaping a public bicycle trailer service.* This project focuses on a service of publicly available bicycle trailers for temporary use. The service could be part of a public policy or a component of the competitive strategy of a department store or an additional service offered by a bicycle shop.
>
> The students were familiar with similar systems. The analysis and identification of possible actors, was based on the existing information, interviews and personal experience. The resulting mind maps list main actors, secondary actors and contextual conditions. In the following phase a profile of the main actors was defined on the basis of a set of criteria.

This analytical phase provided the elements for a first design approach to the systemic solution. On the basis of interaction maps (see Fig. 1) a series of hypotheses were proposed, simulated and evaluated.

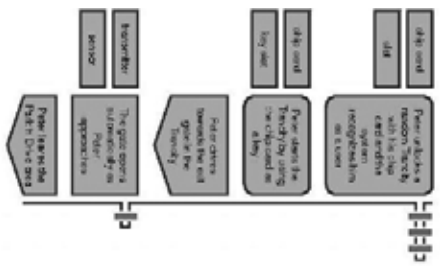
Figure 1 "My Way": System concept 1: the service is offered by a bicycle shop



Bicycle shops could provide the service by lending out or selling products for simple transportation. The shop would be the centre of exchanging products, and making the necessary up keeping of the products. Profit would be the stimulus of the shop, while the user would pay to rent or buy the product to fulfill needs. This would to some extend call for more cycles in the city centers. All other actors would be passive, and would only be influenced by the new service.

Developing the system, logical dimension, time sequences and systemic components: The design phase concerns the development from a conceptual dimension to an operational configuration. This implies a reasonably clear definition of the structure of the PSS, the identification of its main components, the definition of the logical interaction between such components and their time sequences.

Figure 2 "Trancity": graphic representation of requirements for a use case of a car sharing system

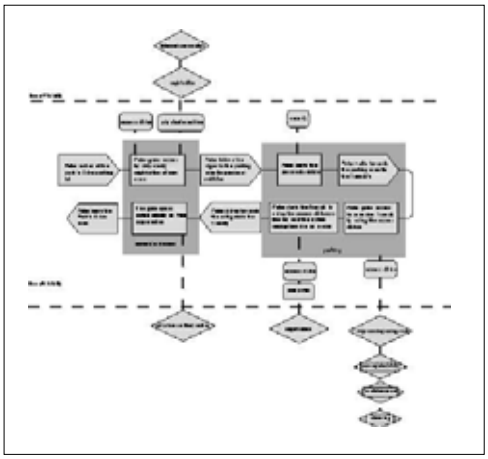


Different degrees of subjectivity in the system to design required different tools. When the various logical and time related components were easier to determine and less subject to unpredictable behaviours student were encouraged to use IDEF0 (1993), a modelling tool used in system engineering.

When, instead, subjective components needed to be considered, scenarios and use cases were used (see fig.2), borrowing such methods from the Unified Modelling Language, used in information technology (Kulak and Guiney 2000). Use cases are short stories about the way a service will be used. They provide a detailed requirement list of each functions included in the service, including material and service components to be designed or modified.

Blueprinting a PSS. While students are very familiar with methods to represent the mechanical and functional components in products design, no accepted and standardised method exists for the representation of a PSS.

Figure 3 "Trancity" (H.Nielsen, C.Broe, M. K.Thomsen, H. Paus): Schematic representation of a use case for a car sharing service



Although service marketing proposes interesting examples of blueprinting (Shostack 1982), students needed more accurate representation techniques. The representation of a systemic solution was sometimes a logical consequence of the use of such methods. IDEF0, for instance, uses graphic representation to model the logical structure of a process. In other cases, when use cases were used, a blueprint was developed generating a detailed representation of each functionality.

Example from students' work: "Trancity" *Use of Scenarios and Use Cases for a Car Sharing System* This project focuses on the design of a car sharing service for the city of Oslo. Use cases were used to elicit the requirements for material details and the organizational structure of the service. Use cases were described in a diagrammatic way, that showed the flow of events, actors involved, pre and post-condition and alternative paths. The graphical description also includes further information such as the space in which each action takes places and other actions beyond the *line of visibility* of the service (e.g. procedures and infrastructures). The list of requirements emerged by focusing on each function and each location. The requirements clearly emphasized the design details to be addressed.

3.2 Domus Academy: I-design

The teaching experience of any Master at Domus Academy, that is for graduated participants that often have already a professional background, lasts one year and is composed by three main phases: (1) theoretical background; (2) workshops for 5 months during which the participants go through 5 to 6 design experiences were they work in small groups led by project leaders and tutors. Each workshop proposes a different theme; the design briefs, often coming from a collaboration with companies, must follow two basic requirements: being relevant in any research directions identified by the school, refer to feasibility and viability criteria; (3) final master thesis – the last 4 months are dedicated to the individual master projects.

Within the I-Design framework, the workshops and seminar of the second part, refer to three main research areas: active tools (interactive objects and tools supporting daily life), media spaces (digital information overlapped to the physical environment) and interactive media and services (new interfaces that modify the service experience). The service dimension is embedded in all the dimensions of interactivity, but it might be developed and described as:

- the systemic framework an innovative object or tool might be based on - in this case the designers are requested to identity and represent the system schema and the main potential actors in order to check gross feasibility of the idea;
- the complete service experience happening in a physical context and/or in the interaction with a new media – in this case the whole experience must be described using all the evidences the service requires and/or the interface with media.

During the first year of the I-Design Master, a 3 weeks workshop specifically focused on service design has been conducted in order to introduce the service concept and related design issues at the early stages of the curriculum. The aim of the workshop was to make participants able to manage the service as a context for the introduction of new interactive media and tools, and to manage the quality of the service as the quality of the whole interaction experience. The expected results of the workshop were not new service concepts, rather interactive tools to enhance the service experience and value. The name of the workshop was "GATES": specific objects within the service interface environment become activators of new service functions. We provided them already with examples of existing service places to work on: a fashion shop, a book and music shop, a real estate agency, the central station and a disco. We separated the participants in four groups focussing the attention each on a different "service experience phase" (wait, test/taste, play, pay) to be analysed in all the service places we gave them.

Figure 4. Let's wait – Real estate agency (Diana C., Furnari, S., Mangupli, M)

Figure 5. Let's wait – Train station (Diana C., Furnari, S., Mangupli, M)

The design phases were:

- quick and dirty analysis of the places through pictures and memo-notes, to identify potential "gates" to enhance the "service experience phase";
- concepts of "gates" for every analysed service places following a given format: one image and description and short storyboard;
- concept design of one "gate" through a conceptualised storyboard eliciting the specific interaction and the benefits for the overall service experience.

The workshop approach is useful to achieve a quick sensitivity towards service interface environments and to grip the different phases of the service experience, not to give the systemic dimension of each service functions. The abilities towards synthetic visualisation of service ideas were stimulated by not introducing extra visualization tools than storyboarding, which they were already used to.

3.3.1 Politecnico di Milano: *ServiceHotels*

The first year of the Master Degree Course in service design foresees two parallel design studios, one working on the service concept generation and the other one on the service development. The *Service Hotels* design studio, belonging to the second typology, aimed at developing or re-designing hospitality services within two Milanese hotels working on the growing service potentialities offered by ICT. Using real case studies was one of the conditions in order to bring students in contact with concrete service development issues; the other condition had been to propose semi-structured design briefs that should have helped students to reach more quickly a specific design area. These briefs were the results of the overlapping of three dimensions: *service theme* (service personalisation or relationship with the territory), *service place* (private places like the room or public places like the hall) and *service activities* (eat, work, sleep, buy, etc.). Positioning at the encounter of some of these axes helped students to position their project proposals till the beginning (for example "personalisation of work activities within public spaces"). The design activities had been organised in three main phases: service analysis (5 weeks), concept generation (3 weeks) and service development (5 weeks). Each of these phases aimed at supporting students to be able to understand the complexity of services and to start reasoning and designing in terms of activities. The design contents (system, offering, interaction and evidences) worked as filters in the way students looked at the existing services and in the way they designed new ones. For each of the design contents we proposed some tools.

The analysis and design of the service system means mainly to identify *who* are the actors involved in the service action and to describe their *competencies*, *roles* and *tasks* in the performance while visualising their reciprocal relationship and kind of interaction.

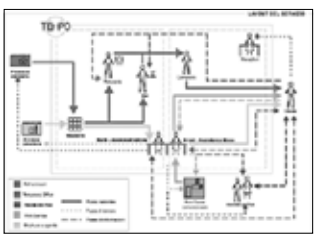


Figure 6. "Tempo" (Manzoni, A., Masala, C. and Morra, M.): example of System Map

In the analysis phase students carried out some interviews to key people of the selected hotel and did some direct observation of the service performance and places. They synthesised the collected information through actors' portraits and represented the analysed service performance through a blueprint.

In the design phase students identified the targeted user profile and the service staff involved in the proposed new service, representing the overall organisation and flows through a synthetic map (System Map, see fig. 6). Because of the reduced number of visits to the hotels, many students presented poor portraits and too abstract blueprint, not enough stimulation for the design phase.

3.3.2 Offering

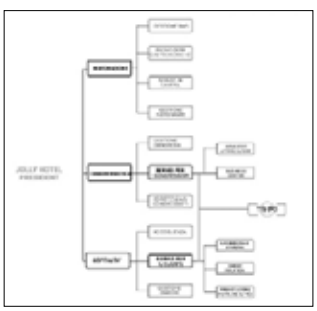


Figure 7. "Tempo" (Manzoni, A., Masala, C. and Morra, M.): example of Offering Map

The analysis and design of the service offering mainly aimed at visualising the *service functionalities* and translating them in terms of user and service staff activities. Students used two similar tools: the *Offering Map* and the *Activity Map*.

The *Offering Map* is a way of representing all the functionalities and sub-functionalities of a service, around the core function. The *Activity Map* uses the same radial or tree like format, but works on activities: through the map students should translate the service functionalities in terms of activities to carry out and articulating each activity in terms of actions and, if necessary, of service operations.

The main difficulty students faced was to distinguish the service functionalities (potentialities of action) from the actual service activities to be carried out, often mixing the two sets of information in the same map.

Figure 8. "Tempo" (Manzoni, A., Masala, C. and Morra, M.): example of Use Case/storyboard

3.3.3 Interaction

The design of service interaction aimed at translating the service offering in potential user interaction paths. This was based on the definition of some potential *use cases*, i.e. describing different *user profiles* and imagine, for each of these, an ideal interaction path or storyboard.

3.3.4 Evidences

The design of the service evidences translates the service description in concrete products, environments, signs, etc. which support the service performance and represent the service identity. In the overall design process the design of the service evidences can remain at a general level of description and visualisation, like through functional layout, sketches, reference images, mock-ups, etc. Students showed different levels of design skills. The design of the service evidences in fact asks for different kind of competencies related to interior design, graphic design, web design and so on.

4 Discussion

In conclusion we can say that moving from different design approaches, the three visions about the *real nature* of service design theory and practice seem to converge on some complementary focus that goes from an abstract to a concrete level: from a systemic level (Aalborg University), to an activity and contextual level (Politecnico di Milano) to an operational and material one (Domus Academy). These different approaches are complementary to each other.

Considering the service design approaches on a general level we can make the following observations:

- *Systemic and constructivist approach*: Aalborg University approach tries to define what we can call a constructivist approach to the general system that originates the real service design solution; considering the actors' network as the real problem setter & solver of service process resembles Bijker's SCOT theory[2]. But there are some points that this approach should verify. First of all the fact that respect to actors' system, the judgement about the fact that service artefacts work or not depends on who is using them and how they use them. This *interpretive flexibility* can be interpreted as a proof that in early stages of service development, the service solution might develop *multidimensionally*. This kind of *multiverso* unfortunately is a great limit to the real economic and organisational development of the service itself. Moreover we can interpret more properly the service actors' system if we characterise it in terms of relevant social groups; in this case only with a deep ethnographical process of observation and interpretation we can find how they define and adapt the service solution to their purposes and understanding capability. In fact referring to SCOT theory we can say that each actor (or group of actors) understands the service solution based on what they already know about related technologies[3]. So a way to develop innovative service system solution is to combine and mix different technological frames. The interpretation of the service frame will stabilize when social groups will reach a negotiated consensus or when one group's interpretation will dominate. We can, therefore, say that the visualisation of the process made using IDEF0 should comprise also the *participation* of the social groups potentially involved in service activities.

- *Contextual and constructivist approach*: Politecnico di Milano uses a *contextual* approach based upon Activity Theory. The main objective of this approach is to include, through an interpretation of the people involved in service activities, the *social dimension* of service activities. This approach has some limitations as it doesn't comprehend and integrate in a deep way, the pragmatic and market oriented dimension of the firm's way of offering. This generates a sort of *double development path* that should be integrated. The Politecnico di Milano approach uses a constructivist vision too that sees the focus of the service concept generation in the world of capacities, of artefacts, of values linked to the action world. This could sometimes reduce the important (and as much fundamental) market dimension with all its related issues.

- *Operational and material approach*: Domus Academy approach starts from a different point of view; it considers service dimension as an embedded interactive process that emerges during the service performance. This vision draws attention to the developing of tools and methods able to understand and design the interaction performance. This approach could be very effective but it could also forget the social and the systemic dimension of service activity especially in its community related issues. This approach could be used in really specific or idea-driven context (i.e. market driven approaches to service design) thanks to the simple and clear steps but it should, at the same time, face the limit of *representation* of the social relationships between the service main actors.

On a practical level the three educational experiences faced some similar issues:

- *Introduction to services*: students with product design background need support to think in terms of services and figure out the outcome of a service design project; this could be improved by a deeper analysis of real production chains in which we can more and more often find *product-service* than only products and through a *best practice approach* i.e. developing a great number of case studies to be used as useful and descriptive examples;

- *Human activity description*: students need tools and methods to understand human activities in service design and to describe its logical and time-related dimension; all the ethnography like analysis tools and methods also require an interpretative part that, in the case of service, must be developed. Very often the different levels of service design (system, collective, and single dimension) can be mapped but not really methodologically clustered and understood. This lack of transparency could be a problem in certain part of service process development, especially when you need negotiation between *stakeholders* and *users*;

- *Service complexity*: the service nature demands that new visualisation tools be able to represent its high level of complexity. Furthermore the design of the service organisation, performance and interface requires different kind of competencies and project skills that seem to exceed the students' actual capacities.

5 Conclusions

The cases emphasize the need to redefine designers' role and competencies, in order to equip design education to the evolving scenario of industrial strategies.

We think that the three analysed approaches represent three different but complementary visions that could merge into a sort of great *service design framework* in which are integrated different design levels (system, macro, micro), different design focuses (market, technology, society, user) and different design tools. If integrated in a unique dimension they could solve almost every possible service design context.

We believe that from a real comparison among the methods of analysis, interpretation, design, development of service could be born a real step by step process that could be used as a basis for building a service design curricula and a real plan of what kind of skills, competencies, disciplinary fields must be involved. This could be intended finally like a great *service design platform* that could then join all other possible and more refined tools and approaches. In our opinion this common platform should be built and this paper tells us that this evolution could be done.

Notes

1 Activity Theory is a research framework that offers a set of perspectives and orienting concepts to study human activity. In particular, the Activity Theory suggests an analysis unit of the human activity, defined as activity system (Engeström, 1999)

2 SCOT stands for Social Construction of Technology see Bijker, W.E., Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change, MIT Press, Cambridge-MA, 1995

3 Bijker call this technological frame

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Integrating 'Design for Digital Interactive Environments' into Undergraduate Visual Communication Design Courses

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This paper describes a way of integrating the study of 'Design for Digital, Interactive Environments' within undergraduate Visual Communication Design courses. It suggests that an appropriate means of integration locates this study within principal-based curricula concerned with generic design skills and knowledge common across media and type of design problem. A second key aspect of integration is determined to be recognition of the unique communication opportunities digital systems offer designers in the representation, structuring and accessing of information.

Keywords: *interactive, multimedia, education, graphic design*

Introduction

The term 'graphic design' describes a profession whose boundaries have shifted to include categories of 'screen-based' design work. This covers a range of activities including the planning and execution of web sites, CD-ROM titles, interactive media kiosks and so on. Since the 'multimedia revolution', which introduced technologies that made it possible for designers to plan and build digital, multimedia, interactive environments, design educators have faced the ongoing challenge of how to integrate the skills and knowledge required by designers in this emerging domain into existing visual communication design courses.

Various approaches, time allocations, aims and objectives, and related expectations associated with the integration of the body of knowledge and skills needed for professional practice in the area currently exist in art and design degree courses.

Often in courses that offer 'design for screen-based environments' the teaching and learning strategies can be little more than an application of print-based design conventions to what is considered just another two-dimensional 'surface' to be organized. Solutions are often modeled on design strategies appropriate for print-based rather than electronic formats, and are even described in ways that suggest print-based treatments are sufficient, for example: 'on-line catalogs' and 'e-zines' (electronic, online magazines).

Another scenario is courses that focus excessively on technical competencies. Acquiring the software knowledge required to execute the work can often become the focus of teaching and learning. The technologies involved are notoriously confusing and time consuming to master, as well as susceptible to constant change. It is all too easy for students and educators to become consumed in production aspects of the process at the expense of a deep investigation into appropriate and innovative approaches to problems of interactive multimedia design.

What I propose here is that the study of design for interactive digital media environments is appropriately integrated into learning through extending key concepts that reside within a common

body of knowledge for designers. Specifically, an extension of the study of 'systems of representation' (or 'signification') used by designers to carry meaning to include the added representational dimensions for communication that digital, multimedia systems offer. I also propose that included in responsibly integrating the study of design for digital environments is a set of what I believe to be essential understandings based on the nature of the digital medium itself. Understandings that acknowledge the critical differences between design for digital, interactive environments and other more traditional print-based design challenges investigated by graphic designers.

Principle-based Curricula

The studio-based design course I teach on aims to cover fundamental skills and knowledge for designers which our staff team have identified under the headings: 'Design Methodology & Process', 'Visual Language' and 'Tools, Materials, & Processes'. Students are introduced to a range of ideas, theories and methodologies through lectures and seminars, and engage in problem-based learning activities to gain practical experience in applying their knowledge.

The aim is to facilitate an understanding of the processes involved in perceiving messages as well as the knowledge and skills involved in constructing them. Using a problem-based model of learning students repeatedly investigate design processes and methods through practical problem solving experiences. They develop a personal familiarity with problem definition, research and information gathering, concept generation, creative synthesis, and analysis and evaluation – all skills essential in approaching any design problem.

Integrated into this practical, studio-based approach to learning are opportunities for students to engage in the critical thinking necessary for them to raise pertinent questions, debate and speculate current issues, and contextualise their work as designers in relation to the wider social, cultural, economic, and political contexts in which it exists. Analysing the ways in which designed artifacts (2d, 3d, and time-based forms) are organised to carry meaning, the motivational strategies used to influence the response and behavior of an audience, and theories of how viewers receive, interpret and understand what they experience, provides a basis for critical investigations of design work.

Course learning outcomes are based around knowledge and skills that cross media and type of design problem. Regardless of the latest version of Photoshop, or the newest tool on the market for building web sites, they remain at the core of considered design activity. The curriculum is organized around a central theme, that of understanding how representations (image, word, number, sound, moving image, interaction & gesture) carry meaning.

Various media and types of problem are used to explore how systems of representation are used to communicate information and ideas effectively. That is, appropriate to the content, context, intended audience, and communication goal. Practical project work, lectures and discussions revolve around understanding the means utilized by designers to encode meaning, and the complexities of the processes used by audiences to decode meaning.

Extending a Study of 'Systems of Representation'

The teaching and learning strategy for building this knowledge is based on investigating content structures that cumulatively build in complexity. The inter-relationships of representational systems used in static, two-dimensional constructs are first investigated through to those utilised in digital, interactive multimedia environments, studied late in the third year programme.

By increasing the representational dimensions along which meaning can be carried, our study naturally extends to include more complex relationships with time and space, investigated through digital interactive multimedia projects. Words can be spoken as well as written, images can move, the addition of sound is possible, and, significantly, components within digital environments can change, update and respond to user interaction. The designers' task of organising and structuring content is

made more complex with the addition of these added representational dimensions. We acknowledge a new set of challenges to be considered by graphic designers.

Emphasis is placed on understanding an interactive multimedia environment as offering unique opportunities for the communication of information, distinct in important ways from the world of print design. Our study acknowledges that meaning is temporary and negotiated collaboratively between a user and the system on a scale different to that of which it might be achieved between a viewer and a print-based construct.

The digital environment offers access to complex, multiple representational means for the communication of information and ideas. This is possible due to the technology behind the medium, and our study begins here.

The properties of the digital, interactive medium are based on the computer's ability to store and manipulate digital information. The behavior of components in a digital environment is controlled by programming code stored in a computer's memory. Elements visible on screen, or sound audible through speakers, are open to change by altering that code.

By turning our attention to the nature of the medium itself we reveal its inherent characteristics and qualities and can begin to identify its potentials and constraints for particular communication tasks. We reveal the properties of the medium that determine the opportunities available to designers for carrying meaning. As well as attending to aspects of two-dimensional form, the added possibilities offered by multi-dimensional, digital systems include:

1 Time-based media

The potential exists to utilize time-based media elements (video, sound, animation etc). Time-based media arts (theater, dance, video, film, sound-design etc) have a wealth of knowledge to be utilized by multimedia designers.

2 Non-linearity

The format for accessing or navigating the content of a digitally based work can be based on an arrangement alternative to that of an essentially 'non-interactive' or 'static' experience. Digital interactive systems present the opportunity to construct less prescribed sequences of events, or, to construct non-linear narratives. It is possible to navigate content in no pre-determined order, and possible to hand over a degree of control to a user.

The system may have many more components to it than what is visible on the screen at any one time. Access to the different parts can be dependent on user choice, allowing for the possibility for two people to self-direct their experiences very differently. Determining how someone accesses information, and determining the users role and level of control over the system, are decisions to be made by a designer.

3 Interactivity

The idea of 'interactivity', which we might talk about in relation to two-dimensional design as the act of scanning a surface, or turning the pages of a book, is emphasised as the defining feature of a digital, multimedia, interactive system. It is the defining quality of a virtual, digitally coded, interactive experience. Events that take place through what we might describe as 'conversations' between a user and the system are controlled internally through programming the system (at varying levels of complexity) to respond to user input in certain ways.

That these technologies make possible certain communication opportunities distinct in nature in fundamental ways from the medium of print is a key understanding that frees designers to go beyond conceptualising solutions to problems of electronic multimedia design within established parameters of print design.

The interactions in themselves are an opportunity for carrying meaning. As well as the visual look a screen element, the way in which it behaves (how it reacts in response to other elements in the system or to user interaction) is an opportunity for a designer to encode meaning.

Various fields of expertise need to be drawn on to inform conceptual, formal and technical decisions in this area of design. The field of time-based media will offer valuable conceptual and technical knowledge - the art of story-telling, sound design, video editing techniques, story-boarding skills etc. Computer science will offer essential programming skills and knowledge. Aspects of human functioning including the cognitive, physical, social, and cultural factors that determine the ways we use, interpret, and understand our world are essential to any and all forms of design.

More specifically, developments in human-computer interaction sciences are invaluable to the study of design for interactive multimedia environments. Students are introduced to ideas and information from a broad variety of disciplines with the aim of developing an appreciation for the significance of information and ideas that come from outside the discipline of graphic design itself.

Summary

Digital, interactive multimedia design challenges the traditional conception of the graphic designer as inventor of two-dimensional, 'visual' form. The increase in complexity of the designers' task is accounted for by the opportunities made possible through the digital medium, opportunities that hold the potential to affect the full range of human senses and offer alternative arrangements for experiencing content. These opportunities include the use of sound and moving image, of non-linear organising structures, and digital interactivity.

As well as attending to aspects of visual form, how elements update or change in response to user interaction or how their relationships with other elements in the system cause them to behave, adds to the representational means available to the designer for carrying meaning.

Fully understanding our role as interactive, multimedia designers demands that we engage the differences as well as the similarities between the traditional practices of graphic designers, and the practice of graphic design as it exists in an increasingly sophisticated technological environment. Undergraduate programmes that claim to prepare designers for work in this domain need to structure courses that present students the opportunity to engage critically with existing solutions, foster creative approaches that explore the full range of opportunities afforded by the medium, and facilitate a cognitively demanding approach to the creation and evaluation of solutions. Approaches to study should signal the full range of related understandings to be developed by interactive multimedia designers, embracing knowledge from a diverse range of non-design disciplines.

How do we approach an effective integration of the fundamental understandings needed for our students to take a deep approach to problem solving in this area? Rather than approaching design for interactive multimedia as an extension of print design (as just another two-dimensional surface to be manipulated with a few added options that complement visual decisions), our integration is guided by a clear educational objective: investigating the opportunities for effective communication provided by the added representational dimensions inherent in digital, interactive multimedia environments. Our aim is to achieve integration through extending a study of systems of representation that gradually increases in complexity to include time-based and interactive media elements.

An integrated approach to problem solving for digital interactive media considers the multidimensional, interactive nature of the medium itself as a starting point for developing appropriate design strategies. Considering the unique characteristics of the digital interactive medium as opportunities for carrying meaning, students are in a better position to conceive of appropriate and inventive solutions to interactive multimedia design problems. Grounding the study of digital interactive environments within these terms opens the way for inventive thinking that challenges a graphic 'page-based' approach. The potential superficiality of solutions that comes from working within models inherited from print-based design can be avoided.

This approach to the study of interactive multimedia design also sets the stage for more rigorous investigations by students moving on to research oriented study at postgraduate level. By favoring study at undergraduate level on the development of design strategies appropriate to the unique representational opportunities provided by the medium, students are involved in exploring the range of extended communication possibilities on offer. Students are set to challenge what has come before, investigate new territory, and speculate on future developments in relation to emerging technologies in the area, adding to the body of knowledge in a developing discipline.

An introduction at undergraduate level to ideas and sources of information outside the immediate disciplines of art and design fosters an approach to study that importantly goes beyond a subject-specific focus. Professional/academic collaborations with experts in non-design disciplines are an important component in the wider development of this emerging, interdisciplinary field of study.

Utilising Different Learning Styles to Develop Curricula, Teaching and Learning in Design

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Elizabeth's research interests interrogate where trends emerge and design thinking and research methods meet in education. These interests are currently focused on identifying ways to extend the designers range beyond the parameters of personal knowledge, individual perceptions of need and peer group approval to enhance inclusive design and design for ageing populations. Elizabeth has published in areas of inclusive design, design for ageing and design education.

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This paper considers the development of project-based curricula, teaching and learning within BA (Hons) Ceramic Design, Central Saint Martins College of Art and Design, University of the Arts London, England. BA (Hons) Ceramic Design is a unique undergraduate ceramics course in a national and international context because its focus is on design through ceramics. The course has established and developed its philosophy since 1991 and during that time the course team have become acutely aware of different student learning styles and how this is expressed through design. Student learning is achieved through experiencing a range of design practice and methodologies and names three key methodologies by which individuals can usually be identified and from which projects are constructed.

Design by Project: is ideal for those who enjoy distinct parameters, the design process perceived as linear with specific points of delivery and outcomes.

Design by Concept: is a more flexible approach and is about building the framework for design thinking and is highly reflective and research based.

Design by Practice: is a more typical ceramist's approach for those who enjoy the process, the making experience and the intrinsic qualities of objects.

These descriptions are not exclusive and often overlap but the articulation helps students to value their own design process whilst being able to use other methodologies in differing circumstances.

Keywords: *learning styles, contextualized experiential learning.*

1 BA (Hons) Ceramic Design, Central Saint Martins College of Art and Design, University of the Arts London.

BA (Hons) Ceramic Design is unique nationally, offering a specialist design-led experience in the context of the broad subject of ceramics. This paper proposes that whilst creative tutors within BA (Hons) Ceramic Design have intuitively developed innovative projects, sensitive to different learning styles, these may be developed explicitly within the curricula by integrating theory into practice. Using ceramics as the focus of the case study locates the discussion within a rich tradition of craft based design, which has embraced the industrial consumer context and issues familiar to a range of design disciplines.

Ceramics is both one of the oldest and newest material technologies demanding understanding and translation of material which has an intrinsic identity, points of reference, history, social and cultural meaning and a highly idiosyncratic, physical behaviour. Working and designing with ceramics requires both an intellectual and tangible understanding of its typology, meaning and technologies. As a fundamental, the course curriculum enables students to 'learn by doing', to design and translate ideas in ceramics, based on a hands-on experience and understanding of clay.

For the last twenty to thirty years, ceramics has tended to fit into one of the two main categories: 'functional' and 'non functional', which could be subdivided broadly into hand produced pottery and art objects on one hand, and industrially produced, functional tableware and giftware on the other.

However, media coverage and the consumer hunger for lifestyle products have had a significant influence on ceramic design and manufacture. Manufacturing industries have had to learn to be more responsive to market trends and to manufacture products quickly and with greater flexibility. In comparison with other industries, ceramic production costs are now relatively moderate, and individuals and retailers are able to gain manufacturing opportunity very easily. A new 'middle market' of well designed homeware, both functional and decorative, aimed at aesthetically aware buyers has emerged, with entrepreneurial individuals such as Ceramic Design graduate Kathleen Hills, and companies such as Yo Yo Ceramics leading this new territory.

Like this new generation of designers, Ceramic Design actively seeks commercial parameters for the course, with students exploring market, technique, production process, time to market and cost. The course sees the relationship between user, audience, material and context as vital to functional ceramic design irrespective of whether the outcome is a lifestyle product, an architectural or site-specific commission, or a bespoke client-commissioned artefact.

Against this new, market-driven arena, social, cultural, ethical and ecological issues are increasingly important. The course aims to offer a student experience that combines a knowledge and understanding of ceramics, design skills and abilities, market and manufacturing awareness with social and ecological responsibility. The curriculum is offered through a range of learning styles that relate directly to professional models of practice. Theoretical curriculum elements are embedded and linked directly to the design activity, enabling students to question, articulate and present ideas in the context of set and self initiated projects. The course has good links with a range of external affiliates, including individuals and companies and has a history of successful and ambitious collaborative projects.

The course team rigorously reflects upon the overall student learning experience and the changing external factors against which the course operates. Although the number of applications suggests that there is a diminishing interest in ceramics as a specialist area of undergraduate study, Ceramic Design has maintained its position in attracting a large market share for the last three years. This is in part due to the student-centred focus of the course, which enables students to identify strengths and extend them, address weaknesses, and realise individual aspirations. The high profile staff team has unique subject expertise and is actively involved in current professional practice and research.

The course continues to build on the success of its graduates, offering a life-long learning approach to the acquisition of skills and knowledge, enabling students to develop the essential transferable skills necessary to enter a wide range of employment and self-employment opportunities.

2 Course Rationale

The course is unusual at undergraduate level in that it is focussed on ceramic design where the relationship between user, audience, material and context are vital to its application of functional design. This is interpreted broadly, embracing utility and decorative function. Students engage with numerous types of creative practices and contexts. They can be characterised, at one end of the practitioner spectrum, as applied product designers who design and produce highly refined lifestyle

products and expressive individual makers who are informed by craft and create bespoke artefacts at the other. Between these lie design practice, which could be interior design and public architectural or site specific design.

It is vital that the practitioner has the confidence to interpret design from a deeper understanding of one particular discipline and acquire the ability to sensitively translate ideas through the medium of ceramics, thereby appreciating that all materials have their own typology, meaning and technology, and require both an intellectual and tangible understanding rather than just their appropriation.

This creative journey can be an extraordinary challenge and a joy. Student success can be achieved through the understanding of the design's context, materiality and function, and the learning approach in relation to the need of a particular audience. This will demand in a student the ability to take risks, employ flexible and lateral thinking and the appreciation of 'designing through making'. The course is student centred, and framed to explore learning styles in relation to professional models of practice.

In the 21st century a good ceramic designer is required to understand and appreciate the breadth of design territories and how those boundaries might be breached at an emotional, strategic, entrepreneurial and commercial level. The nature of ceramic design enables a designer to manufacture individually and in batch production whilst also working within client driven and higher volume contexts. The professional ceramic designer may operate as a freelance designer, as an entrepreneur, consultant or as part of a design team, collaborating with other designers from different disciplines or with architects and planners. The course seeks to engage with and enrich this debate and create opportunity within a highly structured programme.

These distinctive features of the course encourage the students to reflect on and communicate their ambitions and concepts with focus and vision. Individual aspirations are supported and encouraged by a high profile staff team of design practitioners and researchers with unique subject expertise. Building on the Universities' excellence in research in teaching and learning, the course integrates research into studio practice to encourage the ethos of lifelong learning and diversity.

3 Learning Styles, Strategies and Skills

The student profile for Ceramic Design is diverse. There has been a steady increase of students recruited from a wider ethnic diversity, from 33% in 2002 to 40% in 2004. Diversity is welcomed and encouraged as it brings a vast range of experience to the student body. However, diversity creates its own challenges as the conceptions of learning and design may also vary greatly. Ceramic Design recognises that such differences reflect a range of learning styles, strategies and skills. This philosophy contributes to the course aims of progressively shifting student conceptions from a potentially surface learning approach utilised within short term examination contexts, to deeper learning developed and used strategically to support transferable skills relevant to a range of professional contexts. The prospects for Ceramic Design graduates - with a healthy progression of graduates onto a varied range of MA courses - supports the value of this approach.

So what does 'learning style' mean within the Ceramic Design context? "A learning style is a deep-rooted preference an individual has for a particular type of learning (Adey 1999, p.2)," a preferred way of doing something. However, learning skills and strategies compliment these styles:

"Learning skills are almost like 'tricks' which are specific, designed to do one job and can be taught. The term Learning Strategy is used for a group of skills that a learner uses together for a particular purpose. There is no sharp dividing line between learning styles, strategies and skills. They form a continuum from the general deeply embedded (and possibly innate) styles at one end to the teachable subject-specific skills at the other (Adey 1999, p.2)."

However, Adey et al identify two dilemma associated with an over enthusiastic emphasis on teaching and learning focused on particular learning styles. Firstly, the teacher's dilemma, that focus on one style may become disabling if it is at the expense of other ways of learning. And secondly, the

learners' dilemma, that they may acquire a limited view of their own capabilities. The solutions proposed is NOT to teach to a style but rather "Students need to learn both how to use a variety of styles, and to understand the dangers of taking a limited view of their own capabilities (Adey 1999, p.36)."

In Ceramic Design three learning styles are defined:

- Design by Project – which is ideal for those who enjoy distinct parameters. The design process is perceived as linear with specific points of delivery and outcomes.
- Design by Concept – which is a more flexible approach and builds a framework for highly reflective and research based design thinking.
- Design by Practice – which is a more typical ceramist's approach for those who enjoy the process, the making experience, the intrinsic qualities of objects.

These descriptions are not exclusive and often overlap but the articulation helps students to value their own design process whilst being able to use other methodologies in differing circumstances.

From a theoretical perspective, it is interesting to note how these methodologies intuitively recognise theories of multiple intelligence (Gardner 1999) and learning styles (Lamers 2004). However, Adey et al draw attention to Gardner's scepticism for the idea of a general learning style, although they point out that he suggests that "different pupils learn in different ways, some learning better using language skills, some using spatial information and others using quantitative representation (Adey 1999, p.16)." So whilst theories may differ, the practical application has value and certainly this has been the experience for teaching and learning in Ceramic Design.

4 Learning Styles and Ceramic Design Practice

Students who undertake Ceramic Design are, by their nature, a self-selecting group who may share preferred learning styles. However, within this general concept there are subtle sub-divisions of preference associated with specific skills required by Ceramic Design. It is, perhaps, at this point of assumed shared knowledge, that misconceptions about expected learning outcomes by the student and teacher have the most potential to limit student development if left unexposed (Davies 2001). It is essential for both students and tutors to reflect on their understanding of their knowledge and expectations and the impact that each may have on the other (Webster 2002). This reflective process is essential to effective learning but also has implications within the professional design context where efficient communication between the designer and the client is vital (Olson 2000).

In Ceramic Design, learning styles recognise a range of approaches and offer a simple method by which to make differences transparent and understandable within a shared language. Language is increasingly recognised as an important part of the design process where talking has been shown to actively contribute to the design process (Tomes 1998). By recognising differences in preferences and expectations and by developing a language with which to discuss the associated concepts, Ceramic Design learning styles extend the value of individual strategies used to enhance the design process. It is this focus on developing design sensitivity within the ceramic context that defines Ceramic Design. There is a shift in the balance of activity from principally 'ceramics' and learning through doing, to 'design' which anticipates the reception of the product within a defined context. 'Traditional ceramic' teaching and learning has to change to embrace the design dynamics and it is this repositioning that enhances awareness and development of transferable skills.

Design thinking requires Ceramic Design students to speculate on a range of perceptions other than their own, clients, production managers, buyers and end-users. Anticipating alternative definitions of need requires extending knowledge beyond a personal range of experience if designers are to avoid 'solution poverty' (Ward 1984, p.229) from reworking a limited range of known exemplars. Balancing different needs and making sense of complex processes requires flexibility and dexterity manipulating the ambiguity at the heart of the design process. For as Buchanan observes: 'The problem for designers is to conceive and plan what does not yet exist.' (Buchanan 1992, p.18).

The learning styles developed by Ceramic Design help students to plan for 'what does not yet exist' by providing accessible methodologies based on their preferred learning styles. Requiring conscious decisions about the methods used prompts students to reflect on the impact of their learning style and negotiate within the studio context with knowledge of different learning styles. This conscious awareness of design methods shifts the onus of learning from passive students reliant on tutors for guidance, to emancipated learners who actively reflect on the impact of their actions. This concept of self-reliance is harder for some students than others, some find it liberating whilst others feel less comfortable, taking responsibility for the impact of their actions.

Reflection adds value to learning and the design process because as Moon defines, reflection is: 'a mental process with purpose and / or outcome in which manipulation of meaning is applied to relatively complicated or unstructured ideas in learning or to problems for which there is no obvious solution' (Moon 1999, p.161). This definition echoes descriptions of design problems which often remain ill defined and, therefore, resistant to complete analysis. Whilst resistance to complete analysis may provide problems for which there are no obvious solutions it does not mean that solutions are not designed. It may, however, explain the limited interrogation of the design process by designers and the frequent description of design as an intuitive activity, which is resistant to analysis.

Reflection enhances the design process by consciously interrogating the information and assumptions on which design decisions are made. Previous experience becomes transformed into transferable skills as they are connected to future actions by the reflective process. Deeper learning occurs as actions become linked and value is acknowledged within the process of design as well as the product produced. In design, reflective practice was proposed by Schon (1983). However, Cross identified the central creative element of design that may be described as an 'oscillation between sub-solution and sub-problem' (1997, p 439).

The creative oscillation at the centre of the design process may be enhanced by developing reflective interrogation of the information used to define the design problem and assess the value of proposed solutions (Wright 2004). Viewing this process as similar to the experiential learning cycle proposed by Kolb (1984), the creative oscillation can be conceived as central to a consciously reflective design cycle (Wright 2004). Ceramic Design's learning style methodology extends these activities from potentially an inward interrogation of personal practice, to a powerfully strategic tool with which to negotiate alternative perspectives within the broader design context and from within a critically reflective framework. For, as Friedman observes, 'It is not experience, but our interpretation and understanding of experience that leads to knowledge' (Friedman 2000).

5 Integrating Theory into Practice

Ceramic Design incorporates this ethos throughout the course structure and strategies. The course consists of three stages, each of which is self-contained in that the marks from one do not carry forward to the next. The first stage explores the craft of ceramic design, including knowledge and skills in the use of materials. The second stage explores how the craft is the basis of functional design for a particular audience, within a particular context, and from a particular material base. The final stage develops the confidence with which craft and design abilities are harnessed in two significant projects that are determined individually. The curriculum is organised as follows:

- Concepts and components (stage 1);
- Ceramics in context (stage 2); and
- Personal language, professional context (stage 3).

Learning styles relate to these key stages in a progressive development of the students' understanding.

The first stage encourages the students to personally express themselves with learning skills and acquiring technical expertise within a defined precedence. For example, an historical or contemporary context that acknowledges the power of their personal vision and aspiration. The academic staff's professional practice is drawn upon as indicative role models.

In Stage 2 students are encouraged to acquire professional distance by interrogating the value of the different learning styles in relation to their own and others practice. This is enhanced and contextualised by the integration of study trips to industry and the commercial sector. Personal parameters are defined within competitive engagement in The Royal Society of Arts Student Design Awards and validated within professional experience.

Stage 3 draws on the experience of the preceding stages to refine individual learning styles within the newly acquired knowledge and confidence of an emancipated designer. By this stage, Ceramic Design students are reflective and analytical practitioners who can locate their practice within a critical context and who strategically integrate theory into practice. This is achieved by wide ranging research, which raises awareness of social, cultural and ethical imperatives. The theoretical elements of the course are embedded within the design practice of the individual enabling graduates to be able to articulate their critical attitude and position coherently. The ability to communicate effectively, visually and verbally with specialist and non-specialist audiences, is continually tested by presentations contextualised by design methodologies derived from personal learning styles.

The integration of theory and practice in Ceramic Design is consistently referenced within the context of professional practice. This is, perhaps, most apparent within the 'Client Project, Design for Specific Location' in Stage 2, where an overriding theme is established and between four and five clients are identified, each embracing differing perspectives on the central issues. In 2005 the speculative clients will be Southwark Cathedral, WaterAid, Traidcraft, Amnesty International and Pi3 Packaging Innovation within the theme of '*Responsible Design*.' For example, in Traidcraft's perspective the student design consultancy will construct and deliver a working methodology of the designer's relationship with manufacturing in the developing world for sale by a consumer orientated retail client. Of specific interest, is Traidcraft's brief to designers to devise a working methodology, based on their accumulated knowledge of learning styles and professional practice, to integrate Traidcraft's international consultancy with local traditional practices. The designers must understand a range of cultural contexts, the market, the client and the manufacturing base. Whilst the students adopt an identified learning style as a methodology for the project, it is vital that they do not assume knowledge and respond intuitively but rather critically analyse the context to construct a reflective framework for their proposed solutions. Working in a team forces negotiation and understanding of different approaches whilst maintaining personal design integrity. This project illustrates the philosophy of Ceramic Design, that designers should be ethically aware, in a world where perceptions of need are contested (Fry 1992) and increasingly design must recognise its responsibility to the consumer culture within which is operates.

6 Conclusions

Project-based learning is a familiar element in the curricula of many design institutions within the United Kingdom. The 'design project' is conceived as a simplified simulation of working practice, originating from the apprentice system of master and pupil. However, within the context of mass consumption, the products of studio practice have evolved from hand made bespoke pieces, to incorporate design for industrialised mass production. Similarly, the role of design education has rapidly expanded and within the UK this trend is set to continue as government initiatives aim to encourage fifty percent of eighteen to thirty year olds to enter higher education by 2010. Expansion of design education has led to more designers being educated than can reasonably be expected to work specifically as designers; shifting the emphasis from education for design, to education through design. This development has been encouraged as the flexibility and creativity of design offers many transferable skills to an increasingly complex and innovation driven socio-economic environment. Together these trends, for higher student numbers, recognition of the value of design thinking and of the needs of changing industrial societies have lead to a re-evaluation of curricula, teaching and learning.

Within the knowledge economies of the twenty-first century the professional employment opportunities of Ceramic Design graduates will be plural. Graduates recognise the value and transferability of their skills to inform other design contexts and creative industries. The essential value of learning styles in Ceramic Design is that they empower students to become emancipated designers. Ceramic Design graduates understand their personal design process, are strategic, critically reflective and appreciate the increasingly complex consequences of their design decisions within a continually changing world.

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Is there a Need for Cultural Approaches in Visual Communications Curricula?

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Presented and discussed are two possible models of implementation, both easily adaptable as trans-disciplinary courses for international and domestic students across departments of graphic design, advertising, and communications. The first, intended for incoming international students, is primarily lecture-based and fundamentally concerned with providing a greater awareness and understanding of cultural communication issues and possibilities in general, but with special concentration on those pertaining to specifically to the host-culture. This includes slide lectures showing, for example, pieces (from graphic design and advertising) that effectively utilize verbal and visual associations that are culture-specific, language-specific or region-specific. Outlined projects and lectures are meant to enhance knowledge of the host-culture's idiomatic expressions, colour associations and cultural taboos, and include resources for further examination.

The second model, built upon the foundation of the first, includes a much more robust examination of cultural communication issues and possibilities. As such, it is intended not only for international students, but for any and all interested students in the fields mentioned above. Interesting cultural differences might be revealed not only through visual and verbal choices and approaches, but also through what each culture considers to be problematic, indecent, socially acceptable, et cetera. Exposure to foreign stylistic influences can also extend students' creative reach and enhance their visual palette. Projects and presentations, with or without the advantage of a partner school abroad, are geared to take advantage of students' different cultural backgrounds, providing the class with a larger perspective on points of cultural differences, and similarities.

Keywords: *trans-disciplinary, cultural communication issues, idiomatic expressions*

Introduction

As a design educator and a former international student, Mervi Pakaste has had first-hand experience with some of the common difficulties that foreign students face. While a few programs still debate whether international students should be taken into graphic design programs or not, for the general majority this has become a non-issue: all else has become subservient to the quality of the portfolio. There are innumerable benefits to cultivating a thriving international presence on campus in the student population, and as educators we must always keep in mind that there are some general issues that pertain to foreign students. This is inevitably due to language barriers of various heights (depending on the individual student's level of fluency) and cultural differences. The world is getting smaller as we speak, and global and international interaction has become a fact of modern business

and life; It would be a disservice not to equip students, domestic and international, with awareness of some of these issues as they pertain specifically to design.

The following remarks are intended merely as a guidepost; institutions accepting international students into their program will support their students as they see fit. It is our hope that the integration of some of the ideas presented in the following pages to already existing classes might be helpful. We would also strongly recommend that each institution contact their International Office and language departments for possible collaboration and to make use of their skills, resources and knowledge.

The First Course Model

The first model, intended for incoming international students, is primarily lecture-based and concerned with providing a greater awareness and understanding of cultural communication issues and possibilities in general, but with special concentration on those pertaining to specifically to the host-culture. This is less an interactive class where one would explore myriad design-related differences between cultures, than an environment introducing the host-culture to the students and deepening their understanding of its mysterious idiosyncrasies of communicative tone. The core idea is to provide students with a broad, basic awareness of the host culture's unique rhythms that will make them successful designers if they choose to seek employment in the host-culture.

Such a course does not need to be worth academic credit (and certainly not much if at all); the idea is to heighten and broaden the students' familiarity with the host culture (in my case, that of the US) and how it translates visually and conceptually into graphic design work. Two hours a week should generally be enough to get the main ideas across. Much of the time would be spent on slide lectures, not on doing design.

Figure 1

It is important that international students develop a basic awareness of how cultural factors can influence the effectiveness of design. While students quickly become aware of obvious cultural differences between their home country/culture and the host culture, they often do not understand how graphic designers tap into the cultural vein of what is often a fundamentally 'foreign' society.

Figure 2

First I generally impress upon my students that successful graphic design is not simply about decorating, but that good design relies on good ideas and concepts. Culture influences viewers' understanding and associations. The verbal aspect and visual aspect of a piece of visual communication, when placed together, must be right for the cultural context if it is to be interpreted appropriately. In order to be effective the designer must be aware of cultural and social influences that shape an audience's understanding. One widely acknowledged example is colour association; Colour can have radically different meanings in different environments. We all have heard, for example, that the colour white in America and Finland symbolizes purity and is often related to weddings, while in some Eastern cultures white symbolizes mourning. The usage of wrong visual image or words and phrases can mislead or confuse the viewer.

Because of this, students should be provided with a basic grasp of how visual and verbal elements combine to create an overall message, and that there are different ways of accomplishing this task. One can approach this visual-verbal connection on a very literal level, as was done in Milton Glaser's famous promotional design "I love NY" for New York City in 1976 (figure 1). One can also take a more suggestive or abstracted approach, using key visual symbols that take on a different meaning because the verbal association suggests it. Such is a Boston's WGBH – TV Channel 2 ad (figure 2) by Chris Pullman, from the late 1970s. There is also a sequential approach, exemplified in A.H. Cassandre's Dubonnet ad (figure 3) created in 1932.[1]

Figure 3

It is also important to introduce the host culture's main cultural associations to international students. A good place to start is with colour, specifically the associations they hold in the host culture. I previously mentioned the colour white, but there are also others with radical differences, such as red, which in India symbolizes purity, but in U.S. could be used to symbolize evil, emergency, sensual passion, or simply STOP. The U.S. also has many colours related to specific seasons and holidays:

Figure 4

Figure 5

Halloween colours are mainly orange and black, while Thanksgiving holds warm browns, reds and yellows, and Christmas is traditionally marked by the combination of green and red. Now I must point out that it is important to explain not only what seasons or holidays a colour is associated with, but also what that holiday is about or represents. Depending on the country, you might also want to include dominant religions and holidays and colours associated with them. If you are in a country that has very rich religious culture such as India, different deities and religions do have their own colour associations. This is not so much of the case in a country like the U.S., which, while many minority religions flourish, there is one obviously culturally pervasive and generally dominant religion.

One of the main design-related matters to seek out in a foreign environment involves those colours, and combinations of colours, that have been imbued with political (e.g. patriotic, radical, party-related, issue-related) overtones. In the US we are flooded with the ubiquitous red, white and blue. Of course these are the flag colours of other countries as well, such as Norway, the Netherlands, Great Britain, Australia, Iceland, France, the Czech Republic, Taiwan, North Korea, Burma, Yugoslavia, Chile, Nepal, Cuba, and many others. In the U.S. the colours of the flag are used to symbolize a link to a high level of patriotism or nationalist pride; now, again, depending on the history of a country this will vary. In Finland, for example, the flag colours are blue and white, which refer simply to the blue skies and white snow. Blue and white are associated with patriotism to a degree, but the most common use that you see of those two colours would be during a hockey game against another country's team, where Finnish people and the Finnish team will wear their nation's colours.

The topic of colour and cultural overtones leads naturally into discussion of national iconography. Let's go back to the idea of patriotism for a moment. In the U.S., symbols of patriotism include the flag, eagle, star, and well-known national icons (e.g. the Liberty bell or the Statue of Liberty). In Finland, the eagle has a decidedly negative association attached to it and has not found widespread traction as a symbol or logo, because Finland used to be under Russian rule, and the Russian symbol at that time was a two-headed eagle. In Finland, the animal of choice to convey pride is the exotic and powerful lion.

Obviously symbolism is intertwined with history. It is also attached to behaviours. It is important to impress on international students that there are different standards attached to one's behaviour and gestures. It is well worth explicitly pointing out to international students what is acceptable, questionable, and taboo in the host culture. Is it polite to shake hands? What does an open hand symbolize, versus a fist? Gestures that, in the US, would be interpreted as the peace sign, raising the middle finger, a salute, thumbs up, and fingers crossed, will of course have entirely different, often comically unintended, meanings elsewhere.

International students, with future clients in mind, must also be made aware of the effect of personal behaviour such as eye contact. In the U.S. it is considered impolite and dishonest not to look a person in the eye when speaking to him or her; this of course is not the case everywhere. There are also simple societal rules that one should be aware of. For example, should a person take off his/her shoes when entering a house? In Finland, for example, it is considered rude to walk into someone's house with your shoes on, but in the U.S. it is normal in many households. This might seem trivial, but students working on an advertising campaign, for example, may need to portray typical household behaviour. If they do not have the basic understanding of these issues their designs can become ineffective or worse, even offensive to the audience. Ronnie Lipton provides a good example in an article entitled Designing Across Cultures[2]: "After a Chinese funeral, it's customary to have a meal at which a place is set for the dearly departed. At that place, also according to custom, rests a bowl of rice containing upright chopsticks. And in traditional Chinese and Japanese homes, the same symbol might appear in a shrine to a dead loved one. The image doesn't belong in any advertising message except one like this: InterTrend uses the image in a house ad to say it takes a cultural expert to avoid such sticky situations."

Aside from the visual aspects, students' understanding of their host-language needs to expand for their design to become effective. Most international students arrive with a basic understanding of the grammar and syntax of the English language (or whichever the host country's language happens

to be). What the students often struggle to grasp and understand are idioms and slang. These are rarely introduced in English language classes, but are very important to understand, and possibly utilize directly, as a designer or advertiser.

I am going to use American English as an example. There are many idioms and expressions, such as "Apples and Oranges," "Bring home the bacon," "Bend over backwards" or "Piece of cake," that do not make intuitive sense from their literal translations. There are idioms such as "black and blue" which carry along negative connotations, because they refer to violence, beatings and bruises. In order to utilize these types of culture specific idioms the students have to first understand their meaning and how to appropriately implement them into speech: only then can they successfully utilize them in their work.

Slang is another aspect of language that is not generally taught in language classes. It would be hard to do so effectively, since slang terminology changes pretty rapidly, and only a very small portion of slang words stick around long enough and are widespread enough that even people within the same country understand them. Slang is a very regional phenomenon and it varies a good deal. But there are always some consistencies that can be taught, especially words that have dual meanings, depending on the context.

One does also have to stress that meanings of things may also be altered by time, and old meanings sometimes fade into obscurity. Words are constantly fluctuating in and out of fashion. Slang terms change constantly, but terminology and understanding tends to stick with each generation. Current teenagers would not understand the slang used in the 1950s, but people who were young during that time period would immediately grasp such phrases and words. This is especially good to know when designing for a specific age group.

I would recommend that such a course, designed specifically for international students, be run mostly on a lecture and discussion basis, but with a strong research component. Lectures could provide examples of different cultural aspects, whether colour, language, imagery or symbols. And afterward, the students should go and find their own samples of the topic that was discussed in class. They could also have vocabulary and proper use quizzes, for idioms and slang. They might write short papers on the cultural context of different idioms and do interviews on different topics. They could also create group presentations on different topics and then share their research with everyone in the class.

The hard truth is that most design departments do not have enough faculty members to spare one to teach a course solely for the benefit of a few international students. This is why we have presented a second way to approach this issue, framed as a class that could benefit both the native-born as well as the students with international backgrounds.

The Second Course Model

The second model, built upon the foundation of the first, includes a much more robust examination of cultural communication issues and possibilities. As such, it is intended not only for international students, but also for any student interested in graphic design. This model includes a greater emphasis on projects. A greater premium is also placed on interactivity between students. This is fostered through individual and group presentations, projects, discussions, and also ideally through interaction with a partner school abroad.

This class is not meant to be culture specific, but is rather used to build comparisons and deeper understanding about the visual and cultural modes of different societies. The content matter includes much of what is discussed in the first model, but also emphasizes an outward-looking viewpoint, including the examination of disparate cultures, and the incorporation of hands-on design practice. Some of this can be done through a lecture format that introduces the host culture's views on colour, slang, symbols, et cetera, while also having students go out and research how such issues are approached (or not approached) in other cultures.

Once a basic understanding of major cultural differences has sunk in as a fact of human existence, the students are ready to implement their knowledge into projects. The projects can be culture specific or required to work on a trans-national or international or global level. In today's world people and clients are interacting with different cultures extremely frequently. We now have many possibilities for instantaneous interaction across the globe. The need to broaden our understanding of other cultures is greater than ever, which is why it is appropriate to ask for our students to be able to produce work that can be published and correctly understood in several different countries.

Content matter in class assignments might vary from a specific product to a global issue such as a commentary on war and/or peace, politics, world hunger, et cetera. The projects could also be used for students to explore their own identity and experiences and how they have been influenced by the host culture or their research into another culture.

An ideal way to approach some of these projects would be with another institution located in a different country. Students could exchange projects and have discussions or critiques through web cameras with the participating school. If the technological abilities are not there, students could give and receive feedback in writing or e-mail. Projects could be sent electronically for the other institution's classes to print out or view on screen. This type of interaction has already been successfully conducted between institutions. In her article "Exchanges: Culture, Place, Identity, Memory"[3] Ellen McMahon discusses the collaboration that her Critical Issues in Design class has participated in with several different schools around the world. She has found the project interaction to be very beneficial and a great way to introduce and delve into issues of cultural identity.

Exposure to foreign stylistic influences can extend students' creative reach and enhance their visual palette. Projects and presentations, with or without the advantage of a partner school abroad, can be geared to take advantage of students' different cultural backgrounds, providing the class with a larger perspective on points of cultural differences, and similarities.

In Conclusion

We better serve our students, both international and domestic, in preparation for their careers through expanding their awareness of the issues and topics we've discussed today.

Notes

1 *Visual Puns In Design*. Eli Kince. Watson – Guptill Publications, New York, USA, 1982

2 *Designing Across Cultures.* Ronnie Lipton. Published on October 21, 2002. Filed in Cross-Cultural design Web site : 21http://designforum.aiga.org/content.cfm?ContentAlias=%5Fgetfullarticle&aid=297855

3 *Exchanges: Culture, Place, Identity, Memory*. Ellen McMahon. Published on October2, 2002. Filed in Cross-cultural Design. Web Address: http://designforum.aiga.org/content.cfm?ContentAlias=%5Fgetfullarticle&aid=286650

Suggested Publications

Designing Across Cultures
By Ronnie Lipton
Published on October 21, 2002.

Visual Puns In design
By Eli Kince

The American Heritage Dictionary of Idioms
By Christine Ammer

A Dictionary of American Idioms
By Adam Makkai, M. T. Boatner, J. E. Gates, Maxine Tull Boatner, John Edward Gates

The Designer's Guide to Global Color Combinations: 750 Color Formulas in CMYK and RGB from Around the World
By Leslie Cabarga

The Designer's Guide to Color Combinations: 500+ Historic and Modern Color Formulas in Cmyk
By Leslie Cabarga

Global Graphics: Color - Designing with Color for an International Market
By L. K. Peterson, Cheryl Dangel Cullen, Cheryl Dangel Cullen

Assignments Workload and Design Learning Outcome

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The relationship between assignment workload and students design learning outcome is quite volatile. It was observed that too much or too little stress could cause adverse effect on student learning outcome. This paper is about ongoing an project investigating relationship between assignments workload/stress and design learning outcome of level two design course taught at ICM, NUS. The objective of this investigation is to find a balance between students' academic workload and learning outcome.

Information and Communication Management Programme (ICM) is an interdisciplinary programme offered by Faculty of Arts and Social Sciences and School of Computing, National University of Singapore. ICM curriculum is planned such that students must have exposure to both the social science insights as well as the technical skills related to information and communications technology. Modules offered under this programme broadly fall under two categories, "Information and Communications Management" and "Content Creation and Communication". Crucial Component of Content Creation and Communication segments are 3 content design modules (1: Principles of Visual Communication, 2: Designing Content for New Media and 3: Digital Media Project Management).

Keywords: *studio-based teaching, design pedagogy, learning approaches assessment, academic workload, reflection*

1 Introduction

Teaching design fundamentals to non-design students* in interdisciplinary university setting is quite different from the one I was exposed to in my design school. Factors that differ from traditional design school setup and impede traditional teaching methods are.

1 Student's background and exposure: Students are not screened to check their inclination towards design.
2 Teaching environment: Design education relies heavily on situated learning. In a typical university setting, students are scattered and only congregate for lecture/tutorial.
3 Lack of support structure: To name a few - Class sizes are large, restrictions on course time and credit allocation, lack of studio space, lack of supporting courses.

Once the problems were analyzed, I thought coming up with appropriate solution would not be too difficult. However, it took much more effort and time than I expected before I hit the right path. Over the past three years two major revisions were made to the curriculum to get desired design learning outcome. The end result though satisfactory has presented me a new problem – possible excessive student academic workload.

In this paper I wish to share my experience in developing design pedagogy and recent investigation into influences of academic workload on students learning outcome. Basic design module titled "principles of visual communications" will be used for this case study.

* Non-design students: students who do not have any background in the basics of art and design.

2 Module Development

2.1 University Modular Framework

The University operates on a modular system in which students read modules and gain modular credits (MC). MC reflects the workload required for each module. A modular credit (MC) is a unit of the effort expected of a student stated in terms of time. One MC is equivalent to 2.5 hours of study a 1 week. Thus, a module with a weightage of 4 MCs would require a student to devote 10 hours of work a week, including lectures, tutorials, laboratory sessions, homework, and independent or group study. A module is taught over a semester (16 weeks). There are two main semesters a year.

The present framework allows the instructor to change the ratio of lecture hours to study hours. For this module, I have combined lecture with tutorial to make room for 3-4 hours of studio and the rest (6-7 hours) allocated for lab work and assignment preparation (self-study).

2.2 Principles of Visual Communication - Module Overview

This module assumes that students have no prior experience in the areas of design. It introduces students to theories of visual communication including human perception, psychology of color, and principles of design. They also learn application of these theories in designing and evaluating visual content through a series of assignments.

2.2.1 Module Objectives

1 Understanding the basic functions of visuals in communication
2 Understanding and generating methods and methodologies for solving information communication problems
3 Developing visualization skills, concepts and techniques
4 Understanding the relevant concepts in the psychology of perception, cognition and aesthetics and their relation to information design and communication
5 Discuss and justify their design with that of others

2.2.2 Module Structure

The class meets once a week for about 4 hours. Each week a new aspect of design is introduced. The following structure has evolved over time based on students' pace of learning, quality of output and self-study workload.

The module structure is split into 4 sections.

Section I: Introduction and Process (3 weeks)

This section introduces students to the process of design and appropriate use of graphic development tools.

Section II: Theory (4 weeks)

This section concentrates on visual design theories.

Section III: Skill (2 weeks)

Here students develop skills and apply theories learnt in the previous section. They are also introduced to proper use of type and visual composition.

Section IV: Final project (5 weeks)

Students are free to choose their own design problem based on broad outline provided by the instructor.

2.2.3 Module Requirements

1 Weekly assignments (6 assignments)
2 Final Project (5-6 week group project)
3 Self-assessment report*
4 Final Exam

*Self-assessment report is an informal report which clearly communicates the student's thought process, design decisions, effort, knowledge gained, self-assessment, peer feedback & reflection on feedback, while developing assignments. It also includes a brief assessment of overall module.

2.2.4 Evaluation

1 Continuous Assessment (CA): 80% (20% classroom participation, 35% assignments, 25% Final project)
2 Exam: 20%

3 Design Pedagogy

Following are factors that influenced the shaping of the design pedagogy. Some of the factors identified are specific to students belonging to this region. They arise due to university admission criteria, regional schooling, cultural and social setting.

3.1 Students motivation

Factors which influence students' enrollment into this module, in descending order of enrollment percentage.

1 Interest in arts and crafts activities
2 Learning visual communication skills
3 Learning graphic software application tools
4 Based on past students module review
5 Curiosity or degree requirements

3.2 Problems identified in learning

1 Application of theory into practice
2 Ability to connect different concepts taught during semester
3 Initial inertia: Students are accustomed to traditional "chalk and talk" method of instruction. They expect detailed lecture handouts and very clearly defined assignments.
4 Inadequate contact hours (4 hours once a week): The stress is more on self-study. This requires more than usual amount of self-discipline and motivation.

(Top two issues strongly indicate surface learning approach)

3.3 Problems in teaching

The most difficult task in teaching design to students without any prior exposure is to make them understand that…

1 Design, unlike art, does not provide much scope for self expression
2 Most design problems are hard to define
3 There is no one perfect solution; it is about arriving and placing oneself in a position which is the best under given circumstances.
4 A designer should know how to use his/her tools of trade but, just learning to use tools does not make one a designer

3.4 Developing pedagogy

Every year, based on students' performance and feedback, I try to identify areas of improvement. So far there have been two major revisions. I'll try to cover a few important aspects that led to significant changes in terms of teaching methodology and strategy.

When the module was first introduced, I tried to follow typical design school teaching format. I kept the class group small (15 per group) and tried to follow a simplified studio by combining lecture and tutorial sessions.

3.4.1 Format

The class starts with students displaying their assignment of the previous week, followed by lecture, Q&A, next week's assignment and discussions with students on problems they faced while designing and producing their previous assignment.

Problems identified with the above method:

1 Though it seems obvious now, learning in design school happens more due to social activity. In a university setting, students have to move from one Lecture Theater to another based on their timetable. Unlike in design schools, our faculty does not have a place where students can work /discuss their work with the rest of the class after contact hours.
2 In a design school, there are supporting courses that sustain and support design activities of students. In this situation, this is the only design module.
3 Though students' feedback on the module was positive, I did not notice any deep learning. Students looked at lectures as a means to complete their assignments.
4 Students treated each lecture and assignment as an isolated package. They attended a lecture, took an assignment, referred to lecture notes, completed and handed over the assignment, and repeated the same for the next assignment. There was no effort on their part to understand interrelationships between different concepts introduced during the semester.

To tackle above problems I needed tools that would encourage students to think and reflect on what they were doing, interact with fellow students and most importantly think and engage in design activity after contact hours. Following changes were made to encourage this behaviour.

1 **Self-assessment report:** Students are now required to write an informal report on each assignment. In this report, they are asked to document their thought process and design decision process while developing each assignment. They are also required to document peer feedback on their assignments and what they feel needs to be done to improve their design.
2 **Assessment:** All assignments are assessed based on the above report. Effectively, I was grading design process and problem solving approach more than the outcome (skill component).
3 **Concept games:** Games were introduced to help students understand complex problems.
4 Classroom exercises: Students are required to do short (one to one and half hours) classroom exercises to demonstrate their understanding of new concepts. This opens up students and encourages student-instructor interaction.
5 **Assignment revision:** Previously students used to submit their assignments at the end of each week. Now they are required to submit all their assignments at the end of the semester with self-assessment report. They are also allowed to improve on their assignments based on peer feedback and new concepts learnt as the semester progressed. This enables the students to refine projects as needed throughout the semester. Allowing students to revise their assignments as many times as they wished has given them an opportunity to improve their grades by correcting their mistakes. Moreover, the mere fact that they were holding on to their assignments and thinking about possible improvements, made them see the whole module as one entity, effectively encouraging a deep learning approach.

6 **Peer assessment and reflection:** assignment presentation and design critiquing format was changed slightly. It is a bit more aggressive now. Students are encouraged to critically analyze peer and self designs. The presenter can also defend his/her design based on assignment objectives.

These changes brought in a drastic improvement in the quality of learning. The self-assessment report and concept games were the most effective changes. I was surprised to see a drastic change in terms of their design critiquing and defence argument quality.

4 Problem

Though the above revisions produced encouraging results the offshoot of this exercise was an increase in academic workload by almost 200% over past four semesters.

Over past two semesters on an average roughly 15%-20% of my students felt that the workload was too much to handle. As this feedback is anonymous, there is no way for me to know who exactly is facing this problem. At first I struck it down thinking it must be an excuse coming from students who hardly showed up for lectures. However, during this semester I have noticed that some students (10%) who were doing well at the beginning of the semester have started to under-perform towards the end. This has forced me to look closer if the slip in performance has got anything to do with academic workload and the learning environment.

5 Method

5.1 Literature Review

5.1.1 Approaches to learning

Motive and strategy in approaches to learning and studying

Approach	Motive	Strategy
Surface	Is instrumental: main purpose is to meet requirements minimally: a balance between working too hard and failing	Reproductive: limit target to bare essentials and reproduce through rote learning.
Deep	Is intrinsic: study to actualize interest and competence in particular academic subjects.	Is meaningful: read widely, interrelate with previous relevant knowledge.
Achieving	Is based on competition and ego-enhancement: obtain highest grades, whether or not material is interesting.	Is based on organizing one's time and working space: behave as 'model student'.

(Biggs, J., 1987)

5.1.2 Learning approaches and academic outcome

Brief literature survey on perception of learning environments, learning approaches and academic output in university environment has revealed some eye opening empirical studies. Below are few relevant research findings. (Lizzio, A., Wilson, K. and Simons, R., 2002)

- Research indicates that there is a strong relationship between students' perceived workload and learning approach. A heavy perceived workload and inappropriate assessment influences students towards surface learning approach.
- Students' perception of bad teaching environment (teaching and appropriateness of assessment) influences them towards surface learning approach.

Of course, it is not just that simple; there are factors that influence a student's perception of learning environment and academic workload. Such as…

- Interest in the subject: subject interest influences perception of workload
- Personality and lifestyle: personality and lifestyle priorities influence perception of workload

Most of the relevant studies I have come across are conducted in engineering field. Sadly, so far I have not found much in design education based on studio model.

The interesting thing about studio in this context is that most of the problems associated with surface learning can be effectively tackled in the studio. Some of the advantages of the studio model are…

- Design critique: feedback/evaluation is instant.
- Small group: encourages one on one interaction.
- Clarity in assessment: because of studio format the instructor is better informed about students' performance.

5.2 Data collection

Frankly, at this stage I was not sure where to start and what exactly to look for. Hence, I decided to conduct initial study to understand the problem and also to see if the existing theories apply to studio learning environment.

A questionnaire (appendix1) was developed to find out (among other things) students' perception of workload and learning experience. The primary objective of this survey is to collect data from different perspectives, which, hopefully, would help me understand the problem and devise a framework for in-depth study. The survey contains 4 components:

1 **Quantitative component:**
Time spent by students on self-study component
Students' workload perception
2 **Qualitative component:**
Learning experience
Stress in learning
3 **Students were also asked to take Felder-Silverman Index of learning styles (ILS)**
(Ideally I should have also asked them to fill Biggs's study process questionnaire)
4 **Myers-Briggs Personality Type Indicator test**

5.3 Participants

Questionnaire was distributed to all 37 students in the class on the last day of the semester. 29 students responded and 25 responses were used for the study. 4 responses were discarded, as they were incomplete.

6 Results and discussion

At this point I am going to only present data from first two components of the survey as they are directly related to the immediate problem of possible excessive academic workload.

Students are placed into three groups based on their performance (continuous assessment is taken as performance indicator). The date is collated to observe if there is any relationship between students' performance and their perception of academic workload.

Response from students who scored very high (75% and above) in CA component

Time spent on self study per week	Workload Perception	Perception of assignment importance to module objectives	Perception of performance in stressful environment
60% spend more than 6 hours	100% feel it's heavy but manageable	100% feel it's very important	70% said they perform better in stressful environment
10% spend 4 to 5 hours			30% said they perform better in non-stressful environment
30% spend 3 to 4 hours			

Comments on academic workload, stress and learning experience

Enjoyed the module, more stressful, equated to better absorption.

Forced to come up with something, really have to think, by which learnt the process.

I tend to get lazy if there is no deadline to meet; constant workload keeps me learning and moving to the next phase.

Response from students who scored above average (60% - 75%) in CA component

Time spent on self study per week	Workload Perception	Perception of assignment importance to module objectives	Perception of performance in stressful environment
75% spend more than 6 hours	100% feel it's heavy but manageable	100% feel it's very important	37% said they perform better in stressful environment
25% spend 4 to 5 hours			63% said they perform better in non-stressful environment

Comments on academic workload, stress and learning experience

Working constantly will help in understanding concepts well, but sometimes the workload is very excessive

Less stress and workload may allow learning at a comfortable pace, more time for experimenting new ideas

Assignments so hands down which is most effective way in learning concepts, workload not too heavy, helps us in being consistent in our work

Response from students who scored below average (40% - 60%) in CA component

Time spent on self study per week	Workload Perception	Perception of assignment importance to module objectives	Perception of performance in stressful environment
30% spend more than 6 hours	12% feel it's very heavy could not cope	60% feel it's very important	50% said they perform better in stressful environment
14% spend 4 to 5 hours	57% feel it's heavy but manageable	40% feel it's not very important	50% said they perform better in non-stressful environment
14% spend 3 to 4 hours	31% Moderate		
42% spend 2 to 3 hours			

Comments on academic workload, stress and learning experience
Perhaps both book assignments and the final project could be given more time.
Very heavy workload as I tend to perfect each picture/design.
On average it is more manageable for someone who has design application knowledge.

Above results indicate some evidence of excessive academic workload. Top performers are achievers and thrive in competitive environment. They tend to perform better in stressful environment. Most affected group is above average performers who seem to be feeling some amount of stress and are unable to cope with it adequately. This is evident from amount of time they spend on self-study and their response to stress coping.

As an instructor, I don't see much difference in terms of capabilities between high and above average performing students. Both groups of students are equally motivated and capable.

Most of the students from underperforming group hardly showed up for the lectures. I take it that they are not interested in the subject or lack motivation. One of the students in the underperforming group was actually doing quite well at the beginning of the semester. She just stopped showing up for the class for the last few lectures. When I talked to her she said she just could not cope with the workload and it was affecting her studies for other modules. This was a cause for concern.

In any case, I consider this exercise as just an exploratory survey and it is not appropriate to draw any serious conclusions. In a way, it just served its purpose by answering few questions and most importantly helping me device a framework for in-depth study.

6.1 Future directions

This small study made me realize how complex this whole issue is. There are so many variables that it is almost impossible to conduct a controlled study.

The next step in this investigation would be to devise an instrument to find out students' approaches to learning in studio. I am presently devising an instrument based on research studies of Marton & Saljo and J.B.Biggs.

In the present study, I have also noticed interesting relationship between students' personality types, their perception of learning environment and learning preferences. I would also wish to look into this a bit more closely.

7 Concluding Remarks

What is an optimum workload? It is difficult to answer this question. Actual workload is different from perceived workload. And, perception of workload depends on student's background, subject interest and personality (Kember et al. 1996). If one takes a closer look at the data, one will find that only around 55% of students spend more than 6 hours on self-study. University requirement for 4 credit hour module of this nature requires students to spend 6 hours on self-study. Technically speaking, the academic workload for this module is just about right.

What now? Should I reduce the academic workload? It's a very hard thing to do. The basic pedagogic strategy I am following is to keep students on their toes — not letting them ease up completely. It is producing results and there is no indication (apart from a few exceptions) of students switching to surface learning. Having said that, some students do feel the stress and frustration of constant work pressure. Which is definitely not desirable and something needs to be done to rectify this problem. But, I think I'll wait for one more semester before I make any changes. I need to know a bit more about students' motivation, learning preferences and strategies before I can interpret this data correctly. I'll run this survey once more with necessary instruments to get a better picture this coming semester.

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Appendix-1

Your Name

PERSONALITY TYPE TEST

http://www.humanmetrics.com/cgi-win/JTypes2.asp

(Please follow above link for online personality type test and fill the results in below section)

Your type is:

Strength of preferences %

Introverted	Intuitive	Feeling	Judging

Index of Learning Styles test

http://www.engr.ncsu.edu/learningstyles/ilsweb.html

(Please follow above link for online learning style test and transfer the results to below matrix.)

Grade you are expecting

Active	11	9	7	5	3	1	1	3	5	7	9	11	**Reflective**
Sensing	11	9	7	5	3	1	1	3	5	7	9	11	**Intuitive**
Visual	11	9	7	5	3	1	1	3	5	7	9	11	**Verbal**
Sequential	11	9	7	5	3	1	1	3	5	7	9	11	**Global**

Grade you are expecting	

Weekly assignments:

1 **Roughly how much time you spend in developing assignment? (From concept to print/finished product)**

- 1 hour
- 2-3 hour
- 3-4 hours
- 4-5 hours
- More than 6 hours

2 **When do you start working on assignment?**

- Right before the deadline/lecture (on the day of lecture)
- Night before
- ____ days before

3 **You prefer to work on assignments..**

- At a stretch (finish it in one go, from concept to print)
- Over few hours (work on and off over 12 hours)
- Over few days (work one and off over a week)

4 **What do you feel about assignment workload?**

- Very heavy (you cannot cope with it and you feel it should to be reduced)
- Heavy (you feel it can be managed with proper time management)
- Moderate (just right)
- Light (easy)

5 **Most of the assignments are weekly. Do you see a need for more time in developing assignments?**

- Yes
- No

6 **If your answer to above question is "yes", how much time is required to develop assignments?**

- _____ days

Learning experience:

1 **Importance of assignments in this module (relevance to module objectives)**

- Very important (cannot understand concepts with out practical application)
- Not very important (only some concepts need practice)
- Unimportant (there is no need for assignments)

2 **Present assignment workload (which some believe is excess) is**...

- Helping you learn better (constant work load helps you learn)
- Not helping you learn better (I prefer to learn in non stressful and leisure environment)

Briefly explain reason behind your choice

3 **In general you perform better in**

- Stressful environment
- Non stressful environment

4 **Any other views on overall module workload and your learning outcome**

Developing a System of Educational Excellence in Design: the NID Way

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Over the past four decades, the National Institute of Design, Ahmedabad, has developed a unique multidisciplinary system of design education which lays more emphasis on learning than on mere instruction. The structure and pedagogy of its professional education programmes which emphasizes hands-on experience, conceptual originality, a strong knowledge and skill base, sensitivity to India's cultural diversity, and an interdisciplinary approach to design have cultivated among its students the ability to think independently and holistically, to innovate and to learn through creative exploration and experimentation. The process of education at NID has been enriched by a close relationship between the teacher and the taught, where the teacher dons the mantle of the friend, the philosopher and the guide.

The rapidly changing socio-economic and industrial scenario and the advent of the knowledge economy required NID, as the internationally renowned forerunner of multidisciplinary design education, to respond to the needs of the emerging challenges. This required re-thinking on design curriculum, new courses, restructuring entry levels, increasing student intake and adoption of new technology. The new paradigms prompted NID to experiment in establishment of standards for delivery of design education through a monitoring mechanism titled 'System for Educational Excellence in Design' (SEED). It involved setting up of predetermined and explicit academic standards; mechanism to monitor compliance and effectiveness, and creation of an interactive cyclic mechanism to record and map responses. The exercise required diligence to ensure that the academic ethos at the institute was not lost in an exercise that was perceived as technical, and to an extent, less flexible.

Keywords: *traditional teaching approach, challenges and response, SEED, Foundation Document*

Introduction

The post-Independence era in India demanded progressive thinking on development of educational programmes that would not just create a class of educated Indians in diverse academic fields, but also create technological and managerial expertise that is so critical for any emerging economy. The policy makers of independent India rightly gauged the need to establish national institutions that would, in due course, not just create a massive pool of talent, but also create leaders who would contribute to the process of socio-economic change in India. It is in this context that the Government

of India invited the renowned American design team of the late Charles and Ray Eames to recommend a programme in design education in India. Based on their remarkable report – The India Report – the National Institute of Design was established in 1961.

It will be of interest to note that the National Institute of Design was set up not just to create design professionals through its education programmes. It had a much wider national mandate: to train industry professionals through industry specific programmes, provide design consultancy services, serve as a repository of design knowledge, experience and information, and above all, to act as a catalyst for economic prosperity through macro and micro level design interventions for the government, non-government organizations and the industry. Keeping these macro objectives firmly in focus, NID has, over the past four decades, developed a unique multidisciplinary educational system that lays more emphasis on learning than on mere instruction. With 'learning to know and learning to do' as its mantra, education at NID has clearly emphasized hands-on experience, conceptual originality, a strong knowledge and skill base, sensitivity to India's cultural diversity, and an interdisciplinary approach to design. The structure and pedagogy of its professional education programmes has cultivated among its students the ability to think independently and holistically, to innovate and to learn through creative exploration and experimentation.

The NID traditions

Over the past four decades, the institute has developed a unique interdisciplinary system of design education. The professional education programmes that have been developed under each discipline are designed to meet the overall curriculum objectives, i.e., to

- generate scope for integration of experiential and explorative learning in order to achieve a high degree of creative innovation and quality;
- maintain a flexible framework for student-centric learning whereby courses and assignments are able to harness the potential each student has in terms of creative expression and multidimensional learning.
- provide an opportunity to identify, plan and achieve learning goals through an understanding of cultural, social and technological developments in the context of historical, contemporary and individual concerns;
- predetermine the objectives, learning values and standards for each course, and
- provide interdisciplinary and progressive knowledge of design with a focused understanding of professional design practice;
- offer opportunities to develop the necessary professional technical skills;
- facilitate development of critical, analytical, speculative and reflective problem solving skills in an integrated manner;
- understand the user-centric and culture-centric approach to design;
- provide a thorough understanding of technical, managerial and design fundamentals, with strong exposure to real life situations.

To meet the above objectives, the institute developed a unique teaching and learning methodology that combined a range of strategies and methods ranging from the non-interactive at one end of the spectrum to the highly interactive at the other. The learning methodology at NID has always favoured a combination of individual and peer group learning, prototype development, independent learning and research, craft documentation, industrial training and experience on live projects, and effectively provides to the student empathic support, critical guidance, creative stimulus and knowledge that is essential to the development of creative sensitivities in a designer. While the process of 'learning by doing' remains at the core of its philosophy, one aspect of design education at NID that has contributed to the emergence of a unique education model is the structure of ongoing dialogue – often informal – between the faculty and the student. Intense interactions outside the working hours in informal sessions and the process of continuous and critical feedback, support, and guidance have created immense value to the students. Since its inception NID has believed that the design teacher must

also be a design practitioner and should be able to bring live experiences to the classrooms and the studios. One of NID's mandates was to spread design to the Indian masses through multi-pronged strategies. The direct involvement of NID faculties in such strategies provided an added dimension to their personalities. The cultural diversity of India, its rich arts and crafts and multi-sectoral industry offered unique and diverse opportunities in not only application of design know-how but also to contribute to the diversity of design learning at NID. And the direct beneficiaries of this approach have always been the design curriculum and the students at NID.

Though formal educational structure expressed in terms of flowcharts, time-tables, lectures, studio work, documentation, course evaluation and juries existed, the process of education at NID was enriched by a close relationship between the teacher and the taught, where the teacher donned the mantle of the friend, the philosopher and the guide. It was an instructional system that transcended the domains of formal education and mentored aspiring designers to develop sensitivities so essential to this creative field. It was, indeed, an effective system of disseminating knowledge while fostering the individuality of the student, a system which was wonderfully well crafted and suitable in an era when the courses offered at the institute were a few, and the number of students at the institute was less, giving an opportunity to the faculty to carefully mentor the students. Evaluation was largely qualitative and based on continuous evaluation and assessment of the growth of the student as a professional designer.

The Changing Times

Towards the beginning of the 90s, winds of change began to blow across the Indian industrial scenario. Globalisation brought about a sea change in the perspectives of the Indian economy and the emerging challenges demanded a qualitatively different response from the education sector. These were the times when strong foundations in technical and management education would create a critical mass that would provide a platform for Indian companies to compete with the best in the world. These were also the times when global competition would force the Indian industry to look up to design to provide a cutting edge to Indian products and services. As the nation's pioneering institute of design education, NID had to take the lead to address the needs of the emerging sectors.

In fact, education at NID has never remained static or irrelevant. Its emphasis on cultivation of 'the designer attitude' among its students remains at the core of its education system even today. This has helped NID create a pool of design talent capable of offering need based design solutions to the nation. In its formative years, the institute contributed significantly to resuscitate the art and crafts sector in India through its programmes and projects that would help design percolate to artisans and craftsmen. Even today, NID's handsome contribution to the handicrafts, handlooms, bamboo and the textiles sector in India is a fine example of how design intervention can contribute to socio-economic development. While retaining its core philosophy that good design is good business, NID has successfully added a dimension to design education – that design needs to be socially relevant. It is in this context that one has to view the changing complexion of design education at NID. It has shown remarkable flexibility within its curriculum to address the needs of emerging sectors in India. Its ability to imbibe contextual change, yet retain its unique interdisciplinary flavour, has been a hallmark of educational pedagogy at NID.

Though the educational system at NID offered a great deal of flexibility to its faculty to determine the parameters of course delivery within the broad framework, the first major attempt to revise its curriculum was undertaken in the early 80s. This was about the time when the Indian economy, aided by the industry policy resolutions, showed first signs of significant industrial growth. As the only institute of design education in India, NID had to respond not just with an increased intake of students, but also had to restructure some of its programmes in terms of contents and entry levels. However, India was on the threshold of major socio-economic change in the 1990s when liberalization and globalization spurred India on the path of rapid economic growth. It was also the age when economies across the globe were powered by information technology. The 21st century is distinctively

different, as the world has moved from the industrial age to the information age. The service economy has become the driving force powering the economy to an impressive growth rate. And perhaps for the first time, we in India are looking beyond technology and management to lead the Indian charge. We are looking at designers to provide that cutting edge to our products and services, which is so critical in the era of global competition. The early years following Independence demanded a re-investigation of the postulates and resources that could determine the pattern and pace of growth envisioned in modern India. NID's objectives clearly articulated the role of design education and design intervention in such a scenario. The present socio-economic scenario, which has witnessed maturing of the Indian economy from the industrial age mould to the information and innovation age, demanded a swift response from NID. Introduction of new courses in design education at graduate and post graduate levels, increase in student intake, adoption of advanced technologies, setting up of the design research centre and global connectivity with international design institutions was a part of the calibrated and consciously directed response from NID to the emerging challenges. In a few years from now, NID will have a full-scale postgraduate campus at Gandhinagar and a R&D campus at Bangalore with a firm focus on research-led design education. One of NID's conscious endeavours during the last decade has been to develop linkages and collaborations with international institutions of design education. It has, at present, Memorandum of Understanding (MoUs) with seventeen institutes across the globe. The objective is to enable students and faculty to keep abreast of developments in global teaching / learning practices in design education as well as develop a global perspective. The cherished objective of education at NID is also to create a critical mass of world class design professionals who can create a "design impact" in the country. Design students at NID are encouraged to develop innovative design solutions that could be patented and could be realized as long-term business propositions. For this purpose, NID has taken the first steps to create an institutional framework to incubate design ideas. This national initiative to nurture the "designpreneurs" is expected to facilitate growth of design led commercial enterprises in the country.

New Responses to Emerging Challenges

The strength of educational structure and pedagogy at NID has always been its flexibility to respond to the changing demands on design education. Though influenced in its formative years by the Ulm and Bauhaus schools of design thought, it showed the resilience to adopt the design philosophy of Ulm and Bauhaus, yet chart its own course to make it relevant to the diverse and multidisciplinary needs in a multidimensional nation such as India. Today design education across the world reflects a diverse spectrum of economic, regional and social dynamics. There are increasing demands on design to play a key role in the domains that were traditionally the forte of technology or management. A large number of design students and researchers are crossing the regional boundaries and crossing over to new continents in search of new sensitivities, alternative methodologies or collaborative opportunities. Many design schools feel the need for substantial reform in their curriculum, teaching and evaluation methodologies. NID, too, has responded to the demands of design education in the new era. In 2002, it adopted, for the first time, a Credits & Evaluation System that would enable establishment of its educational programmes against global benchmarks. Though NID carefully studied the prevailing systems of credits in many of the internationally renowned institutes of design education, it evolved its own system where credits are not granted in isolation, but are linked to performance in each course the student undertakes. It has, by far, been a major departure from NID's traditionally proven system of qualitative evaluation to a quantitative system that is closer to the global benchmark. The system generates a semester grade point for the student against the credits earned during the semester, and, in the best of NID's traditions, also provides scope for qualitative assessment by the jury.

Introduction of the new Credits & Evaluation System was an elaborate process where the working faculty group held a series of brainstorming sessions over the components of this system such as categorization of courses, weightings, course evaluation criteria, evaluation criteria for the semester ending juries, pre-diploma juries, etc. The working group also had to conduct several interactive

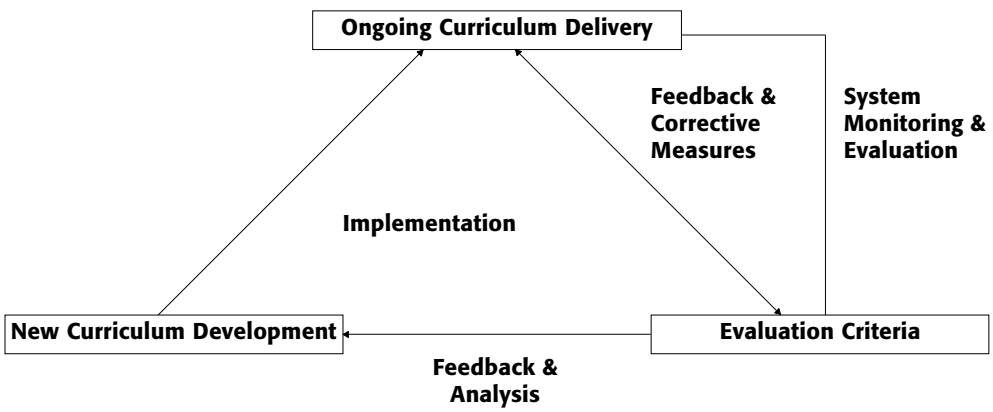
sessions with faculty to apprise them on the nuances of the new on-line evaluation system. A logical extension of this exercise was to carefully document all professional courses at NID and lay down the systems and procedures of course delivery and academic administration. Higher student intake, increasing number of exchange students on the campus and aspirations to launch international programmes prompted NID to initiate the process of developing a framework that would help NID position its educational programmes globally, a framework that would neatly document not just the professional courses at NID, but would also determine the systems and procedures for delivery of design education at the institute. In this endeavour, NID looked at the prevailing practices in other global institutes of design education in a very planned and systematic manner. This included research and analysis by many faculty members who visited international partner institutions under exchange programmes to various countries in recent years. NID's active association and vibrant interactions with the Birmingham Institute of Art & Design (BIAD), UK, provided for a better understanding of such practices.

The SEED Experience

In 2003, the National Institute of Design embarked upon a project to establish standards for delivery of design education at NID. Titled 'System for Educational Excellence in Design' (SEED), the two-year action plan recognized the need for NID, as a public institution, to set up a system of procedures and regulations that can ensure teaching and learning in a transparent, consistent and responsible manner. Adoption of internationally acceptable academic practices, were also deemed necessary to enhance NID's ability to foster international linkages and create opportunities for its students to "plug and play" at the global level.

The basic principles that NID emphasized in this exercise were setting up of predetermined and explicit academic standards; academic quality, i.e., effectiveness of learning opportunities to enable students attain these standards; standards not just for the faculty and students, but also for the managerial, administrative and support staff, an interactive cyclic mechanism that assured expected learning outcomes as per programme specifications and also provided scope to monitor compliance and effectiveness, record responses and map experiences on to the system.

The SEED Approach



The first stage of the SEED exercise began with a 3-day workshop for the faculty at NID, with a view to share with the faculty members, the rationale of a SEED programme and how such a rigorous system can be made relevant to the system of education which has evolved over four decades at NID, draw a roadmap for creation and implementation of a SEED at NID. The experiences of BIAD on their QA system were also shared with a large group of faculty members of NID by Professor Tom Jones, Head of Department of Bournville Centre for Visual Arts at BIAD, and a certified QA assessor.

The major stages in this roadmap were identified as: documentation of all educational programmes with complete details pertaining to flowcharts, time-tables, course categories, course contents, credits, evaluation criteria; documentation and benchmarking of academic and administrative systems and procedures at the institute, setting up of a core working group to undertake critical assessment and review of draft documents. The stage two tasks comprised testing of the Foundation Document, empowering a Monitoring Committee to monitor implementation, record and implement feedback; mid-term review of implementation of the Foundation Document; fine-tuning documentation of graduate/postgraduate courses in the light of experiences at Foundation. All undergraduate and postgraduate documents would be tested in Stage three.

Documenting NID's professional education programmes, academic systems and procedures was a major exercise for the SEED working group. The task was essentially to articulate in a document all the systems and procedures that NID had evolved over a period of four decades. It required diligence to ensure that the academic ethos at the institute was not lost in an exercise that was perceived as technical, and to an extent, less flexible.

The working group then began with a series of meetings with discipline coordinators to benchmark individual course objectives, specifications, contents, methodology and parameters for course evaluation, benchmark programme objectives and map individual course objectives against programme objectives, benchmark the parameters for common courses which are extremely relevant in a multidisciplinary institution such as NID, benchmark course evaluation criteria and map them against course objectives, benchmark jury objectives and map them against programme objectives, integrate benchmarks pertaining to course categories, credits, weightings and evaluation criteria with the Credits & Evaluation System. Since in NID's education system the semester-end, pre-diploma or diploma juries look at the emergent intangible qualities of the student as a designer, include the intangible qualities as a part of the programme objectives.

The SEED at NID is presently at stage two where all professional education programmes have been documented. The Foundation document has been implemented during the current academic year and a recent mid-term review of implementation in the Foundation suggested that the students appreciated the transparency that the SEED introduced in educational programmes and academic procedures; they would expect similar transparency in the courses they would adopt after Foundation. The students rated their learning in Foundation very high; their feedback on courses reflected their concern for quality in education and constitutes an important input in any reflexive system of design education.

In NID's education system, the juries assess the overall value added to the student as a designer. Since the juries have such critical dimensions, a standard set of procedural guidelines and clearly articulated assessment criteria needs to be adopted for all juries – whether semester-end, pre-diploma, or diploma juries. This is even more relevant in Foundation since jury assessment in Foundation has a bearing on the allocation of disciplines. There should be no ambiguity about the qualitative difference in course assessment and jury evaluation in the minds of the students. Ambiguity, if any, ought to be cleared at the Foundation level itself.

Though documentation of Foundation and its implementation proceeded on the right lines, there was a need to create scope for collective reflection of views and perspectives of the faculty and students.

The Foundation document could be used as a model as it imbibes principles that are readily transferable to other disciplines. It would be pertinent to note here that while SEED, as a quality monitoring mechanism, is expected to create a well defined framework for course delivery in design, it is by no means restrictive in its approach. In fact it is flexible enough to encourage innovative practices by faculty and coordinators. One example of such innovative practices is a diligently produced handbook by Foundation coordinators for Foundation students, which not just provides an overview of the educational structure at NID, but also introduces students to the 'campus lingo', key contact persons, faculty mentors, etc. The objective is clearly to make the young students feel 'at home' in a new environment, rather than providing them with an overbearing academic manual at a nascent stage.

The Issues

As a system for monitoring of quality in education, the SEED has been implemented at NID in its Foundation Programme since June 2004. All graduate courses will be brought under its purview from June 2005. An exercise on this scale is expected not just to benefit the students for whom the documentation is a clear articulation of what to expect of design education at NID, but also for the faculty and administrators for whom the document is a ready manual on systems and procedures. One must, however, caution that the SEED exercise did not add anything new to the core ethos of design education at NID. It merely attempted to articulate in an orderly framework the wealth of information, systems and procedures that already existed all these years, albeit in a loosely structured form. Also, unlike most quality assurance programmes in education that seek to make educational institutions responsible, accountable and transparent, and treat students as customers who ought to be given a clear idea about what they will learn and how they will be assessed, the SEED experiment at NID has a broader objective – to create high quality designers for the nation. The quality of course delivery is, thus, an important part of the SEED. In this context, the adoption of the SEED and the Credits & Evaluation System did throw up questions that would perhaps be more pertinent in the context of design education than any other. How do we bring about a formal structure for design education, yet retain those core informal systems at NID, which contributed so successfully to develop design sensitivities among aspiring designers? While experienced senior design educators retire and a whole new generation of young design educators joins NID, how can SEED help to mould the new design educators in NID's traditional ethos? Should design education at NID adopt an overtly international approach, or should it be linked to regional traditions, cultures and the domestic industry? Should the new age programmes in design education be conceptual or technical? Does design education need to be "dressed up" for better visibility in the academic circles? How to go about industry-specific specialized courses and still retain our renowned traditions in interdisciplinary approach to design education? In the context of design education, some of these issues will perhaps be relevant not just to this institution, but perhaps many others with unique systems of their own.

Acknowledgement

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Teaching-learning Methodologies

It is universally acknowledged that as a discipline, design is distinctly different from the study of the humanities or science. The study of design involves creative explorations and the design process involves the three activities of analysis, synthesis and evaluation. Over the past several decades, design curricula, design pedagogy and the teaching-learning methodologies have evolved from the illustrious traditions of the Bauhaus and the Ulm schools of design education. There has been a conscious attempt on the part of many design institutions and universities across the globe to redefine their teaching and learning methodologies to meet the requirements of new design disciplines powered by ubiquitous technologies, growing interest in collaborative practices, and increasing awareness of the need to preserve the local while embracing the global.

With the changing global paradigms, the role of the designer is changing from that of a creative artist to that of a strategic innovator. In this context, not just the design curricula, but the traditional methods of teaching/learning need to be re-oriented and complemented with new approaches with a view to synthesise the best of tradition and modernity.

The papers included in this section throw light on the initiatives taken by some design institutions and universities to evolve teaching/learning methodologies for some of the design disciplines. Jack Ingram and Marie Jesfioutine of Birmingham Institute of Art & Design, UK, for instance, describe the evolution of a Product Design MA in which knowledge and skills that students bring with them are encouraged through "carefully specified" educational technology. They make a case for a learning rather than learner-centred approach to design education. Lindsay Marshall and Lester Meachem of School of Art & Design, University of Wolverhampton, UK, investigate the way software is taught in relation to other aspects of design education, and address how students can become sufficiently conversant with appropriate software in the context of developing their individual creativity. Lawrence Zeegen of University of Brighton, Brighton, UK, expresses fears that students are increasingly looked upon as "clients" and that too many courses in design are trapped in stranglehold of assessment regulations and inflexible modular structures, offering methodologies and systems that work against and hinder rather than encourage and support the flow of creativity.

These and the other papers included in this section make a strong case for design education to adopt teaching/learning mechanisms that enable student designers to break boundaries, challenge rules and attempt new methods and take risks while solving complex design problems.

Wicked Problems and Shared Meanings: Evaluating Design Competence

The Development and Prototyping of an Online System to Evaluate Competence in Students of Design

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Nick Laird's research interests and areas of expertise are: (1) urban contexts and built environments as a stage and umbrella for design intervention and performance; (2) design as an interdisciplinary collaborative process with a particular emphasis on the utilization of wicked problems theory in connecting specific design problems and opportunities to wider contexts; (3) the development of an interdisciplinary assessment tool for evaluation of design solutions.

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Grant Baxter has been employed at the Department of Design Studies since early 1996. His current position is split between IT manager and senior teaching fellow.

Inspired by the quality of the Apple Macintosh™ user interface, Grant has applied user interface and human computer interaction principles to web site design. Most often this revolves around the issue of hiding complexity. His current projects have used complex relational database engines to drive interactive web sites. Keeping details of the internal structure from the user, while not sacrificing functionality has been the core issue.

His current projects include working on a collaborative (Dept of Design Studies and Human Nutrition) research project to develop an "intelligent" database driven, web site to produce individually tailored nutritional booklets (in PDF format, working on the Assessi project - an advanced on-line assessment tool, Developing a web based "manifesto engine" to store, distribute, and collect Design Manifestos, Continuing work on an extensive departmental database driven intranet.

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Within the debate concerned with the advancement of design as an academic discipline, design, and more particularly the design process, has continued to defy comprehensive description or definition. Despite attempts to map the process – usually seen as a negotiation between problems and solution – involving the three activities of analysis, synthesis and evaluation, the most inclusive and accurate outline is often generalized to a point which essentially contributes to the mystique surrounding the process of designing. Given this and the status of design as an emerging discipline, design education within universities presents a unique and complex pedagogy. Assessment protocols, however, may be among the mechanisms which can potentially help to clarify design agendas, design processes and research frameworks.

As a context to the development of appropriate measuring instruments for design performance, this paper surveys the inherent complexities involved in making judgments of processes and products, which characteristically involve quantitative and qualitative dimensions. Using Rittel's Wicked Problems theory of design as a reference point the survey considers the language used in describing the multilayered dimensions of design and how this may be best utilized in the evaluation of the performance of design students.

This paper centres on a description of the design and development of a prototype, on-line marking system which aims to provide tools for academic staff that help develop rigor and consistency in the assessment of design projects across design disciplines. The basis of this assessment system is the development and emphasis of a shared descriptive language.

Importantly one of the objectives of the system is to help demystify or "make visible" the design process to students by presenting the criteria for measurement of design competence for any given project in a linked interactive package.

Keywords: *common ground, design process, wicked problems, language, assessment.*

1 Introduction

The development of this assessment tool prototype, — The Assessi Project — is posited in the context of dynamic change evident in contemporary design education and design practice. The changes are characterized by ongoing debates within academic and industry sectors regarding the nature of design and design research. These discussions could be broadly summarized as being concerned with developing strategies and frameworks which seek to find new potentials through exploration of common ground between disparate bodies of knowledge.

2 Common ground

2.1 Design as an emerging academic discipline.

The status of design as emerging discipline presents special problems in developing an evaluation tool. The craft-based concerns of design specialisations inherently and traditionally presents an anti-intellectual perspective; yet the contemporary future-oriented, innovation-driven operations of the design professions have much to offer and in common with more mature academic disciplines.

Obvious obstacles are those regarding the level of shared perspectives theories, methodologies and terminologies. Despite exploration to discover the corner stones of design thinking within natural science, fine arts, and most currently in social science disciplines, no one definition of design suffices.

In considering the current breadth and variety of design research it could be said there can be no collective agenda but rather, "a plurality of researchers engaged in multiple research streams" (Friedman 2004). The issues regarding an interdisciplinary, shared language and perception of design in this context are apparent.

A useful preliminary mapping of the epistemology of design can be articulated around seven principles (Bonsiepe 1999). First, design is a domain that can become manifest in any area of knowledge and human action; second, it is oriented towards the future; third, it introduces something new in the world, and is thus linked to innovation; fourth, it is connected to body and space, particularly the cognitive space; fifth, design is oriented towards effective actions; sixth, it is linguistically anchored in a field of values and judgments; and finally, seventh, it establishes an articulation between user and artifact; the user — in his or her perceptual, logical and operational dimensions — is of major concern for the designer. The interface in the broadest sense of the word constitutes the designer's central domain of attention; it is through interface design that the designer articulates a space of action for the user. In a sense, design outlines the socio-cultural effectivity of a community of clients, encompassing this community's lifestyle and technological media.

It is the sixth principle — that design is linguistically anchored in a field of values and judgments — around which much of the misinformation or misrepresentation of design occurs. Recent research indicates that many different denominations, notions, adjectives and descriptions are frequently used without much discrimination. All parties involved; designers, educators, journalists, manufacturers, advertisers, retailers and consumers are talking the same language but in effect saying different things [Borjesson, 2004]

2.2 Design as a strategic resource

Design is increasingly recognised as a strategic resource within industry. The change in the role of design and designers from that of a service industry evolved from craft based specializations to that

of an integrating and guiding intelligence within the innovation process, has shaped the development of The Assessi Project. One contemporary role of designers that has been proposed in the context of radical design driven innovation (Verganti 2003) is that of designers as brokers of languages. The notion of designers as mediators and translators within a multidisciplinary development teams has strong resonance with the prompts and expected student performance within interdisciplinary design programmes.

2.3 Design programmes and labels

Design programmes which are informed by interdisciplinary research and which utilise converging information technologies have also challenged and blurred boundaries of traditional craft based design disciplines. The strategic and creative competencies involved in, for example, graphic design and product design, are now broadened, linked and made more sophisticated to encompass holistic concepts of interaction design, communication design and experience design. This development can be seen as a move towards a common ground especially when design thinking and the paradoxical nature of design processes are considered.

3 Design Processes and Wicked Problems

3.1 Design processes

Despite the increasingly dynamic and evolving character of design education programmes the ability of students to deal with the paradoxical nature of design opportunities is of lasting and paramount importance particularly in terms of the potential of interdisciplinary design education programmes, and more holistic design practice perspectives. This intelligence involves the balancing of strategic thinking and creative thinking or expressed another way the capacity to deal with the determinate and indeterminate aspects of design opportunities.

3.2 Wicked problems

One theory, which can inform the design process in terms of its characteristics, stages and "rules of engagement," is The Wicked Problems Theory of Design (Rittel and Webber 1973). The theory goes some way in framing the relationship between determinacy and indeterminacy inherent in design processes. The framework also provides a useful starting point for students to engage with and navigate the complexity and multi-layered nature of the design process.

4 Assessment of Design Outcomes

If the design process itself is described as complex and multi-layered (Lawson 2000) then assessing components of that process and its outcomes is similarly complex. One conventional strategy is to try and compartmentalize the design process and assess the constituent parts in light of the relative success in performance of the final outcome. This assessment strategy runs the risk of either reducing the design process to an over simplified map or producing endless checklists of identifiable quantitative measures at the expense of any meaningful commentary on qualitative aspects or indeed the holistic outcome of the process. In this regard the wicked problem framework also provides a means of organising formative and summative assessment of student performance.

4.1 Formative assessment

Formative assessment for example takes place continuously in the manner of day-to-day studio achievements, project progress, critical discussion groups, peer group feedback and tutor student communication. This type of assessment is a powerful guide to students and runs across all aspects of the design process from brief formulation to refined design.

4.2 Summative assessment

Summative assessment is based solely on design outcomes or programme deliverables and is essentially a final holistic judgment. While the conventional jury system of debating and assessing student design outcomes goes someway to addressing the interdisciplinary and multi-layered nature of the assessment process this is both time consuming, resource intensive, to a large part invisible to students and usually thinly documented.

Summative assessments undertaken by different individual tutors are also prone to inconsistencies across the tutorial or studio groups.

5 The Assessi Project

5.1 Briefing statements and design parameters

The challenge of this research project with regard to the above discussion was to devise a flexible prototype assessment tool to be used by design teachers, students and administrators. The following statements acted as the brief for the research project:

The prototype should provide a narrative space or common ground for the development of an accessible, shared and consistent assessment language.

The prototype should act as both a learning and a teaching tool.

The prototype instrument would accommodate interdisciplinary educational contexts and audiences and be sensitive to both determinate and indeterminate aspects of the design process.

The prototype should reflect the multi-layered complexity of the design process.

The prototype should streamline the assessment process and integrate with institution-wide assessment policies, grading systems, tracking and recording administrative systems.

The prototype should be enjoyable to use.

The Assessi project is a research project in progress. Currently the prototype is being piloted and tested over the 2005 academic year. The pilot involves 8 academic staff members from different disciplines, some 85 students engaged in a range of design projects and 2 academic administrators. Their responses to user survey questionnaires will be used to refine the design of the prototype interface.

5.2 A short description of the system

Assessi is driven from the Design Studies Intranet and takes advantage of its inherent security and integration with wider institutional systems and users. The system is built on the simple idea of an electronic mark sheet, which is constructed from layered elements. There are 3 element types [Fig. 1]

Fig.1 Assessment elements

1 Static text fields which provide common spaces for the final wording of design assessment criteria to be agreed on and refined by assessors (Fig. 2)
2 Input text for any individual or custom or open ended comment necessary
3 Sliding scales providing common spaces for the development and refinement of descriptors relating to levels of performance within formative or summative assessment criteria. Each level of performance has its own common space. (Fig. 3)
4 Check boxes to allow tracking of work submitted (Fig 4)

Fig 2. Static Text fields. Formative Assessment Statement

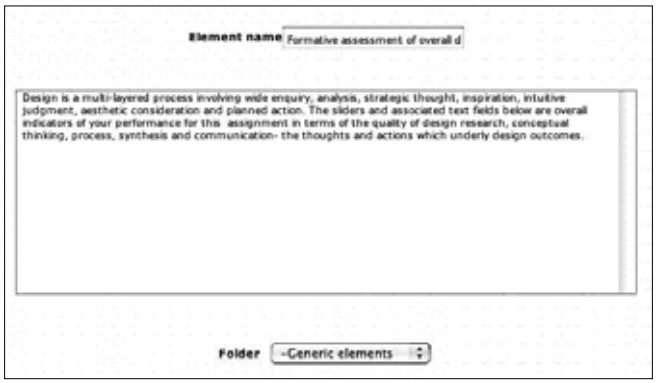


Fig.3 Sliding Scale. Formative Assessment Element. Design Research Performance Indicator

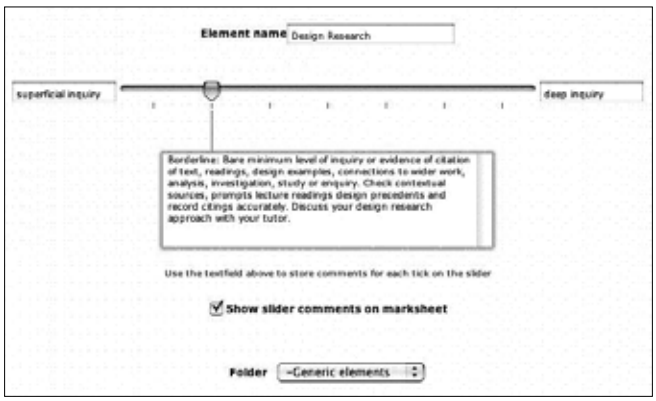


Fig. 4 Checklist for submissions for any one project

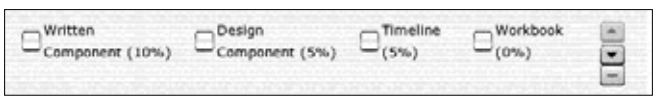
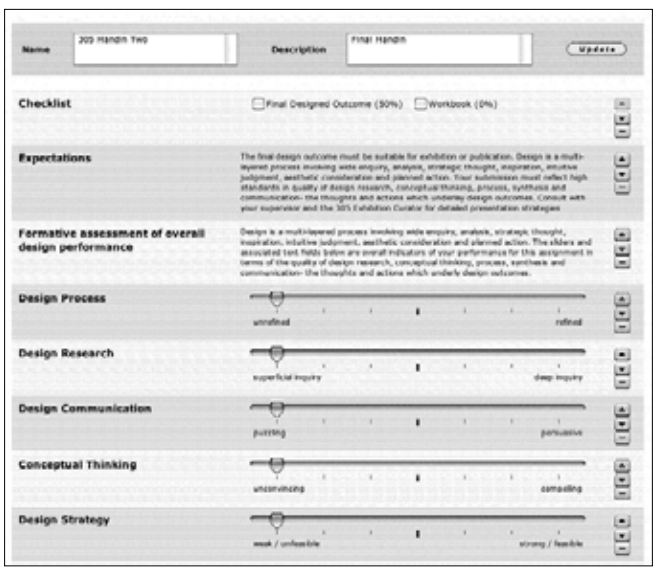


Fig 5.Layered electronic mark sheet. Formative assessment elements



The elements can be customised according to any specific projects. Sliding scales for example can be configured to any of the wider university grading protocols. The ability to manipulate elements to create and display a layered assessment framework of design out comes mimics the multi-layered nature of the design process itself. The flexibility afforded with both formative and summative assessment strategies also provides a framework for assessing the determinate and indeterminate aspects of design outcomes — a means of dealing with wicked aspects of the design process. [Figs.5, 6]

The elements are pooled in central folders and can be used as is modified or refined in any combination of layers. A security hierarchy related to accessing the common spaces allows wording to be locked in at any time. Completed electronic mark sheets can be emailed in PDF form to students or viewed through the departmental assessment web site, which will also carry assessment policies and protocols. The mark sheets are also integrated to a database, which displays complete student records and statistical analysis of relative student performance.

The finalized electronic mark sheets will eventually be developed to interactive versions for students who at the outset of a design project or assignment can engage with the multi-layered assessment criteria of design, assess a hypothetical performance and receive the feedback and grades.

6 The Assessi Experience: A pilot case study

The first prototype version of Assessi was introduced to a third year course offered by the Design Studies Department at the University of Otago, Dunedin, New Zealand. This course was selected as a pilot for the use of Assessi because it involves self-navigated studies (inclusive of the framing of design problems and opportunities) and is supervised within an interdisciplinary research framework. It is also one of the courses where design specialisations are brought together.

The course involves 70 students working individually or in small teams co supervised by one design staff member and one other from a related academic discipline. This year interdisciplinary collaborations have linked Design with Chemistry, Computer Science, Biomechanics, Film and Media Studies, Anthropology, Visual Culture, Philosophy, Art History, Marketing amongst others. Other collaborations involve Australian design institutions.

6.1 Developing Evaluation Criteria Mark sheets as Teaching and Learning Tools

The first step in setting up evaluation frameworks for the course was to establish common ground between interdisciplinary supervisors. Robust discussion about the nature of design, design processes and expectations regarding outcomes of the projects course resulted in an agreed statement about design, which linked all the formative assessment criteria (fig 5)

Importantly the generic formative evaluation criteria regarding student performance in research, conceptualisation, strategy, design process and communication was also agreed upon and added to the library. Similarly the summative assessment criteria were debated especially in regard to the weightings for each phase of the design process. Agreed milestones of the project were Project Formulation (broad research, understanding user experiences and imagining new opportunities and initial design responses), Formal Project Proposal (presentation, research initial concepts, "just enough" prototyping and basic strategy outline), Final Presentation (design solutions, detailed design and promotion) Report (post design evaluation and reflective practice).

These phases and delivery deadlines were the basis of the four electronic mark sheets constructed for the course. All four electronic mark sheets were demonstrated to students at the project outset and their opinions sought. In light of their comments a refined hard copy was distributed as a set of linked prompts, which serve as visual reminders of not only the evaluation criteria but also the multi-layered and dynamic nature of the design process.

6.2 Evaluation of Project Formulation Phase

To date only the Project Formulation Phase involving a literature review of pertinent scholarly information, technical data and design precedents together with initial design responses and a possible strategy have been evaluated and results distributed.

While there is anecdotal evidence only at this stage — structured questionnaires for users are being developed — responses to the system have been promising. Teaching staff also find Assessi easy to understand and straight forward to use. They see the system as a flexible tool rather that a rigid

imposed system largely because it is based on building a shared language — something they feel they can own or have some influence over.

Staff report spending shorter times and experiencing less burdensome tasks marking student work, once the system has been mastered. There is agreement that the common shared descriptors of components of design thought and action give a clearer perception of the complexity of the design process. It follows that the staff feel that a much more comprehensive feedback can be given when a generic database is used in conjunction with individually tailored comments and common observations. The automatic calculation of totals and equivalent grades was universally appreciated.

In comparison to other evaluation systems students see Assessi as articulating the whole assessment process for the project duration. In this sense the electronic mark sheets act as a way finding system on a number of levels- the most helpful of which is to provide a tool to demystify and engage with the design process and issues of project management.

The importance of integrating scholarly and field research in ways that inform the design process has also been clarified in the minds of the students. Similarly there is a heightened awareness of the design process and recognition of the value of the aspects of reflective practice.

Importantly the system has catalysed deep discussion between staff and students about use of the language to describe design outcomes and of formative and summative assessment criteria

From an administrative perspective Assessi has proved to be efficient. The hand-in of work and progress with evaluation, on site or at remote locations, is easily tracked by the course co-coordinator. Similarly, the archiving and emailing of results is seamlessly integrated with the assessment toolkit. The results so far indicate that the assessment system is transparent, friendly, secure, personalised and with opportunities to further customize the user experience once more complete survey information is correlated.

7 Conclusion

Problems that arise from the assessment of student design outcomes could be seen to emanate from the indeterminate and confusing nature of design problems or opportunities. While this complexity may be engaged with informally during the design process by student and staff, the formal assessment of the final outcome often avoids accurate and helpful description and analysis. Within an interdisciplinary design programme where there are a number of languages inherent in the assessment process, the need for an instrument to broker these languages and to streamline the feedback process is apparent.

Assessi, the working title of a prototype on line evaluation system, provides a means to develop and broker languages not only between disciplines but also between users of the system — academic staff, students, tutors, visiting practitioners and administrators.

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Nurturing Students to Think Creatively in Design Education

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Most of the present day design schools around the world teach design progressively just by means of simple to complex design projects. Such projects are usually hypothetical models of the real world scenarios based on the assumption that students by just doing these projects will acquire capabilities to solve design problems, being creative and imaginative. This may not be the case in general taking into consideration restrictive mindset students accumulate during their schooling or college years. This might be related to the teaching methodologies which mainly revolve around logical, analytical and rational thinking skills. The authors believe that to be a creative designer (any design related field), nurturing student's ability to bring about fluency and flexibility in thinking while approaching design problems is important. In view of this belief they run a mandatory course at the start of B.A. (Hons) in Design programme at the School of Design, The Hong Kong Polytechnic University and some of their concepts of nurturing creativity, dealt within this course are looked at in this paper.

Keywords: *hypothetical models, restrictive mind-set, nurturing, fluency, flexibility*

1 What is Creativity?

The dictionary meaning of creativity is the "ability to create." In the words of De Bono, "Being creative means to bring into being something that was not there before."[1] De Bono's lateral thinking is a deliberate process concerned with the generation of new ideas. The concern being to develop those skills needed to change one's perception and bring about flexibility in thinking. Today creativity is not something limited to the domain of art and design alone as creativity "is often thought of as an ability to think of alternatives."[2] Another popular notion regards creativity as novel combinations of old ideas to suit today's lifestyle.

Thus creative thinking today can be regarded as the ability to solve problems at work, study or business, offering a range of solutions. Creativity in the domain of design is not limited to aesthetic attributes and solutions with original concepts; giving importance to user needs and functionality is also regarded as being creative. Christiaan's research on creativity of the product in design work recognized the functionality of the product taking precedence over aesthetic values.[3] Moreover creativity is not limited to any particular discipline such as design, but involves all strata of society including scientists, artists, teachers, managers, hospitality and tourism industry etc.

There are different approaches for developing creativity, like *pragmatic approach* – concerned with developing creativity with methods like De Bono's lateral thinking, Osborne's Brainstorming, Gordon's Synectics etc; *psychometric approach* – dealing with testing/measuring everyday creativity with Guildford, Torrance Tests etc; *cognitive approach* – concerned with understanding the mental representations and processes involving a generative and exploratory phase using processes like retrieval, association, synthesis, transformation, analogical transfer etc; *social personality approach* – dealing with personality development in context of setting up of an environment that encourages creativity.[4]

Creativity is a thinking process associated with being original, generating different ideas, defining alternative possibilities in our everyday work-play-leisure activities. It hence requires the ability to take risks to get away from usual routines or break rules, being imaginative, learning progressively through one's own mistakes. Creativity involves making unusual associations or new ways of looking at things. Hence creative thinking process will involve getting away from routines, breaking rules, risk-taking, being imaginative, having a playful attitude and last but not the least, a nurturing environment for bringing forth flexibility in thinking and paradigm shift.

2 What are the Needs of the Design Industry and Design Students?

2.1 Needs of Design Industry

Design education encompasses fields like product design, industrial design, fashion, visual communication, advertising, interactive design, architecture, etc. In a broader sense "Design education is related to even engineering design with emphasis being laid on design skills of graduating engineers."[5]

A Baseline Study on Hong Kong's Creative Industries (2003) identified advertising, architecture, antiques and crafts, design, digital entertainment, film and video, music, performing arts, publishing and printing, software and computing, and television and radio as creative industries. These have "*atypical forms of employment* involving job flexibility, multi-tasking and are project based."(6) This means that the professional environment needs skills to adapt to new situations. The designers are faced with the challenge to meet the demands from changing lifestyle, address issues on sustainability and have design closely associated with business. This involves multidisciplinary approach to design with skills in generic problem solving. Most of the industry clients today expect the design consultancy to spell out the requirements of the project and be able to create a project brief in the context of changing user needs, business trends and competition. Creative solutions that address customer satisfaction form the basis of distinction in a market filled with products with similar functions and features.

The connection between changes in lifestyle, professional environment and education has received considerable attention in recent years. Education will need to foster flexibility, openness, ability to produce novelty, ability to tolerate uncertainty — in other words, creativity.[7]

2.2 Needs of Design Students

The needs of the students of design are brought out through scenarios of project work in design studios. Studio-based learning has been widely adopted as a general educational foundation in design education, where interaction between studio tutor as well as fellow students is encouraged and is very important for student's learning experience. Here are few scenarios of studio-based learning contexts where nurturing creative thinking is beneficial to the students' learning ability and have already been practised at The School of Design, HKPolyU (The Hong Kong Polytechnic University).

Scenario 1: Designing is thinking, not merely a presentation and communication tool

Designing is not merely an activity based on skills. It requires both critical and creative thinking ability. In addition to designing pleasing products, the curiosity to redefine, question and explore design should be encouraged. In studio projects students are given a brief to work. As part of the project development students research users, books, Internet, journals etc; next explore on conceptual sketches before starting with technical drawings and models for their proposal. All through the design process there is an urge to look at the whole process to arrive at a product. All the different stages of designing like sketching, drawing, model making are looked more as tools for presentation and communication (to put forth the design proposal through visualization techniques).

It could be interesting if each one of these stages is looked at as a thinking tool as well. This means that after each stage reflection (questioning, redefinition) and then developments based on reflection be encouraged. By means of using sketches, models and other ways of visualization as thinking tools, each stage could reflect small developments in design content that could eventually reflect some leaps in terms of overall design as well. Attitude of bringing in alternative design solutions should be encouraged in each of these different stages which will nurture flexibility and fluency in thinking, an important aspect of creative thinking.

Scenario 2: Students' perceptions on "being creative."

It is a known fact among design students that a designer needs to be "creative." A vast majority of them view creativity as an artistic ability alone. Awareness in viewing creativity as an attitude or a way of thinking should be promoted. It is common occurrence in all design schools that students approaching design tasks often talk to their teachers/instructors that they do not know how to begin or proceed with the given task and feel stuck and unable to proceed with the design process. Possible causes of "stuckness" could be associated with several different issues such as lack of research, inability to understand the given task, and tendency to develop solutions copying those eye catching ones from available resources. Such students do not understand that the process of research and analysis supports and develops creative thinking, bringing out innovative solutions derived from researching the product, researching the competition and researching the target prospects.[8] Students need to be made aware of understanding the problem in the context of user needs, existing products, and market competition to gain unique insights to address that problem. Introduction to creative thinking concepts like getting rid of assumptions, creative problem re-definition, idea generating techniques, bringing about paradigm shifts, evaluations will guide the students during the initial phases of design.

3 How can Creativity be nurtured in Design Education?

In our view "creativity" is a thinking attitude/style concerned with flexibility and fluency in thinking (referred as divergent thinking) especially important in the conceptual phases of problem solving. Fluent ideation is demonstrated by a thinker who generates many ideas; fluency being measured in terms of quantity and not quality. Flexible ideation is exhibited by a thinker who expresses diverse ideas, the measure in this case being variety.[9]

It has been seen that skill based education is preferred by many of the industries, where fresh graduates begin work on concepts given by the senior creative designer. While conceptual thinking is also very important for the students in view of the rapidly changing market needs. Hence in The School of Design, HK PolyU we respect both the views and hence offer a mandatory course for year 1 students of BA design programme called "Design Thinking" involving both creative and analytical thinking. Students are thus introduced to creative thinking tools in the early stages of the design education with emphasis being laid on putting these tools into practice during their 2nd and 3rd year. A similar model has been proposed earlier by Treffinger, Isaksen and Dorwal.(10) It is a sequential three level creative learning model for Creative Problem Solving involving instruction in thinking tools as level one; practice and learning as level two and applying them in real work scenarios as the final level.

It is very common in design disciplines talking about being playful, imaginative, bringing about paradigm shifts etc. and our attempt is to provide to the students some tangible and deliberate ways to bring imagination, playfulness as well as paradigm shifts as a means for problem-solving in their future design projects as well as everyday activities.

The exercises for the course are carried out in a very informal atmosphere some as group-work while others being individual and could be categorized as quizzes, puzzles, educational film reviews, talks with practising designers etc. These exercises (each one being different from another) are conducted in a casual workshop style, intending to make a mark in their memory database, which could be retrieved or recalled for use anytime in their future projects. Reflective articulation is encouraged by asking the students to maintain a lab-log (personal diary) recording their own experiences and thought processes while designing.

Most of the exercises in "Design thinking" are short and are meant to trigger diverse ways of thinking, which could be further pursued and developed by the students in their future design projects. Students are made to work on a variety of exploratory exercises focusing on different stages of creative thinking process like *Preparation, Generation, Incubation and Evaluation*. The Incubation stage is a part of the creative thinking process during which an individual is connected to the problem subconsciously even when not working on the problem. After a period of relaxation, unusual ideas may be triggered during this stage.

Getting rid of assumptions Problem re-definition Ideational fluency Paradigm shift Design Matrix Recording and Reflection Experimental Evaluations

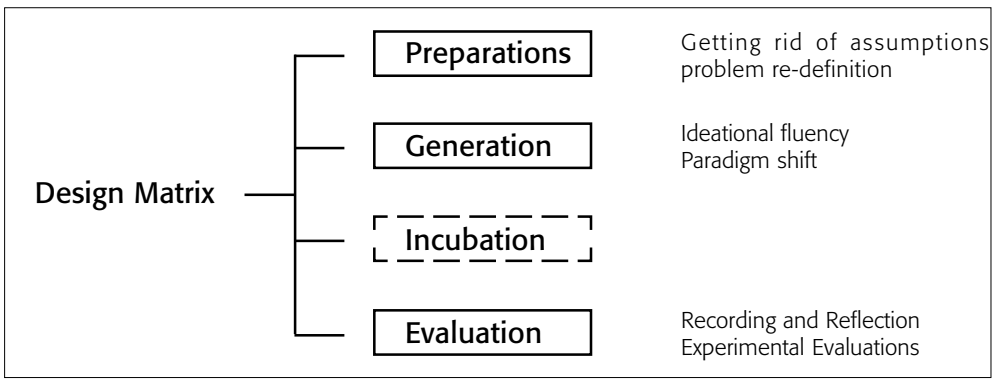

Fig 1: Creative thinking process outlined with concepts explored in each stage

Our objective is to encourage creativity in terms of:

- Getting rid of assumptions : Starting with a fresh perspective.
- Problem re-definition : Redefining/reframing project briefs.
- Ideational fluency : Ability to generate many ideas
- Paradigm shift : Ability to change one's perception and frame of reference.
- Recording and Reflection : Promote recording and reflection of thought.
- Experimental Evaluations : Evaluating concepts through models/prototypes.

These creative thinking concepts as defined in the creative process are not independent of each other and do have interrelationships when you see them in the context of working on a project. These may also not follow a pre-defined order.

3.1 Getting rid of assumptions

In other words this means trying to look at a given problem with a fresh outlook or with an open mind. With education, rationality and experience we develop rigidity, inhibitions or in many cases routine habit of doing things. This can stop us from looking at the problem with an imaginative outlook. One way to get rid of assumptions is through a first hand research [11] of the problem in view of the target user, the context, existing products, manufacturing process etc and experiencing it

through all senses like smell, sound, feel and not just visually. This kind of research stimulates the imagination and demonstrates use of playful attitude in design development. For example before designing a product, the designer, through role-play, could try and feel the needs and aspirations of the target group, which is referred as empathy. Empathy is a way to understand other people, products by being them for sometime. Use of all senses in the research also provides unique insights, triggers unusual association to the problem and its context, thus providing a rich source of potential ideas.

3.2 Problem re-definition

Today, professional practice involves dealing with clients who have a vague idea of their problem and a projected solution; and in most cases there is no set brief or exact requirements stated. The clients are much more likely to ask the design consultancy to figure out what should be created.

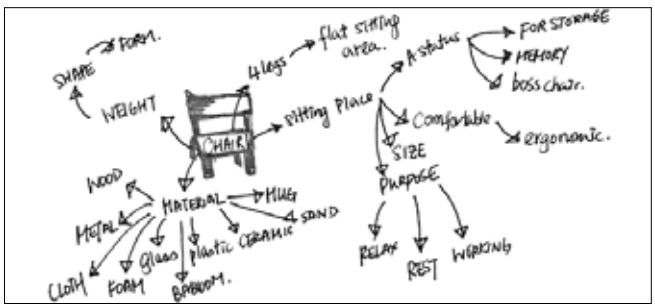

Fig 2 : Exploring "Design a chair" by a student and the beginning of reframing it to "Sitting place"

Problem re-definition or problem construction is a way to understand and identify the requirements of the problem and view it in context of different perceptions (user needs, cultural context, product variants, economy, climate etc). One could reframe the brief so that it enlarges the search space, with more diverse ideas and keywords for achieving the goals of the problem. For example the problem statement "*Design a chair*" evokes an established mental image based on our past experience associated with attributes like form, structure, material etc.

This statement could be reframed as "*Design a comfortable sitting place*" which is devoid of preconceptions and promotes curiosity to understand the problem through questions like "*What is comfortable*?", "*When is one comfortable and why*", etc. This could lead to different realizations ranging from comfort being related not just to *Physio-pleasure* (pleasure to do with body and senses) but even aspects like *Socio-pleasure* (pleasures to do with interpersonal and social relationships), *Psycho-pleasure* (pleasures to do with mental comfort), *Ideo-pleasure* (pleasure to do with values like user-friendly, environmental-friendly, etc.) as well as comfort being related to the environment as a whole and not an individual artifact.

Fig 3: Exploring "Design a Comfortable Sitting Place" by a student Physio-pleasure Socio-pleasure Psycho-pleasure Ideo-pleasure

3.2 Ideational fluency

This is concerned with the quantity of ideas generated as well as their variety or diversity. Students are introduced to idea generating and organizing techniques like classification, brainstorming, mind-mapping.

Classification is organization based on certain attributes like pattern, shape, material, usage etc. nurturing abilities like sensing, observing, patterning etc. This is an initial step to reflect on the diverse relationships one can come up with while classifying a given set of objects as well as to understand similes, metaphor and analogies, which are based on comparisons. Classification helps us detect the hidden patterns in our surrounding environment, developing our ability to form new patterns by combining two or more attributes like structure, usage, material etc. It promotes flexibility in thinking and brings in multiple perceptions.

Brainstorming[12] is a popular tool to catch spontaneous thought processes for generation of ideas. It encourages putting forth of all ideas without constraints, inhibition and is especially useful in the

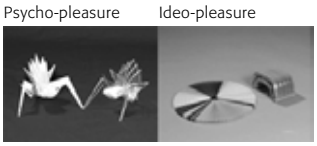

Fig 4: Prototypes by students on "Comfortable Sitting Place"

early stages of problem solving. The initial goal of brainstorming: is to strive for quantity, the reason is based on the fact that the first 20-30 ideas are the ones that we are already aware of and hence may not be the unusual ones. Also with more ideas listed there can be more options to get associated ideas as a result of synthesis of two or more listed ideas. Brainstorming breaks us out of routine thinking to generate a set of refreshing and new ideas. Random word, image, or object could be used as a trigger to reflect in context of the problem from a totally new perspective. While brainstorming asking questions to do with changes in size, proportions, environment, user-friendly approach etc become very important and makes the students to think on concepts like object manipulation (changing proportions and other physical characteristics), hybridization (combining objects), looking at context, users etc. in order to generate a diverse set of ideas.

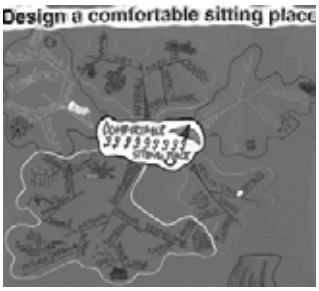

Fig 5: A mind-map on "Comfortable Sitting Place" by a student

Mind-mapping[13] is a visual thinking tool developed by Tony Buzan which uses combinations of word-images to record and organize the thinking process, its contents as well as unexpected associations between them. It is non-linear, visual and hence helps in memory recall and encourages associations between different thoughts at the advanced level.

3.4 Paradigm Shift

We develop our routine ways of doing things in professional as well as everyday activities. Such unwritten rules that we tend to follow could be referred as "Paradigms." Paradigms enable us to solve problems successfully but they fail to address the demand for change in trends or lifestyle over time. And hence designers need to be able to bring about paradigm shifts, sometimes deliberately to be able to look at the problem with new perspectives. The earlier proposed concepts of *First-hand Research and Empathy, Problem re-definition, Ideational fluency*, also bring about paradigm shifts. *Analogical thinking* and *Break the rules* help to bring about paradigm shifts deliberately in a profound way during generation stage of creativity process.

Analogical thinking uses similes, metaphors and analogies as thinking strategies to invoke new associations based on comparisons between objects. They could be used especially to understand new unfamiliar concepts by establishing connections with familiar ones, as well as to approach a familiar topic in a new way. For instance, examples from history could provide the basis for new design. Students could thus start to appreciate the relationships between their various courses, be able to observe day-today life from a broader perspective and realize the importance of recording and reflection.

Break the Rules is another deliberate way of getting away from routine habits of thinking and nurture the ability to be curious and question.[14] To begin with, the students are asked to break their routine habits, like going to a place or performance they had never been before, talking to people of different disciplines, etc. The students begin to make new observations and associations by getting out of routine ways. They are then encouraged to apply "break the rules" while approaching design problems as well. For example for the design of a robot, the students noticed that most people focused on the movement of the robot based on wheels or human beings. Breaking a rule they decided to research animal motions like jumping in frogs and sliding in snakes to induce robotic motion.

3.5 Recording & Reflection

Recording and Reflection of one's thoughts and experiences is very important. Schon characterizes a reflective practitioner as one who emphasizes problem-setting (in addition to problem solving) activities, reasons about the problem and solution through experimentation and fluidly engages in a variety of representations to experiment with the problem.[15] In order to put this into practice, we have made it mandatory for every student to maintain a lab-log to catch thoughts, experiences and associative ideas of each of the exercises carried out in class. Lab-log is a reflective notebook and should contain their observations, experiments, lecture and seminar notes, record of successes, failures, frustrations, despair, joy and imaginative leaps into the unknown. In particular the lab-log must contain their perspectives of all the exercises. Thus the lab-log is an evaluative tool, based on personal reflection.

3.6 Experimental Evaluations

Sketches, drawings, 3D models, prototypes are different ways of visualizing design projects. We encourage the students to use each of these in no particular order as thinking tools as well. In other words we encourage them to move from 2D to 3D or vice versa simultaneously playing with proportions of the object. Instead of replicating sketches into tidy drawings and then models, we ask the students to reflect and experiment in each of these stages for design development. Students through such experiments realize the connection of building 3D models using 2D planes as well as building small prototypes to evaluate their design. These evaluations are student's own opinion and not to do with user evaluations.

4 Conclusions

Through the different exercises in the course students get an opportunity to try different approaches to work on design, more so as the majority of the exercises are designed to promote self learning where students learn through their own experiences as well as those shared by their peer group. This is manifested through a graduate survey conducted in 2002-03 which indicated that BA (Hons) in design empowered its graduates most in developing a broad understanding of design in the social, economic, technological and cultural contexts, become more forward thinking, enhance their creative problem solving ability and appreciate a multidisciplinary approach to design.[16] This course has run over a period of 5 years and seeing the positive results through student feedback and based on the view that creative thinking is not limited to a particular discipline, similar subjects are being offered in HKPolyU as electives for other disciplines in higher education (engineering, business and management etc.) as part of UGC funded teaching and learning project titled "Creativity Development in Higher Education (CDIHE): Developing Multiple Talents of University Students through Creative Teaching and Learning."

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Holistic Approaches to Creativity and Design Education

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Krishnesh Mehta has been working on the synergetic convergence of Design, Science and Technology and Management for over a decade. He has done Masters in Physics followed by an Advanced Diploma in Space Sciences. He is a chartered lighting engineer with specialization in Reality SFX. He is certified in alternative therapies and medicines. He has also done MBA and has been actively involved in researching on Senses and Sensibilities, Perceiving Perception, and the Neurophysiology of Creativity, Leadership and Systems thinking. He has also done extensive work on combining the best of the modern and the ancient sciences like yoga for achieving desired alteration in the brain functioning. Based on the above convergence he has developed the concept of Multi-sensory (48 plus sensors) and Cross Sensory Design, Perceptual and Intuitive User Interfaces and has been holding regular workshops on the same. He has been a member of the Faculty in the area of Design Science and Strategic Design Management at the National Institute of Design, India, for the last 10 years. He has also been an active player in the setting up of the country's first Design Business Incubator.

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Learning is generally all about building a definite and never-flinching conviction in the learner about the ability and talent for the learnt topic. For example, learning drawing is complete when the learner gets convinced that s/he could draw. Education, then, is about building this conviction in the taught for the topic. Creating this belief, confidence and assurance in the student is what an educator should aim for. This is all the more applicable for tangibly imparting the so called subjective and intangible topics like creativity and design. Creativity is more of an attitude and an approach rather than a skill. The same applies for design. Traditionally, these convictions are conveyed by making the student do things repeatedly, or work as an apprentice, till he has fully imbibed learning by doing as it is often called. These methods seem to have worked well so far. However, in the present experience economy they need to be updated. Using them the students often appear to give more importance to the hand skills than the mind skills. Even today most design schools do not teach creativity as a separate course. It is assumed that it will be absorbed while learning by doing. This leaves a lot to chance. Some students may fail to understand integratively, some may not. Are there other methods that help in requisitely altering the beliefs and attitudes so that the student develops as a well-integrated creative person? This paper strives to outline some of the approaches to teaching creativity and design more holistically using the convergence of the various modern and traditional disciplines like physics, neurophysiology, neuro-psychology, yoga, etc.

Keywords: *assumptions, tangibility imparting, fully imbibed, teaching creativity*

Introduction

In this new and emerging knowledge and experience economy the nature of creating and delivering design is changing and therefore the role of the designer is being redefined. Design is becoming more of a mental skill than a physical one. It is no longer sufficient for a designer to be skilled physically alone; s/he must be skilled, at least equally or ideally more, mentally as well.

Today, it is possible to replace or hire the physical skills easily and more economically than ever before. New technologies have made certain traditional skills of the designers almost redundant. For example, with the advent of computers and highly user-friendly graphics, interior, fashion design software, etc. it has now become possible for anyone to dabble with graphics design, interior design, fashion design, etc. Similarly, the rapid prototyping and visualization technologies have enabled even the most unskilled person to create product designs, models and prototypes of a high quality. This is further emaciated by the fact that the difference between a good and bad design is often not very clear among the masses. In such a situation the role of a designer is fast changing from that of being artistic and creative to that of being innovative and strategic, from that of being just beautifiers to that of being differentiators creating utility and value. In this context, the function and nature of design education too has to change. The traditional 'learning by doing' methodology has to be complemented with 'learning by thinking' as well. More stress needs to be given on the modes of

teaching that transform and affect the minds as much as or more than the hands. Besides, with better understanding of the brain and how it learns, now made possible with the latest brain probing technologies, intangible mental skills like creativity and systems thinking can now be measurably taught. Of course, this does not mean that this paper suggests that all the old and traditional methods have to be replaced; it only suggests that they need to be re-looked into, re-oriented and complemented with newer methods in order to synergistically achieve the best of both, tradition and modernity.

This paper seeks to suggest some of these re-orientations and paradigms based on the most modern findings in the fields of physics, neurophysiology, neuro-psychology in conjunction with some traditional disciplines such as yoga, etc. and some empirical studies, born out of this convergence, carried out by the author.

Re-looking at Design and Design Education

Traditionally design has been primarily seen as a problem solving activity. The trouble here is, solving the problem and, therefore, doing and trying to solve and arrive at a solution becomes more important than thinking about the problem. Too often design students do too little of problem finding and jump on to problem solving. This often leads to solutions that are too specific, solving only one or two attributes and hence infinitesimally incremental and, therefore, frequently lacking the holistic and systemic aspects. This is all the more important in today's context of the complex trans-disciplinary nature of everything where no part exists in isolation of the whole. In fact, if majority of the time is spent in problem finding than the solution/s will emerge almost automatically. This necessitates re-looking at design as a problem finding activity rather than the problem solving one. Design has to be about finding problems first and then solving problems. This should not be taken to mean that solutions are not important, but more effective outcomes could be achieved if the problem is detected more perceptually and fully. This requires more perceptual and analytical skills and also a very sharp and keen observation that not only sees the obvious but also senses and perceives the unobvious. Developing this precision of observation and sensitivity becomes important and has to be addressed by design education.

Design, by its very nature, has to be user centric and is all about expressing for others and hence understanding human behaviour, how we sense and perceive is especially important. Sensation and Perception is taken too much for granted by all of us. Do we ever wonder how our lives would be like without the senses, even without one sense? And without the resultant perception? Design students need to go behind the senses to understand how perception happens, to SEE inside the senses and the seat of all perception — the brain and the mind — to explore, experiment and experience the anatomy and the physiology of perception (both brainly and mindly, external and internal, this worldly and the other worldly). They need to be taught to understand perception to perceive better, to understand themselves and others — human or otherwise — and the environment better. So that they can develop the desired sensitivities and sensibilities that help them EXPERIENCE better and facilitate others experience better. So that they can DESIGN anything and everything better. Imparting all this has now become possible with the help of neurophysiology and neuro-psychology. Therefore, topics like perceiving perception, and developing the senses and sensibilities need to form an integral part of all design education.

Education must be able to create a clearly perceptible transformation in the taught. It must create a conviction in the student about the capabilities achieved and therefore the capacity gained to face any situation in the given field of study. In fact, one can say that one has learnt something only when one can convince oneself about the capability one has gained. This kind of confidence and belief is easy to attain in the objective disciplines like science and technology as the amount of learning is easy to quantify and measure, but very difficult to gain in the branches like design. However, drawing from the advances in the brain and neurophysiology research in the last few years, it is now possible to quantify and measure even a subjective learning like design and creativity, etc. This is possible due to the fact that every behaviour and emotion has a distinct neural physiology and that every

particular neural physiology leads to a specific behaviour and emotion. And this neural physiology can be objectively and quantifiably observed. Education, and the learning there from, in this context is nothing but the nature and the quality and the quantity of the neural connections achieved.

Evolutionarily, a major part of the human development has happened in the midst of nature, out in the open wilderness. This has led to the evolution of our sensory sensitivities that are more tuned to nature and natural environments. For example, the spectral response of our eyes is in tune with the spectral composition of sunlight and so on for other senses as well. Nature is multi-sensory and we find that the human perception has also evolved to be a fundamentally multi-sensory phenomenon. Nature, no matter how insignificant it is, a small peek from a window or a view from the balcony, is forever able to grab our attention and it surely is never repetitive and often always inviting and de-stressing. It is eternally dynamic, at all times multi-sensory, ever fresh, continually new and decidedly and precisely branded. Everything natural has a distinct liveliness and ignites a unique emotion that most artificial artifacts fail to evoke, like a room with a window is more desirable, no matter how small, as compared to one without it, or that after hours in climate controlled air-conditioned office we do long for just that dash of fresh air, which is enough to enliven our spirits. However, since the last two hundred odd years, the humans seem to have been increasingly moving away from nature to more artificial environments by 'intelligent' human interventions and design. But these designs are most often out of sync with the natural sensory sensitivity of human perception. The harmful effects of these have resulted in 'gifts' of the modern day in the form of diseases of stress, depression, etc. This has already made us re-think our direction of progress. In this context the role of designers as ones who humanize technologies and thereby enhance the quality of life, ideally both physical and mental and maybe even spiritual, is becoming all the more important and crucial. It is in this context that Multi-sensory design becomes relevant in the present context. Very few design schools, if at all, address this issue of multi-sensory and cross-sensory nature of design.

Can all the above possibly be taught? Taking a holistic approach, based on the research on synergistic convergence of Design, Science and Technology and Management and the traditional and modern methods of education and learning, the Design Science department at the National Institute of Design, India has developed modules and techniques for imparting topics like Perceiving Perception, Sensitizing the Senses and the Sensibilities, Multi-sensory and Cross Sensory Design, Perceptual and Intuitive User Interfaces, etc. and they are being offered to students and industry at various levels and in varied forms for the last 3-4 years.

Experimental Study

It has been found that Visual Imagination and Creativity are two[1] among the many vital ingredients necessary to be imbibed by anyone desirous of becoming a designer. In fact, today, there is an increasing awareness of the Multi-sensory-ness of experiencing and designers are increasingly becoming aware of the need for multi-sensory design and hence it is no longer sufficient to develop only visual imagination but ideally multi-sensory imagination. However, there seem to be no design schools that explicitly transfer these mental skills to their students. At most, the students are given a few assignments through which the students may pick up the desired qualities. But that is leaving a lot to chance. Some students may learn, some may not learn at all and both will not even know whether they have learnt or otherwise. This is one of the reasons most students take longer than their prescribed durations to complete their studies, as they do not feel themselves convinced and confident enough to face the world.

But can Multi-sensory Imagination and Creativity be imparted at all? The modern neurophysiologic studies[2] seem to answer in the affirmative. The neurophysiologic studies claim that creativity can be achieved by activating the associative and synchronistic neural connections in the brain[3]. The Multi-sensory Imagination can be imparted by activating the parietal and temporal lobes along with the limbic system and sensory cortex areas. This approach gives a more tangibly quantifiable means to impart and measure the learning. The obvious next question is how these activations and neural connections can be achieved. Our studies have shown that combining the modern brain activity altering techniques like Entrainment, Resonance, Psychoacoustics, sonic neuro-technologies, etc.

along with ancient traditional techniques found in yoga, like progressive relaxation and yoga nidra, specific meditation techniques may help achieve the same.

An experiment was set up to study the same. 10 student volunteers were identified. The students were given specific assignments in creativity and multi-sensory imagination and their performance was noted. For multi-sensory imagination they were given assignments and visualization exercises[4] that subjected them to different multi-sensory situations that they had to describe in terms of the experience perceived by them using techniques adapted from Zaltman Metaphor Elicitation Technique (ZMET)[5]. Brain wave activity was tested using EEG and a questionnaire developed by Dr. Daniel Amen[6] based on SPECT (Single Photon Emission Computed Tomography) with suitable modifications. The students were tested before the interventions were given. They were then taught specific techniques that were based on the combination of Entrainment-resonance and yoga, which they had to carry out everyday. This was carried out for 15 days and again the same tests were administered. Of course, these tests and study can be considered as only indicative and for more emphatic study brain scanning using fMRI or fDOT need to be carried out.

Results

1 person of the 10 was not able to practise daily interventions and so pulled out. Of the remaining 9, 3 were not very regular in practice. The remaining 6 showed a distinct improvement in their ability to be creative and multi-sensory imagination. This was cross- validated by their performance in their regular courses and their confidence to deal with such assignments. Thus, the results show that it is possible to measurably impart creativity and multi-sensory imagination skills through amalgamation of the traditional and modern knowledge.

Conclusions

In the new economy the demands on the designers are changing. Today good design is a treat for the senses. Good design attracts, persuades, seduces, serenades, mystifies, and wows and delights. Good design makes one lust for it, makes one fall in love with it. In such a scenario design students need to be made ready for the same by employing some newer modes of teaching so that they can design for and with senses and sensibilities. This paper also proposes to re-look at design as a problem finding activity, and highlights some of the mental skills necessary to be imparted to design students. It also proves through an experimental study that it is possible to impart the mental skills by using the convergence of traditional and modern technologies.

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Training Perception – The Heart in Design Education

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This paper attempts to show that the conscious use of perception in creative design and its training allows students not only to significantly improve the originality of their final design results, but also to improve their working performance and their understanding of the diversity of life itself. Perception is placed at the core of design thinking and thus at the heart of design education. What the designer perceives with all his senses while he is reflecting on a design problem-space has a profound impact on how a situation is interpreted, and how design solutions are developed. To explain the importance of perception and cognitive approaches to the development of the teaching of design, we introduce 'Radical Constructivism', the paradigm on which our research is founded. According to constructivist theory, perception operates as a 'self-organizing-information-system', which restricts our thinking to established patterns. While searching for a new perspective on a design problem, we have to liberate ourselves from this mechanical kind of perception. Before describing the perception training methods in a Design School, we should look back at the introductory course of the Bauhaus, where teachers such as Itten, Moholy-Nagy or Albers had already given special emphasis on exercises on sensory perception. Next, the paper describes some methods and principles for the training of students' perception, which have been developed in the Design School, as a complement to perception training, through design projects and drawing classes. Presented are some specific exercises with visual examples. Students' results confirm to us that the training of their perceptive ability deals not only with the education of future designers, but also with the sharpening of their sensory abilities as a foundation for humanising life itself.

Keywords: *design cognition, perception, creative thinking, radical constructivism, design didactic*

1 Introduction

Proceeding on the assumption that design aims to create something different from what already exists, creativity should be given more priority in design education than it currently is. There is still a noteworthy dominance in design education of technical, methodological and semantic knowledge following the principles of logical deduction and rational optimisation techniques. But information about concrete design projects and specialist knowledge are not enough to create innovative design solutions in our rapidly evolving world. According to such authors as Lawson [1986], Dorst and Cross [2001] or De Bono [2000], design innovation is primarily the result of a system of possibilities that creates hypotheses and new visions. And the production of new combinations, and of unexpected and uncommon responses, is the cognitive ability of a life system (individual, group, organisation), which we define as creativity. The creative designer is the one who has vision and imagination and who makes connections between previously unassociated ideas and concepts. Because of this, as well as analytical, analogical and synthetic thinking, the designer operates through the way he 'sees' (with all senses) and structures the world.

The phenomenon of perception is so seminal to the understanding of cognition that it has stimulated a considerable body of research, and this includes the field of design [for example Schön 1987, Kolodner and Wills 1996, Oxman 2002, Pombo and Tschimmel 2005]. In a paper about 'Visual Re-cognition', Oxman [2002] distinguishes between two levels of visual processing: The term 'low-level

visual process' is applied to perception as a transformation process of sensory information into a model of the real world. The 'high-level vision,' by comparison, contributes to the understanding of the properties of the perceived object, involving previously stored information. This last process is defined by 'visual cognition.' As we don't want to limit the term perception to the visual sense only and we think that a low level perception does involve stored information, we do not distinguish perception from a cognitive process. We understand perceptual cognition as the complex process of exploiting at one and the same time the stimulus input, and also the reasoning about its properties.

We consider perceptual reasoning to be the basic skill in the creation of new realities and thus at the heart of design education. What the designer notices with all his senses while he is reflecting on a design problem-space, has profound impact on how a situation is interpreted, how analogies to other knowledge domains are made, and how design solutions are developed. While Kolodner and Wills [1996] emphasise three moments of the design process in which perception plays an essential role - problem reformulation, augmenting the teleology of design pieces and the emergence of criteria -, we think that perception influences the design process at every moment.

In this paper we want to show that the conscious use of perception in design and its training allows students not only to significantly improve the originality of their final design results, but also to improve their working performance and their understanding of the diversity of life experience itself, as a base for all creative thinking. Before describing concrete exercises which we are using in our design school in Porto, together with other measures for the development of perception, we want first to look back at some methods which were used by teachers of the foundation course of the Bauhaus, and which characterise design education even today. Firstly we will introduce the cognitive approach in design education and describe an interdisciplinary theory of thinking and perceiving through construction, explaining in this context the importance of perception for the creative thinking process in design.

2 The Cognitive Approach in Design Education

Over the last twenty years, scientific interest in design cognition has grown rapidly. The cognitive processes of designers have been well documented by researchers such as Lawson [1986, 2003], Schön [1987], Cross, Dorst & Roozenburg [1992], Oxman [1999, 2002] or Love [2003], all pointing out that the design process is too complex to reduce design thinking to mere 'problem-solving' or 'information-processing.' These authors demonstrate that design involves a variety of mental operations and introduce into the design field concepts like the 'divergent thinking' of Guilford [see Lawson 1986], the 'Reflection-in-Action' model [Schön 1987], 'visual re-cognition,' a concept that Oxman [2002] developed for explaining the phenomenon of visual cognition in design, or the concept of 'emotional thinking,' based on the neurological approach of Damásio [see Love 2003].

Since Schön's work in educating the 'reflective practitioner,' we can find cognitive orientation as a foundation of design learning. Subsequently, Pombo and Tschimmel [2005], in a recent study, characterise design thinking as an internal dialogue between knowledge and imagination, reason and emotions, logic and intuition. In their description of the complementary interaction of 'sapiens' and 'demens' in design creation, they introduce the concept of 'Perception-in-Action,' emphasising the perception ability as 'the core of creative design thinking.' What one is thinking is inseparable from what one is perceiving, which Arnheim has been showing us since the Sixties [see Arnheim 1954/1978, 1969/1996].

And now the interdisciplinary discourse about cognition, known as 'Radical Constructivism' [Schmidt 1992, 2000], shows us that perception and recognition is exclusively a reorganisation of previous experiences. Constructivist authors challenge the existence of an objective ontological reality and recognise the plurality of perception. Our brain isn't a reflex system open to the environment, but a functionally closed system that operates on the base of generic evolution, cultural patterns, earlier internal experiences and one's emotional state. Therefore, Von Glasersfeld, Roth, Schmidt, Varela and other researchers in cognition describe the brain as a 'self-referential,' 'self-explaining' and

'semantically closed' system, which doesn't have direct access to the world, but which constructs and presents 'reality' only for itself and within itself. [Compare the different approaches in Schmidt 2000] Consequently, perception operates as a 'self-organizing-information-system,' which restricts our thinking to already set up patterns, based on our own personal history. This explains the fact that designers interpret a given design problem in quite different and subjective ways, so that each designed object is the result of a personal view and choice from the designer/team and the design-situation. Constructivist theory calls this phenomenon 'interest guided perception': perception is always interpretation and assignment of meaning [Roth 2000].

If we see our environment, which is full of diverse stimuli, we understand immediately that we need our selective perception to survive, to distinguish important things from less important, and be able to react accordingly. At this point arises the still unsolved question of whether the cognitive subject can influence his own perception, or if he is only the victim of his own perceptual system. In our approach, we proceed on the first assumption.

One of the most recognised cognitive blocks in design is the perceptive block, an impediment for the clear comprehension of the design project, and for the necessary information finding an original and useful response. In *Conceptual Blockbusting*, Adams [1979/1986] describes five of the most frequent perceptual blocks: the tendency to see what we expect, the difficulty of isolating a problem and redefining it, the tendency to over limit the problem field, the failure to look at the problem-space from different points of view, and finally, perceptive saturation.

Since the Twenties, Gestalt psychology has shown us that the use of patterns is in the nature of perception and that the construction of patterns happens according to some principles, following Gestalt laws. If we are searching for a new perspective on a design problem, we have to liberate ourselves from a routine and mechanical kind of perception and from stereotypical views of the design subject. Perceiving is not only a mechanical register of sensory impressions but it is a creative interpretation of the 'reality' which includes processes such as comparisons, combinations, simplification, abstraction, etc.

To design anything original, according to Bohm [1998], there is a need for 'real perception' or what we can call 'creative perception.' 'Real perception' is about actively searching for the difference, as opposed to a passive and mechanical reception of sensory impressions. Sensitivity to difference and similarity enables one to perceive new structural orders in the natural world and also in the knowledge stored in our mind. The creative designer is the one who perceives and relates what other people don't perceive and relate. So 'creative perception' requires design students to learn to be more attentive, alert, aware and sensitive.

3 Perception in the Design Education at Bauhaus

As early as 1910, the American philosopher John Dewey pointed out the urgent need for thought training in education, criticising the natural tendency of individuals to develop 'erroneous mental habits' and also criticising the traditional school system of his epoch [1910/1997]. His pedagogical concept "Learning by doing" remains the didactic foundation for experience-based learning in most design schools. Certainly aware of Dewey's educational theory, but also influenced by the German and French pedagogical reformers such as Pestalozzi, Fröbel, Rousseau and Montessori, teachers from the Bauhaus applied educational methods which were characterized by efforts to develop latent creative thinking abilities. These were not even considered by the rigid school system of mechanical learning methods.

In this context, teachers such as Johannes Itten, who already thought that our reality is constructed by subjective sensations, paid special attention to the liberation of creativity through perception training. Anticipating the Radical Constructivism Movement, Itten wanted the students to develop their perception and creative thinking abilities through an interior experience, starting from their own selves. This would include their feelings and emotions, and not limit itself to an intellectual approach.

In order to refine the students' sensory sensibility, both, visual and tactile, Itten made numerous studies of material and textures in his courses, which have been adopted by his successors Lazlo Moholy-Nagy and Josef Albers [see Wick 1989, Droste1991, Fiedler and Feierabend 1999]. Whereas studies of nature strived for more objective observation of sensorial impressions, Itten aimed through life drawing classes and classes of art interpretation to improve the more intuitive perceptual ability of his students. By exploiting the universe of forms, he emphasised the rhythmical and emotional aspect of such visual analyses. In his pedagogical practice, Itten thus tried to complement the subjective perceived experiences of his students with objective knowledge in shape and colour theory. This combination represented for him a conditional indissoluble relation by which can be constructed the 'complete man' [in Wick 1989: 163].

Connected to the didactical approach of Itten, both Moholy-Nagy and Albers aimed in their introductory course to develop the creative potential of their students, reinforcing their perceptual senses, feelings and thoughts, 'especially those of students who had accumulated — as a consequence of common education — a useless encyclopaedia of knowledge' [in ibid: 201]. Through exercises with diverse materials, they tried to make accessible to the students the complex interaction of visual, acoustic, tactile and other kinds of perception. Exercises for the refinement of the tactile perception of materials were, for Moholy-Nagy, considered as a preliminary phase, necessary to the differentiation process of the visual perception ability. Albers has perhaps been the teacher who follows more closely the pedagogical thoughts of Dewey. In his own words, "doing is better than learning" [in ibid: 236]. Following the 'learning by doing' concept, in today's design education we can still find exercises in three-dimensional construction such as Moholy-Nagy and Albers had applied in their teaching period at Bauhaus, but earlier exercises, to develop the tactile or visual senses, seem to be very rarely used today. In step with his pedagogical work, Moholy-Nagy applied his theories of perception in his own practical photography work, and thus created totally new visual perspectives of reality for his time. In Albers painting work called 'perceptive painting,' he plays with optical illusions and shows at the same time the impossibility of definitive and objective visual perception [Kitschen in Fiedler and Feierabend 1999: 319].

Whereas Itten, Moholy-Nagy and Albers have made a fundamental contribution to the development of new educational methods, Kandinsky is important to our argument because of his theoretical content. As he himself had possessed a strong capacity of synaesthesia, he developed a concept of synthesis that involved the parallel processing of different sensory experiences, such as the association of colour and sound, colour and texture, sound and taste, etc. Although Kandinsky had written down his theory in several documents, such as *Der gelbe Klang* (The Yellow Sound) [1912 published in *Der blaue Reiter*] or *Punkt und Linie zur Fläche* (Point and Line to Plane) [1926/1973] or *Essays über Kunst und Künstler* (Essays about Art and Artists) [1955/1973], we can not find any evidence that didactical methods with synaesthetic thinking were being taught at the Bauhaus. On the contrary, Kandinsky pronounced himself in favour of analytical and systematic observation methods, which 'are the way to arrive at a synthesis' and he applied the analytical approach in his drawing classes, where he aimed to develop a foundation of 'exact vision' [in Wick, 1989: 269 and 302].

Kandinsky's theoretical approach and the numerous exercises carried out in the perceptual universe in a orientation process by teachers such as Itten or Moholy-Nagy, demonstrated, nearly one century ago, that perceptual thinking has an important role to play in design education, above all, of first year students. Even today in the foundation year of a design course, the acquisition of theoretical knowledge about the language of objects and images, and the development of thinking and perception, both of which are necessary in design activity are still in evidence. In the Bauhaus, despite all attempts, there was still not really a conscious training of a designerly way of thinking as an educational objective. As late as 1999, Oxman complained that, "the cognitive properties of design learning have never been the subject of design education," but then added that some researchers in cognitive design had begun to give new directions for the development of modern design education.

4 Training Perception in Modern Design Education

The concrete 'teaching' of creative cognition strategies such as 'divergent thinking,' 'analogical thinking,' 'visual reasoning' and 'creative perception' is still largely missing in the European academic system and design education. In most design schools, the methods derived from the introductory course of basic design curricula at the Bauhaus are still applied along with methodological approaches derived from the HfG Ulm. But times have changed. And so have the paradigms of design [see more Dorst 2000]. In constructivist perspective, the belief in objectivity of perception, such as was defended by Itten, Moholy-Nagy, Albers, Kandinsky and also by numerous later teachers in other schools, can't be defended in today's design education. We have to look for new methods of motivating our students to develop their perception and their cognitive capacity in general: methods and exercises that are fit for current knowledge, practices, and for the information age.

Besides the training of perception in studio-based design projects and drawing classes, and through the first year disciplines such as two and three-dimensional design in which colours, shapes and volume are explored, in our design school we are conceiving other complementary measures and some principles, whose purpose is the development of 'creative perception' as opposed to a routine kind of perception. This list will be completed after finishing an empirical research project, which we are currently doing with our design students.

Principles for the development of 'creative perception':

- Conscious destruction of stereotypical views in respect of a thematic subject.
- Divergent exploration of the project information and the relevant knowledge to deal with the problem-solution space.
- Activation of all senses in the act of perception.
- Temporary suspension of the critical judgement and re-evaluation of man's characteristics as '*demens*' in the design thinking [see Pombo and Tschimmel 2005].
- More trust in our intuition instead of mere guidance by conscious thinking.

Concrete measures:

- Frequent application of certain 'creative techniques,' which train flexibility and originality of students' perception, such as 'brainstormings,' 'mind maps,' 'analogies' or 'inversions.'
- Meta-cognition: reflection and discussion about thinking and perception habits.
- Introduction of acting into the exploration of the problem-solution space of a design project.
- Encourage travelling through other countries and cultures with predefined observation tasks.

In our didactical approach, we don't consider learning results to be the reflection of an input, but as the construction of one's own world. For this reason we seek to introduce students into the world of design cognition, design interaction and of the learning process itself. So, instead of teaching in the traditional way, we give the students tools, which can provoke a new way of thinking and perceiving their environments. The first three measures we have already intergraded in a special discipline in the first year of the design course, where we are also applying all the proposed principles. The same principles are the basis for an exercise, which our exchange students have to carry out in the countries they visit over a period. Next, we describe these two pilot-projects in greater detail.

4.1 Training Perception in a New Discipline about Cognition

One year ago, in our design school, we started the development of a pilot-course, provisionally called 'Cognitive Processes in Design' [Tschimmel 2004]. In this first-year course, different kinds of cognitive processes in design activity are brought together, like the perceptive, the creative, the communicational, the learning and also the emotional and the teamwork process. The main goals of this new discipline are to help the students to improve their thinking abilities, and at the same time, their learning performance. And for that they need to develop a Meta-cognitive competence.

Parallel to the theoretical presentation of each design thinking skill, the students carry out several exercises where they can feel and try out the different thinking processes. In a subsequent evaluation of the exercises, students reflect about problems that emerged, their thinking and working process, and the feelings they had during different working periods. They also consider influences from the environment and the dynamic of the team with which they worked. Relating to perceptual thinking, students have to be aware that perception can be an active process, a process of searching, led by our expectations, goals and emotions and not only the passive reception of sensory impressions. The capacity to observe oddities and ambiguities in our world is the foundation not only for more creative thinking, but also for a more ethical attitude.

Most of the exercises of the course are designed to train visual perception and imagination, because design is a mainly visual field and seeing seems to be a sense which perceives more aspects of the stimuli (colour, texture, form, space, movement) than the other senses which are limited on only one or two aspects. One of the more embracing exercises we have already applied is the following: Students had to observe and record a curiosity of our natural or artificial word. This curiosity can be represented by photography, drawing or other graphics, or recorded by audio or video. Here are three of the visual examples realized in the last and in the running academic years by students from the first year of our Design Course: In image 1 we see several open refrigerators from different countries for which Ricardo Seixas had asked for in a virtual chat room. In image 2, Hugo Alves has looked inside women's handbag. And in image 3, Catarina Ribeiro has looked at the shapes, which the splatters of seagull droppings leave on the ground at the seaside.

As in the third example, there are various other exercises related to ambiguity in our course [see the example of the ABC from André Fangueiro in image 4]. In her studies about visual cognition, Oxman emphasises the innate condition of visual ambiguity in representations of shape as the essential of emergent design [2002: 140]. How many shapes or Gestalten can we see in an object? And feel by touch? And perceive by listening? The exploration of ambiguity in perception through other senses than the visual is still not very common because of the dominance of images in our occidental culture. How many objects can produce the same sound? And about the textural quality of an object: can a soft looking object be hard? And, can a hard looking one be soft? And is it possible for an object to be at the same time soft and hard to the touch? And about smell and taste: how many objects can we find with a sweet smell and a bitter or salty taste? These are the kinds of questions we try to explore deeper during this academic year, in several exercises on ambiguity. In another exercise students have 10 minutes to find 10 objects which are, in all respects, different from each other in colour, shape, texture, size, sound, smell and taste. In this academic year we are also trying to introduce exercises in which two or more senses interact with each other, following Kandinsky's concept of synthesis through perception.

Image 1


Image 2

Image 3

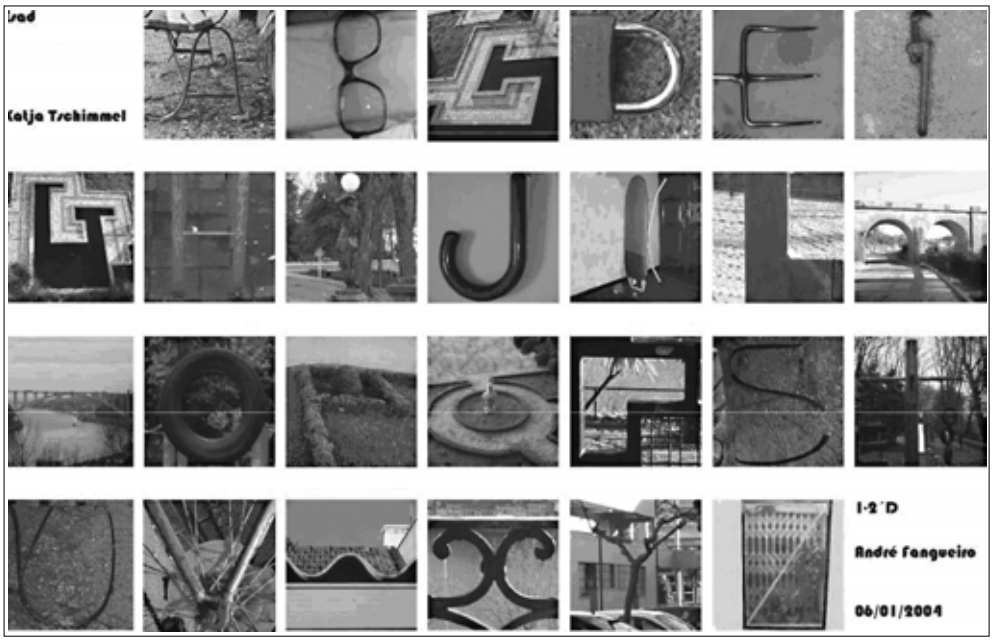

Image 4

4.2 Training Perception in Students Exchanges – Work in Progress

Another current pilot project in our school is training perception on student exchanges. Students who participate for one or two terms in an international exchange have to carry out an exercise that is based in sensory perception of very different realities in their exchange country: they have to 'look' at details in the other culture without collecting stereotypical 'images.' The observed curiosities – natural or artificial – they have to record by photography, drawing, video or by other information supports.

5 Some Conclusions

Our experiments have indicated that perception training is an indispensable contribution to the learning process in design education, in the way that it improves the development of the cognitive ability to manipulate the symbolic representations of design knowledge. The first students' results from exercises and their evaluation of the introduced principles and measures confirmed to us that an understanding of the major role of perception in design thinking definitely generates more original ideas and practical solutions. The liberation from the routine of perception is the basis for all innovative design. We believe that students who understand how active perceptual reasoning serves their design processes, can, over time, learn to master this strategy with or without explicit instructions to do so.

Although design cognition and meta-cognition in the last academic year, have become a formal content of design education in our school, we are far away from a pedagogical curriculum based on the explicit learning of cognitive strategies, as Oxman idealised [1999]. There is still a lot of work to do. More exercises have to be invented, the existing ones have to be further tested and improved. And in a future research project we plan to develop a description for the 'Perception-in-Action' model, which we have introduced in this paper.

One thing is sure: the training of thinking and sensory perception competence, not only deals with education of future designers, but also with the sharpening of sensory abilities as a foundation for humanising life itself. This, after all, was the objective that Itten, Moholy-Nagy and Albers strove for in their educational approach at the Bauhaus.

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Preparing Design Students for their Future Industry Profession

How to Encourage Student Innovation and Creativity in Design Education Programs

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The recent business trend that saw fashion companies relying primarily on communicating brand values as a way to build companies and profits has seen mixed success. Demographic changes in what will become almost the mainstream community is likely to see this mixed success decline even further. The Creative Class as they are termed by Richard Florida (2002) or Cultural Creatives as named by Ray & Anderson (2000) will become a dominant consumer group and their characteristics suggest that the recent branding focus will not be enough to win over these individuals. Attention will need to return to the product and with it will come the need for creativity and individuality.

It is important therefore that Design Education programmes prepare students for this environment and this will require a focus on fostering personal creativity. Psychologists such as Maragert Boden (2004) and Mihaly Csikszentmihalyi (1996) through their documented investigations into creativity provide valuable foundations for analysis of how to promote creativity in Design Education programmes. This paper draws on the research findings of these two individuals as well as the author's own experience as a Design Lecturer and suggests strategies that will assist design students in developing their creative capabilities.

Keywords: *communicating brand values, demographic changes, strategies, fostering personal creativity*

1 Introduction: Creative Customers Demanding Innovative Products

Toward the close of the 20th Century, the focus of most large fashion companies was on growth through expansion into new markets or through extending the products of existing brands. Whatever the chosen strategy, a strong emphasis was placed on branding and this became more important than the product itself. The product became simply a means for the customer to purchase the values of the brand and the companies that knew this focused on communicating the brand and extending how that brand could be purchased by often very diverse product extensions. The success of this strategy has been mixed with some companies successfully growing their business and profits whilst others have diluted the value of the brand through overexposure or through not adequately addressing product differentiation.

But a number of demographic changes are occurring that will negatively impact on this strategy and will result in the importance of innovative design re-emerging. Richard Florida in his book The Rise of the Creative Class (2002) identifies creativity as the new driving economic force and profiles the members of this class who will be the power shakers of the economy. These people are creative individuals who seek diversity and individual expression. They are non-traditional in their views and are motivated by lifestyle rather than survival. They possess a strong interest in design and feel no pressure to conform to social dictates. The characteristics of Florida's Creative Class resemble in some respects the Cultural Creatives as described by Paul Ray and Ruth Anderson in their 2000 book of the same name. This group is anti materialistic, suspicious of large global corporations,

motivated by issues of sustainability, spirituality and equality. Ray and Anderson forecast that by 2010, more than fifty percent of the population of western countries would be Cultural Creatives. Between them these groups become the most important consumer groups for companies to consider as a result of their purchasing power and sheer size.

But reliance on brand communication will not work with the 'Creative Class' or the 'Cultural Creatives.' The 'Creative Class' know about design, they have sophisticated and individual tastes and are unwilling to follow established norms. The Cultural Creatives may possess these qualities also but certainly are opposed to mass consumption and manipulation by corporations. Reliance on branding will be perceived as manipulation; instead consumers will be looking for innovation in design with attention to both aesthetics and function. These consumer characteristics, coupled with intense global competition that requires superior innovation in all aspects of the business, highlights the importance of innovation and with respect to the product, and also highlights the re-emerging importance of design and the designer.

The role of the design education institutes then becomes to equip the designer with the means to meet the needs of a more competitive and discerning market. This involves a number of responsibilities that include providing the design student with an appreciation for changed cultural values and, more importantly, providing the student with capabilities beyond traditional and formularised trend forecasting and product development strategies. Successful educational programs will support the learner in fully capitalizing on or harnessing their creative potential. It will allow them to discover their own strategies and their own approach to the development of ideas, encouraging independence of thought. Achieving this in a design education program cannot be assumed. Careful consideration must be given to culture, curriculum structure, student teacher relationships, rewards and implementation strategies that will enhance student experimentation and growth. The intention of this paper is to identify some of the factors that enhance creativity in an educational environment and those strategies that promote independence so that the student will take these skills into the working environment.

2 What is Creativity?

Margaret A. Boden, in her book The Creative Mind: Myths and Mechanisms (1990), describes creativity as the ability to come up with ideas or artifacts that are new, surprising and valuable. She describes three types of creativity, which correspond to the three sorts of surprises. They include:

1 Creating unfamiliar combinations of familiar ideas.
2 Exploratory creativity, which involves new ideas being generated within existing styles of thought that in itself change that thought framework.
3 Transformational creativity, which is even more extreme in that it changes conceptual spaces or styles of thought allowing for complete new ideas and thinking to follow on.

Csikszentmihaly in Creativity: Flow and The Psychology of Discovery and Invention (1996), describes creativity as "…any act, idea or product that changes an existing domain, or that transforms an existing domain into a new one." The term domain is used to describe specialist fields of interest such as art, science, music, and, of course fashion. He goes on to define a creative person as "someone whose thoughts or actions change a domain, or establish a new domain." (p. 28)

3 Creativity: The Domain, the Field and the Individual

Both authors suggest that creativity involves altering existing patterns, styles, thoughts or ideas in a specific domain such as fashion, art or music. They go on to suggest that for such a change to be legitimately called creative the change must be useful or relevant as perceived by what Csikszentmihaly (1996) calls the field, i.e., those individuals with specialist knowledge of the domain. In the case of fashion, creative design may involve design modification that is evolutionary in nature and include the ability to manipulate proportion, colour and or silhouette to create a new twist to an existing

style or it may require more exploratory ideas that create the big shifts in fashion style. Consider the influence of designers such as Issey Miyake on our ideas about cut and Giorgio Armani's influence on our perceptions of what tailoring is. These ideas required acceptance from fashion media, buyers, other designers and eventually the final consumer for the ideas to be meaningful. If these designs were not time relevant they would not have been accepted and as a consequence not perceived to be creative. The important point these authors make and the basis for my proceeding argument is that creativity involves interaction between the individual, the domain and the field.

With respect to the domain, Csikszentmihaly (1996) suggests that the rules of a domain must be understood before the individual can be creative because creativity requires altering the rules with deliberate intention. He suggests that possessing a rich and sophisticated database of knowledge and ideas as a result of extensive exposure to the domain allows the individual to draw from broad and diverse sources and re-work them with new insight. Can an individual, who possesses no sound design foundations or knowledge about the working materials or construction requirements for a specific discipline, be creative in that discipline? Well some might argue that it is possible but I would argue that it is not sustainable.

Many creative people put their success down to being in the right place at the right time and this is generally referring to how the 'field', as it is called by Csikszentmihaly (1996), has assisted them in their success. They highlight the importance of creative work getting exposure to the relevant people, as without this, the output of the potentially creative person will not have the opportunity to impact on the domain. Csikszentmihaly (1996) suggests that as part of the individual's knowledge of the domain, the individual should know the criteria of the field. That is, how do these people evaluate creativity or what elements of a new idea are important to them. Therefore, a fashion designer must not only possess comprehensive design capabilities supported by thorough knowledge of materials, cut, construction, performance and market considerations of fashion, but must also know what fashion critics consider to be good fashion.

The final element in this creative system is the person. As previously mentioned, an individual must not only possess knowledge of both the domain and field; he must also possess motivation and interest to pursue creative work within the domain. Neither Boden (2004) nor Csikszentmihalyi (1996) attribute creative success to natural talent alone. Instead, they suggest that natural talent only instigates initial interest in a domain and that more often than not it is simply hard work, genuine interest and curiosity, intellectual capability and openness to experience that produces creative success. The research undertaken by Csikszentmihaly (1996) identifies no distinct creative personality but does identify that the majority of creative people possess a high level of complexity, i.e., "…the ability to move from one extreme to another as the occasion requires" (1996, p.57). He documents ten pairs of antithetical traits, which are as follows:

1 Creative individuals have a great deal of physical energy, but they are also often quiet and at rest.
2 Creative individuals tend to be smart, yet also naïve at the same time.
3 They can swing between playfulness and disciplined, and responsible and irresponsible.
4 Creative individuals alternate between imagination and fantasy at one end, and a rooted sense of reality at the other.
5 Creative people can be both extroverted and introverted.
6 Creative individuals are remarkably humble and proud at the same time.
7 Creative individuals do not feel compelled to conform to rigid gender role stereotypes.
8 Creative people are considered to be rebellious and independent but knowledge of their domain and its rules requires certain traditionalism.
9 Most creative people are very passionate about their work but they can also be very objective.
10 The openness and sensitivity of creative individuals often exposes them to suffering and pain yet also a great deal of enjoyment.

To highlight the influence of interaction between the individual, the domain and the field Csikszentmihalyi (1996) highlights that the extraordinary creativity of the Renaissance period in Florence was not simply a result of individuals being particularly creative but a result of a number of factors such as the rediscovery of earlier Roman technological capabilities, political motivations that supported the development of art as a means of control and wealthy patronage that demanded and in turn promoted the pursuit of new ideas. This suggests that environmental factors play an important role in fostering creativity and this has important implications for design institutes genuinely interested in promoting innovation within their programs. Although it is easy to argue that enrolling naturally gifted students is likely to enhance creativity, the institute has both opportunity and responsibility to control the educational environment so as to nurture that creative talent and promote innovation by fostering an innovation supportive culture, ensuring comprehensive domain specific content coverage, implementing teaching strategies that promote creativity and maximizing interaction with the field.

4 Implementing Design Education Programs

What are the implications of this analysis for implementation of design education programs? A primary and very important consideration is that of organizational culture or specifically educational institute culture. The recent business trend in structuring companies and company practices so as to promote innovation should be interpreted in the institute environment. Bureaucracies should be trimmed but flexibility and the opportunity for autonomous working practices should be integrated. I recognize the difficulty in this, particularly for those institutes that are Government funded and require both a focus on standardization and efficiency but it is worth considering how flexible practices can be integrated into the institute.

The Fashion Design Studio is a small section of a very large Government funded educational provider in numerous skill areas. Although the organization itself (TAFE) desires to promote innovation its size, bureaucratic nature and working practices certainly do not support innovation. Its educational focus is on standardization as a result of competency-based education and also focuses largely on efficient use of resources. Despite this, the Fashion Design Studio has managed to maintain a strong focus on innovation and is recognized as producing the most innovative fashion design graduates in the country. This is achieved through a strong creative culture that exists within the section that is in extreme contrast to the greater organization of TAFE. This culture is idea driven rather than rule driven. The level of standardized practices and policies is low in relation to TAFE's expectations; the curriculum has been written to promote flexibility and although a competency based framework desires standardization, autonomous teaching practices encourage the opposite of standardization. This conflict of cultures often causes logistics and management problems but the section's commitment to excellence and innovation is a more powerful motivator.

Altering a culture and specifically creating an innovation supportive culture is not an easy task and it cannot be assumed that change strategies will have an automatic impact on the organizational culture but awareness of the influencing factors is certainly likely to promote a more creativity supportive environment. A more democratic and flattened structure that allows for decision making at the classroom level is likely to create a more responsive environment as it has with many commercial businesses. Curriculum should be written to allow for flexibility in delivery and individual learner interpretation. Recruitment policies need to ensure that teachers are creativity focused and possess the skills and personality to promote creativity among students. Rewards and feedback for both staff and students should not only focus on final outcomes but foster experimentation and process. Management needs to consider strategies that provide both teachers and students with a sense of security that will allow them to take risks.

All these are designed to create a more liberal environment that is tolerant of the diversity and complexity of the creative individual. Richard Florida in The Rise of the Creative Class (2000) reveals that creative people choose to surround themselves by other creative people in tolerant environments that exhibit diversity. Environments that house high numbers of creative individuals promote creativity

due to exchange of ideas and this provides the creative individual with a level of satisfaction that is often impervious to monetary rewards. This desire to surround oneself with other creative individuals and its influence on creativity extends beyond Renaissance Florence. Paris at the end of the nineteenth century was such a hub of creativity. Today New York is an important environmental centre for artists.

Although the managers of educational institutes may not be able to control the level of creativity within the greater environment it is important that they appreciate how exposure to other creative individuals enhances creativity. Csikszentmihalyi's suggestion that the rediscovery of ancient Roman capabilities having influence on the level of creativity in the Renaissance period provides insight into the importance of having access to prior and alternative ideas and processes in promoting innovation. My experience is that class groups that have a sharing and supportive culture produce better designs than those groups that are self protective and secretive about their work. It has also been noted that exposing less capable design students to the working practices of students with more advanced skills results in the weaker student enhancing their own creative ability. Institutes should consider strategies that promote discourse between students within and across diverse design disciplines, and across different levels of study.

Csikszentmihalyi's research (1996) identified that creative people love what they do and that such love of work was necessary for the motivation needed to be really creative. He reveals that creative people are motivated by enjoyment and not money. He identifies nine elements of enjoyment and as an extension of the creative flow process that have important implications for educators. They are:

1 There are clear goals every step of the way.
2 There is immediate feedback to one's actions.
3 There is a balance between challenges and skills.
4 Action and awareness are merged.
5 Distractions are excluded from consciousness.
6 There is no worry of failure.
7 Self-consciousness disappears.
8 The sense of time becomes distorted.
9 The activity becomes autotelic or an end in itself.

This identifies some obvious implications for educational programs such as providing sufficient direction and guidance in the development of skills, providing timely feedback on performance and ensuring that the level of skills or knowledge imparted is appropriate to the learners' capabilities. It also identifies some more subtle implications. It is important that the institute provides an environment that fosters motivation to be creative, an environment that supports the enjoyment that creative expression brings. The idea is to create an environment that the student perceives as conducive to individual expression, experimentation and curiosity. Such an environment will motivate students to excel in their pursuit of creativity.

Csikszentmihalyi states, "…successful environments …provide freedom of action and stimulation of ideas, coupled with a respectful and nurturant attitude toward potential geniuses, who have notoriously fragile egos and need lots of tender loving care" (1996, p.141). To achieve this, managements must be sincerely committed to creativity. Rules and regulations should be kept to a minimum and the programs should allow for flexibility, as without this there would be no room for creativity to flourish. Educational managers should promote interaction between the student and the field as it exists outside the institute. This includes exposure to the work of existing design professionals from around the world through magazines and the Internet as well as local industry professionals and the media. This allows them to gain a more comprehensive knowledge of the domain whilst increasing their awareness of what the field considers to be relevant creative criteria. Where possible these individuals should be encouraged to actively support creative design either through sponsorship or active involvement with the students.

Csikszentmihaly's suggestion that a comprehensive knowledge of the domain is necessary for an individual to be creative in a domain (1996) highlights the importance of delivering structured educational programs to ensure that design foundations are adequately covered and that adequate time is given to the acquisition of these skills. Although argument surrounds whether design tuition should be delivered within a specific discipline or whether design should be taught without consideration to the discipline, Csikszentmihalyi's work (1996) would suggest that there is merit in teaching design within specific domains as creativity can only exist within a discipline or domain. Thorough knowledge of the domain (or discipline) requires that the designer has knowledge about the logistics of realizing the design concept. For instance, in the domain of fashion thorough knowledge of design fundamentals, concept development techniques, pattern cutting, construction, industry standards and marketing considerations is essential. Of course, the coverage of these areas will vary with the greatest attention given to design.

The best way to structure the delivery of these various skill sets is a matter of debate. At the Fashion Design Studio we commence tuition with design fundamentals whilst at the same time cover the basics of textile manipulation, pattern cutting and construction. The second year continues this mix but at a more sophisticated level across the board. We also introduce some marketing concerns and commercial responsibility issues in the latter phase of stage two. The final year continues to increase the level of sophistication of the original skill areas whilst focusing on an area of specialization, and on advanced marketing. This approach to curriculum has been designed to promote innovation and its success is evidenced by students who come to us after completing the clothing construction courses. These graduates find it more difficult to push the boundaries with cut than those who have undergone no previous training. Learning design at the same time as learning pattern cutting encourages the learner to recognize the connection and instigates creative applications of traditional pattern cutting rules. Delaying a focus on commercial and market constraints also assists in promoting creativity. We have learned that the students must reach some level of competency in design before they can creatively integrate commercial responsibility.

The approach we are taking here is to thoroughly teach the rules, and once they are understood, encourage the student to break the rules. This is consistent with Csikszentmihalyi's view of creative work. Quoting an old Italian saying, he writes, "One cannot be creative without learning what others know, but then one cannot be creative without becoming dissatisfied with that knowledge and rejecting it (or some of it) for a better way" (1996). Teaching the rules so they are meaningful to the learner requires logical and sequential delivery that is linear in nature but this must be balanced with the opportunity for investigation that is not necessarily linear or immediately logical. Therefore curriculum structures should allow for the co-existence of these two opposing approaches to work. That is, order or logic should be balanced with chaos or disorder. This is achieved by ensuring co-requisite delivery of the more rule dependent content with content that is more investigative or exploratory in nature.

Curriculum structures, although important considerations, must be supplemented by creativity promoting teaching and delivery strategies if the educational programs are to be effective. Therefore, when delivering content on the rules of the domain such as design theory it is important that the student has the opportunity to explore the potential of the theoretical elements being discussed. For example, when analysing line, students should be made aware of the existing and potential influencing factors of line but should also be given the opportunity to explore their own emotional responses to line and experiment with their own design ideas in response to line. A similar approach should be used in the transfer of knowledge across skill sets. When a student is learning how to pattern cut and construct tailored garments they should be working in design classes on how to push the boundaries of tailored detailing. They should be encouraged to experiment with ways to alter a tailored collar or what fabrication is used for the tailored garment.

Experimentation is necessary in any learning but particularly important for development of creativity. As discussed earlier, it is more likely to occur in an environment that is supportive of creativity and encourages students to focus on the creative development or design process work and not just on

the end product. This will encourage creative experimentation where as a focus on the final product can result in the student playing safe and not exploring ways to be really creative. It is my observation that often when students are given a brief they want to rush to the end of the project and as a consequence are not motivated to explore concepts to their full. This can result in students not learning how they can develop sophisticated concepts from generic briefs. It can also result in work that lacks inspiration or does not demonstrate student growth. To promote the effectiveness of this strategy and content focus the teacher may choose not to tell the student what the expected outcome is, instead guiding them along an undirected path. Shifting the focus on processes and not the final outcome cannot, of course, be the only assessment strategy. However, this strategy can be integrated this into a program in design development subjects with a view to encourage students to explore their creative potential.

To assist the learner in this process, it is important that project briefs given to students are both flexible and complex enough to allow for creative interpretation. Project briefs that are holistic in nature tend to promote creativity more than those that are highly focused and isolationist in their focus. Project briefs promote creativity when they encourage research and allow individual interpretation. Even if the project briefs are relatively straight forward, instructions should encourage the students to explore their own individual relationship with the brief. They should use the theme to encourage a personal interpretation and investigation. The briefs should allow for conceptual interpretations and not require a literal analysis of a shallow idea. Eventually students should be encouraged to develop their own briefs so that they independently see the opportunity that exists within set constraints.

5 Strategies for Developing a more Creative Personality

It is of course important to consider strategies for promoting divergent thinking. Csikszentmihalyi (1996) suggests that the three dimensions of divergent thinking — fluency, flexibility and originality — which commercial programs attempt to promote through brainstorming, can be encouraged without formalized and team oriented problem solving techniques. Fluency results from brainstorming of ideas. Flexibility results when the student learns how to establish new idea paths and deliberately looks for diversity. Encouraging students to come up with absurd or deliberately unlikely solutions can foster originality. Strategies that promote success of this approach to problem solving include encouraging students to keep journals, short time limits (such as 30 seconds) to sketch designs to specific briefs, generating design possibilities in small teams or following group critiques with the requirement that students develop further the work of their class mates. These strategies encourage the student to put down ideas without fear and often these ideas provide good foundation for further design development.

These work specific strategies encourage more creative output or better design development. However, it is also important to consider how we as educators can assist the student in developing a more creative personality. Csikszentmihalyi (1996) considers the first step in this to be instigating curiosity and interest. Interest stimulates creativity through an openness of mind that encourages the student to look beyond the predictable or the immediate. To encourage curiosity the student should be taught how to observe, find surprising things in their environment or seek out surprising situations. One strategy for encouraging observation is to give time in class to allow students to present inspirational observations from their everyday existence. Students should be encouraged to see the abstract qualities in things around them or to analyse the underlying qualities of the object under observation.

Students should then be encouraged to participate in the curious by deliberately doing something surprising, as this is likely to result in new responses and evoke genuine interest. For Fashion students this may involve dressing in a style that is contrary to their own style but could also involve putting themselves in physical environments that will result in new experiences or observations. Exposure is directly linked to the ability to be creative; therefore encouraging students to naturally seek out exposure to diverse things will enhance their creative abilities. I have seen a tendency for students,

in an attempt to manage their study and part time work commitments, to deny themselves exposure to anything that they do not perceive as being essential to their present situation. The suggestion that they take some time out to see a film or go to gallery is seen as being lazy rather than being perceived as an opportunity to enhance their potential creativity. Students should be made aware of the importance of exposure in developing the personal database necessary for creative expression.

Retention of these observations and experiences is not always automatic. Therefore, the students should be encouraged to record their observations or be allowed to explore opportunities within the observations. Just as students keep a design process journal, they should also be encouraged to keep an observations journal that may be reviewed to generate ideas for new design concepts or to bring in unique and unpredictable ideas into existing design concepts. The recording of observations allows the opportunity to draw on various and unrelated ideas and identify abstract connections that may lead to the development of unique and complex ideas. Recording of everyday experiences and observations will eventually lead to a more curious personality that is capable of seeing the extraordinary in the ordinary, leading to a more creative individual.

As discussed earlier, creative people love what they do and it is this love of what they do, rather than the monetary reward that motivates them to produce their creative work. It is not possible to suggest absolute strategies to foster or enhance that love of craft. However, there are some factors design educators should consider. Csikszentmihalyi (1996) states that if you do something well it becomes enjoyable, and alternatively, if you continue to fail at something it becomes frustrating and negatively impacts on enjoyment. He goes on to say that to keep enjoying something you need to increase its complexity. The above has a number of implications for the educator. Firstly, it is important to identify individual student's strengths and weaknesses, provide him with adequate support in their weak areas and guiding him in how to further exploit his areas of strengths. This highlights the importance of timely feedback and the need to ensure that the student capability is well matched by the skill level. Careful consideration needs to be given to the time allocated to training delivery and increase in the complexity of the content. This has implications for flexibility in delivery durations and implementation of the programs. Students not only vary in their capability, but their creative development usually occurs in bursts. This suggests that there needs to be flexibility for students to cover the content. However, this is not often feasible due to budgets and delivery timetables. A more manageable approach is to factor in the ability of the students to increase the complexity with which they cover the content. That is, through increased research or more complex briefs, students have the ability to create challenges that are relevant to their individual needs.

6 Conclusion

It is individual needs and the flexibility to accommodate individuality that underpins this approach to enhancing innovation or creativity in our educational programs. Creativity is about the unusual or the surprising as discussed by Boden (2004). If we as educators are serious about fostering ideas that are unusual or surprising we have to create an environment that allows for creativity to emerge. This requires abandoning a rule driven environment and replacing this with more flexible structures and practices that allow the room for the unexpected. The idea is to replicate the creative process somewhat in the development of education programs. Achieving this is not necessarily easy as programmes need to ensure comprehensive coverage of the curriculum, while at the same time ensuring that students graduate possessing the relevant professional skills.

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Design Voice

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Pravin Sevak teaches graphic design at Western Michigan University, Kalamazoo, Michigan. He graduated from the National Institute of Design (NID), India, in 1979, and began his career at Sudharshan Dheer's Design Studio in Mumbai. Later he worked with the Creative Unit Advertising Agency, Mumbai, and Bidhan Advertising Agency, Ahmedabad. In 1984 he rejoined NID where he commenced his career teaching graphic design. During this period, he also practiced design, successfully completed two permanent exhibitions for the Government of India, as well as designed various publications, book designs, type designs, map designs, and corporate identities for both public and private sectors. In 1998, on sabbatical leave, Pravin was invited to teach graphic design at Ohio University at Athens, Ohio. Next he taught at Truman State University in Missouri and Northern Kentucky University, where he was recognized as the most influential teacher of the NKU design program. "Eventually," he says, "in this information age, my research goal is to understand, explore, and share crosscultural design needs."

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Design is a problem-solving process, and finding a clean, clear, and communicative solution is what a graphic designer strives for. Today, almost anyone can become a designer. What constitutes a good graphic design teacher in this contemporary environment? Throughout the past twenty-five years of his design career he has taught many courses and each has led him to believe that learning never happens in isolation, and should engage a responsible, and creative attitude towards any given problem. The graphic design teacher is the initiator of ingenuity, imagination, and must always represent a source for encouragement in any circumstance. Yet, perhaps the most important role of a teacher is to define, and present boundaries in a sequential manner to the students, whose role in turn is to explore and discover what lies beyond. He or she is responsible for setting high standards such as serious concern, visual sensitivity, and critical evaluation. The platform for evaluation criteria lies in recognizing performance, participation, and professionalism. Students should have the aptitude and confidence in their own capabilities to elicit their creativity and their drive for learning should come from within. Their success is measured not by their grades, but by the quality of their creative work. Technology has significantly altered how both students and teachers value core design principles. Learning to know when, and how to use computer technology, as well as proper visual literacy, can provide an opportunity to students in recognizing true creativity. Adapting technology into teaching methods is essential in learning the design process, but we should not ignore the traditional rules of design because they are upheld no matter what technology is in current use.

Keywords: *graphic design, teacher, student, design process, technology*

Introduction

In our ever-changing world, graphic design aids in communicating our ideas, concepts, and information through visual forms. Design is a problem-solving process where finding a clean, clear, and communicative solution is what a designer strives for. Yet it seems that almost anyone can become a designer as long as he can access computer and design software, resulting in the visual chaos we see today. However, solely mastering the tools and tips of a design program and simply embellishing an idea into visual form does not make one a master designer. Acquaintance with such tools is feasible without any education in design. Herein lies the façade. For a graphic designer values both the aesthetic and functional principles that the final design communicates. A graphic designer not only knows how to use the tools and techniques but also follows a thorough process to solve the design problem for the intended goal defined by the client. He values bringing order and clarity to information, and above all understands the ultimate purpose of his design – visual communication.

I believe that the learning process never happens in isolation. In order to be confident in designing one needs proper inputs in terms of education and rigorous training. Here comes the important role of the teacher who imparts knowledge and professional experience to his students. The teacher, therefore, plays a major role in preparing a graphic designer.

Throughout the past twenty-five years of my design teaching career I have taught courses from foundation level Drawing, Basic Design, to senior level courses such as New Media, Design for Social Causes, and Graduate Presentation, and many more. I have recognized after all these years that the experiences of a design teacher involve both happy and unhappy surprises. When a student excels the teacher revels in the successful passage of knowledge. On the other hand, I could never understand why and how students would demand the best grade when their work did not reflect it. As a teacher then, it is our duty and responsibility to know our "clients" who are our students, and to understand their needs, strengths, and shortcomings as well as their culture. We are guides to our students and as any other guide we must always be prepared and motivated to teach design with dedication, confidence, and with professional knowledge. We must have the aptitude to teach, to enjoy imparting knowledge to a future generation of infinite possibilities. Most importantly, I believe that a good design teacher must absolutely love what he or she does.

Teaching design however is not mechanical. Design cannot solely be taught via lectures. It is not like math or science where facts, figures, and formulae lead to steady solutions. A design teacher brings and offers the real life scenario to the students. Apart from being a good graphic designer, one who is knowledgeable about all that the field encompasses, the teacher must consider how to interact and share with his students as well as how to induce and inform them with balanced approaches. When giving a critique, for example, we must always be unbiased and honest, and should be open to upgrading our own knowledge. Many times I myself have learned from my students and it brings me joy not only to see someone else learn, but also to expand my horizons to their point of view. Teachers should set high standards for the students, those that challenge them to think of unpredictable solutions, which still serve the purpose. Introducing students to higher levels of achievement allows them to develop higher skills. They should motivate weak students to become better, good students to reach excellence, and excellent students to go beyond all expectations. Nevertheless, the teacher should recognize these high standards themselves, should explain them to the students, and should encourage them to meet up to such standards.

Once a teacher projects his/her ability as a professional designer he or she gains insight into how to aid the students. Having a clear vision about the profession the teacher should teach design values, and must take care not to impose upon the students their personal design style. Students should be inspired to learn from other successful designers but not just imitate someone else's style. In some cases students blindly follow what the teacher approves of, or what they think the teacher will like. Yet the teacher is not the ultimate audience of their message. Providing inspiration and encouragement to them to seek their unique style is usually all that is required for students to gain confidence in what they are doing. Apart from avoiding the monotony of following previous examples, giving students challenging and unusual projects ensures that they will research the material related to the assignment on their own, which opens the doors to originality and creativity. Bringing in successful and appropriate examples that have followed a thorough design process initiates their responsibility of seeking better solutions regarding the similar subjects, adding quality and diversity to their learning process. Promoting them to "think outside the box," to go beyond and search for original and unique solutions drives them to seek that originality.

Teaching itself is a design project and as in any other profession a desired outcome results from thorough preparation. Subject related information resourcing, preparing lecture notes, visual presentations, and the syllabus which incorporates the course content, objectives, production processes, evaluation criteria, and university policies, form the heart of the course. In the syllabus, apart from setting all guidelines clearly, "the teacher must balance the requisites of the class, needs of the students, and expectations of the school" as "the syllabus is her [the teachers] blueprint, roadmap, and manifesto rolled into one." Lectures should be prepared in a way that balances both theory and practice of the subject. If we over-bombard students just with theory, they will be unable to understand its practical uses. Yet if we neglect the theoretical concepts that began the process in the first place, such as form, function, colour psychology, typography, visual aesthetics, media, and design history, students might not appreciate the process for what it truly is and the changes it has

undergone. It is also important, throughout the stage of preparation, to divide the total time unit into its specific phases so that the content is taught in a hierarchal, connected, and flowing order. Organizing the detailed inputs to be given at each phase should be considered well in advance. For imagine walking into a class and introducing concepts unprepared at random. It would be immensely time consuming and difficult for the students to link the content they are learning.

The first day of the class is always appointed with the task of getting to know and understand my students and vice versa. Not only do we introduce ourselves but also share our likes and dislikes regarding some aspects of our lives, dreams and aspirations, our hobbies and backgrounds, interests in other arts such as music, theatre, or dance, sports and movies. We begin to become a team who can share each other's knowledge and ideas comfortably, interacting freely, and learning together throughout the course. And then we get down to business, so to speak — I hand out the course syllabus. Students always complain that their syllabus has either been crumbled, torn, is right side up, or up side down. The sequence of paragraphs is distorted, the spacing of all bulleted paragraphs justified into very close spacing; titles and headlines appear everywhere; random usage of bold and italic type and different type styles daze the eye. I never deny any of these complaints though, for the mess in this first syllabus is intended, after which the actual syllabus is distributed. It is my way of making my point, the point being that they should realize that the graphic design profession involves the ordering of information in a proper hierarchy with appropriate emphasis. They should never overlook legibility and readability aspects in communicating with the various type styles that are at their disposal no matter what idea it is they are conveying. Delivering their design in an effective and presentable manner, one that integrates their individual design style should always be a top priority. They must not forget that the prime objective is to communicate, and to communicate clearly.

The design profession is very planned and organized, a sensitive subject where, if visual information is not introduced properly to the audience the solution will not have served any purpose. Information haphazardly put together with no connection, clarity, or hierarchy does not clearly reveal the main point. I call it the "Pudding Process." Often, students put too much "sugar" into their final design. When they try to solve a design problem and try to make it look good, their tendency is to put all the "goodies" together into one concept and emphasize everything in their design. But emphasizing each and every element is no emphasis at all. It is therefore important to teach them how much "sugar" to add and when to add it. The manner in which preparation and presentation of the pudding is done results in success only through trial and error. Questioning the flavour and exploring new avenues are what I demand from the students — experimentation with the purpose in mind.

The approach a teacher should take when introducing a new concept or principle to a class is to take students from the known to the unknown. As a teacher, I also believe that for basic level courses more emphasis should be put on solidifying the student's knowledge about learning the basic design elements, the fundamental design principles, and design tools and techniques. Teachers should provide clarity about what the design fundamentals incorporate and develop projects that have immediate relevance to the student, which makes it easier for them to understand. For example, when introducing them to the colour wheel, I ask them to bring as many objects as they can find for the colour they like. Later, working in teams during class, they arrange the objects sequentially into a circle creating the colour chromes, hues, and values of the colour wheel. I have found that it is more effective at the foundation level to take students from something they know and understand, to completely new concepts they learn together in class. When introducing typography I ask students to cut 20 to 30 letterforms pertaining to the initials in their name. They categorize them in class into light, normal, or bold, small and big, thin and thick, and narrow and wide forms. In this case they begin at something they know on a daily basis, namely their initials, and are introduced to the various typography elements in use.

On the other hand, senior level courses should emphasize the design process, concept development, and communication. They should be given the opportunity of solving complex design problems. For this is the stage at which students should be trained in how to develop an idea for a given project

independently, and consider what other alternative possibilities exist for the same problem. One other crucial aspect at this level is that of decision-making, for teachers here should emphasize how students consider which idea or concept to select for further development. Introducing senior level students to projects that challenge their creative abilities brings them to broader levels of understanding. Introducing design projects about real life scenarios and case studies offers students a better awareness about their immediate society. At the senior level, not only should the curriculum focus on various media, but also focus on the content, subject-related research, production techniques, and the message. Apart from teaching Brand Identity, Publication Design, Package Graphics, and Multimedia Design, courses such as Design for Social Causes should also be incorporated into the curriculum, for it provides the students with inputs that help in preparing better designers who are conscious and concerned about their own society and also helps them for their future design career in the real world. Indirectly, not only do they learn from designing for such complex subject matter but it also instils confidence in the tasks that they are about to undertake.

The design curriculum of the graphic design program should not only include courses such as Drawing, Elements of Design, Graphic Design Principles, Colour, Form & Structure, and Typography, but should also incorporate Environmental Exposure, Design Process, and Design Software for Illustration, Image Manipulation & Typographic Layout at the introductory level. Design for Social Causes, and Professional Exposure (Internship) at senior levels should also be considered. Environmental Exposure is an important course, which allows students to develop basic skills and attitudes about the world around them. The objective is to develop perception skills, study the immediate man-made and natural environment as well as the culture and its activities, and finally document it. The Design Process course would provide a thorough understanding about design problems where students can develop proficiency in how to solve such problems in a methodological manner. One of its main ingredients then should be emphasizing the process through dealing with hypothetical problems presented during the course. Professional Exposure (Internship) allows seniors to work with a real design firm, giving them some level of professional experience and confidence.

Learning design is rather expensive where students have to spend an enormous amount in order to complete their study. As a result most students not only attend school for learning design but at the same time, work outside the educational environment at different capacities. I still recall the shock I experienced regarding the students' attitudes upon beginning my first semester in the United States. I would walk into the class only to find students with headphones on, listening to music, or chewing and popping bubblegum; even worse, one even had her feet on the worktable! The bitter truth is that there are different kinds of students that a teacher encounters. There are those who are sincere and dedicated; those who understand that the learning process is just as important as everything else in life. There are students who like to learn but lack motivation. Some students are just there in class for the sake of being there, nothing more. Lastly, there are those students who are always "full of excuses." One such student's grandmother died four times before he finally attended the critiques! It is very important then for students to have the aptitude to learn, the yearning to gain knowledge, and the thirst to seek it.

Being a student does not just mean completing assignments, as the teacher demands, rather being motivated to do so upon realizing that it is a part of the learning process. Students usually strive to satisfy the teacher and are unclear about what it is they themselves want to accomplish. They are more concerned about their final grades than asking themselves what they have gained. However, students should worry more about the process than their progress. Once they don't receive the grade they want they begin to disrespect the teacher as well as the course claiming, "I did what you wanted me to do." As a result, in art and design education, it seems that there are grade inflations where teachers give every student either an A or a B. It is completely wrong though because the success of students is measured by the quality of their work rather than their grades. Students should respect their teachers at all times, a crucial aspect of discipline. But their drive for learning should come from within themselves and they must realize that the learning process will benefit only those who are eager to learn.

Once motivated and given the freedom to explore and discover the boundless possibilities that exist for any given problem, students do in fact put their mind and heart into their work. During review sessions, however, when asked what they think of their end result some say, "I like it." "But why?" "I don't know. I like it." In such instances their design solution is subjective rather than the objective approach they need to inculcate in order to achieve a feasible outcome. For design is for people, and to design one needs to understand people, human behaviour, psychology, and sociology — considerations that in many cases are the missing links to successful results. When a designer says "I like it," it should not only be his/her personal viewpoint; rather he or she must have confidence that the audience for whom they are designing is kept in mind, why the design is for them, and if the message is clear to that audience. Therefore, students must always consider that not only does a good and effective solution require sound craftsmanship, communication process, and creativity, but it also results from understanding the message itself and knowing the audience that receives it.

There are four criteria that teachers must take into account when evaluating students – participation, performance, presentation, and professionalism. In many ways, participation breaks the teacher-student barrier as insight is shared freely and fluidly between the two in order to reach a successful result. Participation is a very important factor in learning, especially in a visual art like Graphic Design. Since learning never happens in isolation, critiques are a healthy manner by which participation can be fostered. They create a platform for dialogue where one can learn positively and meaningfully from each other. It is a platform where students develop skill in communicating with an audience, creating confidence in them. Critiques generate discussions that bring different perspectives and views from both the student and the teacher. For the students, critiques are one of the best ways of learning about themselves because feedback from peers allows them to relate to each other better, to communicate with each other more easily, and to objectively analyse together what processes have been followed to reach the feasible solution.

I always incorporate as many critiques as I can into the course, be it mid-process critiques or the final critique itself. Each one of them is equally important for gaining insight into the progress made at that stage as well as to reflect the level of performance of each student. I am a strong believer of the process. I ask students to show each step in detail before presenting their final solution. During class I help students with the tools and techniques they use on the computer and at the same time encourage them to follow the process thoroughly. When giving feedback, I try not to sound like giving advice as a teacher; rather I share my views as a member of their audience, asking them how the end user will look at their design. I bring in questions regarding design principles they learned in foundation level courses so that they do not overlook the fundamentals no matter what level of complexity the project might demand. Spending time generously with students and discussing the concepts, visual aesthetics, and the ultimate message broadens the scope of evaluation. Students should always seriously evaluate each stage of development, and should consider visual aesthetics and sensitivity throughout the process. How well a student performs is determined by the amount of research carried out regarding the project, the level and process of ideation, explorations, eliminations, and selections. The entire process including development, finalization, and documentation also determines their performance.

Presentation does not only mean visual presentation, but also verbal communication of ideas with the audience. One must learn how to present a design in an effective manner to his or her client. The process is the designer's argument that supports their choices in reaching the final solution. One must be clear, concise, and confident in presenting what has been done, and the logic and reasoning behind it.

Professionalism is reflected not only in the final presentation or final submission of a design, but is also revealed throughout the course. How well the students work in a team, how well they conduct themselves, their attitude in the learning process, how attentive and punctual they are, as well as how well they resolve complex problems and issues without overlooking basic fundamentals are all

components of a true professional. A professional should always be critical of his or her own creative process and must have a good attitude towards everyone.

In teaching design today, the computer plays a very important role as it has almost replaced the basic tools of the trade like the pencil, brush, ruler, and right angle. It seems like design has taken on a predictability and sameness primarily because it offers readymade solutions. The computer does provide simultaneous control over different parts of creating a design, but the computer is nothing more than a calculator, a machine, and if operated on properly yields quick results. I call it the "magic box" that says, "Your wish is my command." In the studio students only have a one ft. to two ft. space apart from that which the computer monitor and CPU occupies. There is hardly any workspace. When introduced to an assignment, students directly begin working on the computer without any thought of sketching their ideas on a sketchpad or an unlined piece of paper. Students should delve into their own creativity instead of relying on the magic box to do so and must know when and how to use computers. Computers are not designers. Similar designs result from the computer because it is not as unique as the designer's own aesthetics and inspirations. Students must be taught visual literacy and must be able to recognize true creativity as opposed to the "fad" because just knowing how to use a particular software program does not make one a designer. Even teachers should realize that we should not ignore the time-honoured principles of design because they are upheld no matter what tools and technology are in current use. The human mind and hand are capable of much more than the computer itself; after all, the computer was created by the human mind and hand.

The graphic designer plays a crucial role in our everyday lives. We serve to inform, to persuade, and to move through graphic form. In designing, however, we must always pay heed to the processes we have undertaken, the audience for whom the design is created, and the message that we are conveying. Design education is learning by teaching, and in this process the teacher and the taught explore together. Albert Einstein once said, " It is the supreme art of the teacher to awaken joy in creative expression and knowledge." It is our duty, as teachers, to dedicate ourselves to our students. A teacher must understand, encourage, inspire, and respect his students in order to be effective. We must aim to help students experience the world beyond pure facts, and guide them towards becoming more confident, independent, considerate, and open-minded. Striving to get the highest quality work possible will not only make them professionals, but will also make them aware of the greater world around them. Teachers should demand perfection, ask students to reach, and expect them to try. Unconditional generosity to help students outside the class is a pleasure because it ensures their future success. There is a joy in seeing the best students excel, the pride of the average student in completing a project, and the satisfaction of the lesser student persevering when they thought they could not make it. Teaching may, but learning never ends. There will always remain a quest for knowledge and understanding, and as long as this need is present, so is the role of the teacher.

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Keeping Off the Straight and Narrow

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Originally coming from an art and design education background with a major in sculpture, Laurene has melded a career of practicing artist, designer and educator in Australia and Japan. Since 1995 she has been a lecturer and research supervisor at RMIT for both thesis and project students. In 2001 she expanded her interest in applied research from the design disciplines to include cluster supervision of workplace based research projects within the School of Education at RMIT. In 2000 Laurene co-developed the Master of Design Online at RMIT. This is a cross-disciplinary program for design professionals and currently works as a lecturer within the Program. She recently completed her PhD entitled: Anfractuous: an exploration of creative practice. This research project explored the relationship between space/place, reflection, kinesthetic engagement and the creative process. Within her practice Laurene endeavors to explore and present comment on the interactive nature of experience, especially through aesthetics and the rich relationship between theory and practice. Laurene has published, presented and exhibited work across these diverse areas and continues to pursue a multi-disciplinary perspective.

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Over recent years universities have become 'corporations' and the economic rationalist perspectives of 'more for less' or 'just in time' delivery have begun to undermine the heart and soul of design education.

Design, like all creative disciplines, involves an explorative process. A problem is posed or need is identified, then through a complex series of questions, thinking and actions, a solution or answer is identified and realized. Richard Buchanan's (1995) 'wicked design problems' need time and space to be explored, or even tamed. Even though as practitioners and educators we are aware of the importance of these two basic elements within the creative process, they continue to be removed from the structure of education; in the curriculum, the timetable and in the project briefs themselves. There is a belief by some, that education must model industry, work to its pace and within its constraints. There are many limitations with such a perspective. Those who work in industry have had time to learn and discover prior to being bound by workplace expectations. Also who is to say what industry is doing is right or best? It is the place of education, particularly tertiary education, to question these structures, to seek out alternatives and to prepare graduates to be the best designers they can be; aware of aesthetics, problem solving, technology, the market and the history and context of their discipline. As educators and educational institutions, we have a great responsibility - we are responsible for the future of our industries. With such a responsibility it is essential that we claim our authority with our peers, our industries and our institutions. We should not allow ourselves to be swept up into this speeding towards the end approach to design, for such an approach undermines the value and contribution of design to society and business.

Keywords: *design education, practice, the studio, discovery*

This paper is a discussion of the current perilous situation within design education where there is an increasing focus on a linear curriculum with an outcome focus; an approach to design education that undermines the very basis of design, the limitations and potential foibles of such a limited approach to design education (or indeed any discipline area), for it is asking us to do exactly that which we discourage within the classroom.

Twenty years have passed since Donald Schön wrote The Design Studio (1985). In this text Schön endeavoured not only to articulate the richness of the design studio as a location for education and preparation for industry with the design disciplines. He did so out of a political need to make a statement about the value of design education as a pedagogical construct that could be of benefit to all disciplines. He did this knowing that due to economic rationalist perspectives, the studio, with its focus on time and space, did not fit a leaner and meaner model of education. The impetus for this paper is a concern expressed by academics and industry (Shapiro 2004, Rosenberg 2003), as to the limitations of design education as a place for rich learning and the subsequent inability of graduates to meet and push the needs of industry (both in skill and creative capacity). These limitations are largely focused on time, time spent with teachers, on work placements and in exploring possibilities. Schön's concerns live on.

Within this discussion I am using the term *design* as a broad industry interpretation. I am not focusing on any specific discipline within the design industries; however I do limit my discussion to the design industries and the application of design as a method for engaging information gathering and sorting such as 'research design'. The nature of contemporary design practice and design companies/ firms (the ultimate locations for the outcomes of design education) is no longer limited to disciplinary barriers and it is increasingly common for design practitioners and practices to explore and work with client briefs from across the traditional discipline boundaries. For the sake of this discussion the term design and design education shall refer to those design disciplines that have the *studio* as the traditional model for teaching, learning and practice. The term *studio* is used to describe both a process and a location, what we may also refer to studio practice. This space may be both actual and virtual, and is designed to enhance, challenge and facilitate creative exploration and outcome. Design will also refer to the many aspects of design: aesthetics, problem solving, making, manufacture and the poetic. I would like to emphasise that I am not endeavouring to argue for a one size fits all approach to design education, I acknowledge the rich diversity that exists between us (Shapiro 2004) and wish to focus on the consistencies.

This paper draws on three distinct yet connected areas of data. Firstly there is the data from my doctoral research into the experience of creative practice completed in 2004. In this research I worked with a diverse range of creative practitioners to explore how they experienced the acts and processes of their creative work. The intention being, that if I could understand how working professionals experience design practice within the realities of workplace limitations I may better be able to enable design education that supports graduates within their future practices. This is the impetus for this exploration of design education. Secondly I also draw on a broad range of literature in the fields of design education, practice and space to further explore and consider ideas. Finally there are my reflections on my professional practice as a design educator and design practitioner. The interaction of the three enables me to embrace a working and cyclic application and exploration of knowledge informed by theory and practice (Van Schaik 2003, Jarvis 1999, Argyris & Schön 1974).

Before I proceed further, I would like to share with the readers a dialogue presented by John Berger (2002) in his essay *Steps Towards a Small Theory of the Visible*. This conversation represents an exchange between a painter and the subject or muse of their work.

"How did you become what you visibly are?" asks the painter.
"I am as I am. I'm waiting," replies the mountain or the mouse or the child.
"What for?"
"For you, if you abandon everything else."
"For how long?"
"For as long as it takes."
"There are other things in life."
"Find them and be more normal."
"And if I don't?"
"I'll give you what I've given nobody else, but it's worthless, it's simply the answer to your useless question."
"Useless?"
"I am as I am."
"No promise more than that?"
"None. I can wait for ever."
"I'd like a normal life."
"Live it and don't count on me."
"And if I do count on you?"
"Forget everything and in me you'll find – me!" (Berger 2002, p. 17-18)

In this text Berger explores the relationship between the creator (artist, designer or other creative practitioner), the subject for exploration, and the subsequent object or outcome of creation. For him the three elements are intrinsically linked. Creation is a relationship of collaboration. It is not a fair or easy relationship. The exploration may be tempestuous and based on love, fear, desire or longing; yet for all its challenges if it is embraced it will be a relationship of great meaning, depth and valuable outcome. The aim of the relationship is not for the creator to capture, copy or render, rather it is to go within the subject/issue of exploration. To converse with the subject that offers itself to the collaboration, is to enter the heart of the issue so that the essence may be found.

In Berger's conversation between subject and painter there is indifference by the subject to the act of creation. It will not change or be anything other than what it is. It is the artist that has the quest to answer their 'useless question.' The subject is confident in its knowledge and ability to provide the answers that are sought, purely by being: 'I am what I am.' By contrast the artist/creator must accept a 'non-normal life,' forget everything and through so doing, find what it is that they seek.

Although Berger speaks from the perspective of painter, I wish to expand the context to that of creative practitioner the disciplines of design. This process of negotiation is consistent in the engagement between the designer and the problem/issue that they address whether it is form, aesthetic or function, it is us, the designers, who are challenged not the objects/outcomes of our creation.

Design Education = Learning

It is fair to argue that the prime objective of design education is learning and in professionally orientated education such as design education, that this learning will result in the students completing their studies with the appropriate skills and knowledge required for employment. This, of course, does not mean that students, upon completion of a programme of study, will have learnt all that they will need for the rest of their lives. Rather it is proposed that upon completion of their study programme they will have learnt a methodology of learning that will support them throughout their professional practice. Learning is much more than specific knowledge or skills, in the same way that design is much more than its physical outcome. A graphic designer is more than a placer of text on a page; in addition his profession requires that amongst other things he also be a sociologist, a communicator and negotiator, and a problem solver and innovator. These are qualities that go beyond mere manipulation of materials. They require an understanding of what exists within the field and an acknowledgement of the possibilities of what is yet to be discovered. The depth and resilience of the less intangible qualities of a designer are the ongoing evidence of learning, learning that can be articulated as a methodology of the practice of design.

Increasingly design education is being forced into a 'just in time' method of delivery. Funding is being limited, curriculum is being minimized, contact time between the teacher and the student and among student peers is being reduced and class numbers are increasing. Schön (1985, p. 96) claimed that it would be "unfortunate… if university or government officials were to respond to budgetary pressures by treating schools of architecture [design] as vulnerable targets of opportunity." The studio (in architecture) is for Schön an important vehicle through which epistemological and pedagogical discourse should be rethought. Almost twenty years on from this publication the 'vulnerability' of studio-based teaching identified by its author has arguably become even more pronounced across the disciplines that currently employ it. Such programs are expensive to run and outcomes are not as easily quantifiable as they are in other disciplinary fields. Studios require space, materials and time. The 'reflective practicum' (p. 89) with its open briefs and exploratory nature does not conform to the contemporary emphasis on 'outcome focused' education within the tertiary education sector. There is an expectation that more will be achieved with less resources resulting in a pre-defined and measurable outcome.

NID, in its statement of *Educational Philosophy* (NID 2004), states that educational institutions have "two tasks: instruction and intellectual training and the provision of opportunities for growth

and maturation. That after all is what growth and maturation are about." NID's overall pedagogical philosophy is one of practical knowledge, where students gain knowledge of the field through an integration of theory into practice. Through the actions of the practice of design students are able to gain greater understanding of design as a practice and of the methods of manifesting the design outcome. This approach is an application of the original recommendations made by Rae and Charles Eames (1958) when they were commissioned to provide recommendations to the Indian Government for a proposed curriculum for a design school that would support and further the emergent design industries in India at that time. What is particularly striking about this report is its methodology. In 1958, the Eames were acknowledged designers who are sure to have had considerable opinions about design education; yet despite this they undertook an extensive, consultative design exploration in order to come to a rounded proposition for the potential for design education in India.

As one reads their report it is striking how their 'whole person' (1958, p. 16) approach to design as an act of inquiry informed both their own design, and their recommendations. Their design briefs outlined in the report have not aged with their focus on the principles of design that inform the realisation of design outcomes (pp. 10-21). The report is based in the realities of manufacturing and of local needs and yet they do not limit their design propositions. On page 8 they state:

> Of all the objects we have seen and admired during our visit to India, the Lota, that simple vessel of everyday use, stands out as perhaps the greatest, the most beautiful. The village women have a process, which, with the use of tamarind and ash, each day turns this brass into gold.
>
> But how would one go about designing a Lota? First one would have to shut out all preconceived ideas on the subject and then begin to consider factor after factor…
>
> Of course, no one man could have possibly designed the Lota. The number of combinations of factors to be considered gets to be astronomical – no one man designed the Lota but many men over many generations. Many individuals represented in their own way through something they may have added or many have removed or through some quality of which they were particularly aware. (pp. 8-9)

What becomes apparent through the Eames' discussion is the accumulative nature of design – in ideas and in resolution; that a solution to a problem or need at one point in time is not a solution forever. New designers, new needs and applications will continue the process and morph the solution into a new manifestation. Design in this process is collaborative and consultative, in the same way that we articulate aspects of studio practice.

Considering Linearity

Logically design, as a process, is linear. There is a beginning and an end, whether that beginning is a new question or an adaptation of an existing object and the end may not be forever, there is an end at a point in time (fig. 1).

Figure 1:

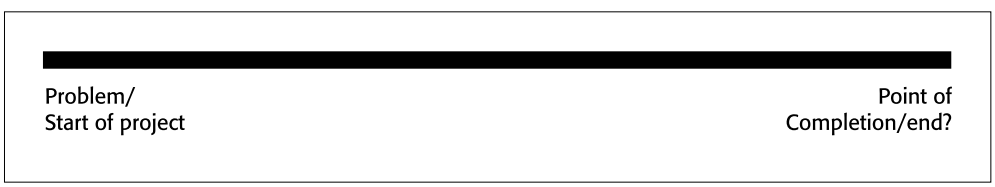
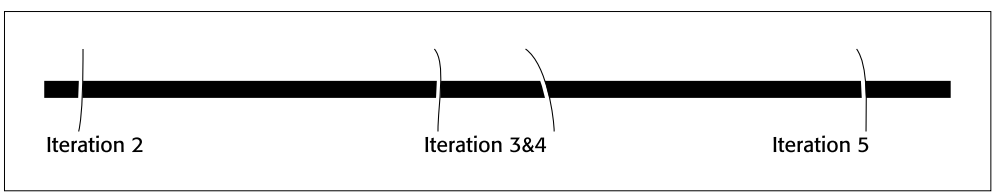


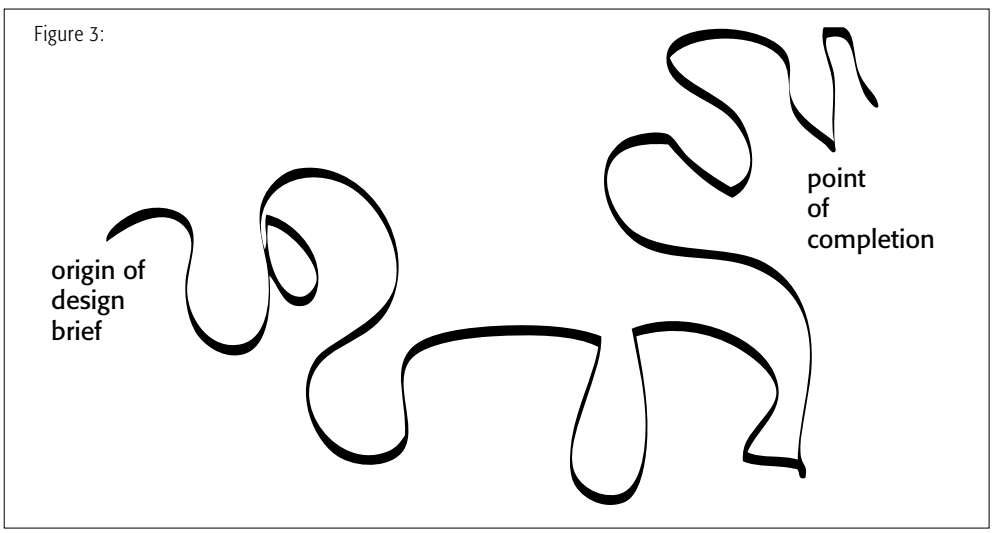
Figure 2:



We may work on one project over a number of explorations, each new project picking up on where we were and moving forward (fig 2).

This approach to design is very neat and controlled and, I believe, represents the model for design education that we are currently being forced to adopt. The clarity of the end point and its visibility at the outset of the project is, I believe, problematic. Design as a process of problem solving (that includes exploration of aesthetics and materiality as a given attribute of design) is a process of exploring possibility even within specific constraints, such as building requirements for architects or the three-dimensional and kinaesthetic attributes of the body for fashion design. Conventionally in design there is a brief, it may be set by ourselves, by a client or in an educational context by a teacher, but there is a brief where a problem or need is set out for us to explore, and we could say Berger's conversation between creator and subject begins. How we undertake this conversation/ process will vary according to experience and design constraints (e.g. funding, delivery, materials etc), and of course our willingness to engage in the conversation. This is particularly challenging the more established we are as designers; it is very easy to pursue the same solution (conversation) over and over again. At the other end of the scale, repetition can also occur through inexperience, evidenced in students who do not further or extend themselves and where a design curriculum does not push them to do so.

Figure 3:



Ray and Charles Eames' proposition for design and their own methodology for engaging with their practice of design is not one of an assumed outcome, rather it is an ongoing process of exploration and consideration. There are conversations and negotiations as solutions are found and the project is moved forward (fig 3). Sometimes the turning points are planned at other serendipitous.

This more meandering articulation of the research process is consistent with my findings through working with design professionals and exploring their design process (Vaughan 2004). Many expressed their frustration within their professional work, endeavouring to balance their preferred process (fig 3) and the limited expectations of clients (figs 1 & 2) where there is limited understanding of the process of design, and the potentially rich outcomes that can be achieved through due process, and the narrowness of financial limitations and expectations at market outcome. In this way we could argue that current government funding schemes are as limited as commercial companies seeking quick answers in order to increase income.

Many have argued that design as a practice has many connections to reflection, particularly Schön's concepts of reflection in action, reflection on action and reflection through action (Tonkinwise 2004, Mason 2002, Schön 1991,1985,1983). In fact I have argued previously that there similarities between the multiple cycles of double loop learning (an interpretation of reflective practice) (Argyris & Schön 1974) and design practice (Vaughan 2004b). Within such a circuitous model there are no backward

steps, rather there may be returns approached with greater clarity. This indirect approach to research is what Terrence Rosenberg (2003, p.3) describes as practice that is 'centrifugally' driven. This is practice that 'explores possibilities,' where the 'aims are to expand and develop opportunities,' and the 'impulse is not towards certainty but to escape it' (ibid). Design practice that is centrifugally driven cannot embrace an outcome-focused approach to design solutions. If one is in fact endeavouring to escape certainty within the search for a solution, it is not possible to have a clear or assumed outcome set out within the horizon. As we engage with the subject of our exploration we traverse a path of inquiry and co-discovery in search of an answer or solution at this point in time, and as presented in figure 2 the engagement may not be over when we need it to be, the exploration may go on for a lifetime of discovery.

Enabling Design: Knowledge and Education

As design educators our aim is to teach students how to design. One of the greatest hindrances to achieving this universally is the complexity of design and its interpretations. Yet if we are to accept that the 'how to' is the important and consistent aspect we will need to do two things. Firstly, we need to be clear (individually and collectively within an institution) of how we are defining design within the curriculum. Secondly, we need to enable the exploration of 'how to design' within the curriculum. This is the most important and obvious and yet often not done. Enabling the exploration of how to design requires that design projects, methods of assessment and project brief outlines allow the time and the freedom to meander a centrifugal path of discovery. One that is conscious and reflective, where the exploration of knowledge is a methodology of action that links directly to practice, and takes place with a community of designers, design realisers (makers or manufacturers) and design users (Tonkinwise 2004, Eames 1958). It is integral to such a process and exploration of the practice of design, that focus is not purely theoretical rather that there are direct links to the physicality of design (Tonkinwise 2004, p. 3, Vaughan 2004).

The teaching of design is not a short-term activity. To teach someone how to design, particularly design as a critically reflective process of possibility, is to enable him with a methodology of practice, which is a methodology of learning, discovering and knowing. The practices of the classroom studio are the practices of the workplace studio and it is essential that the two be connected. What takes place in the classroom should be connected to, but not limited by, the practices of the workplace; and the workplace is the ongoing location for lifelong learning and application of what took place in the classroom.

Embracing the Anfractuous

One of the key findings of my research into creative practice has been that a cookie cutter, linear approach to design education undermines the rich and explorative process of design as revealed in the labyrinthine, meandering nature of creative discovery. Data has shown that the process of creative exploration is one of engagement with surroundings, of exploring and proposing possibilities that lead to new discoveries and future explorations. Within the project, design professionals working within defined industry protocols (where design problems are responses to client needs) expressed and identified an anfractuous methodology at work in their creative practice. My argument here is that this also holds true, and will continue to do so, within the educational parameters of design educational frameworks. If the student practitioners are going to apply this methodology on graduation, then the educational institution should logically provide analogous training and experience in that design practice (based in the studio). As we prepare students for the realities of the workplace, the greatest skill we can teach them is a methodology for engaging in design and the ability to seek out design solutions, no matter what its context, technology, location or limitation.

Csikszentmihlyi's (1990) state of 'flow' (an all embracing engagement with the acts of practice) cannot be imagined as a well-maintained and controlled channel cutting across the forest of the design studio, rather it more closely resembles the apparent random trace of an animal's path as

they sniff and burrow their way from tree to tree. As we explore and teach the practice of design, let us stay off the straight and narrow.

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It is not the Winning; it is the Taking Part

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"Education is too important to be left solely to educators." - Francis Keppel, (1916–90) American Educator.

Education and particularly design education can't win. Or so it seems. Set between a rock and hard place, the best courses in design education seek to create forward thinking, motivated and talented designers with a thirst for knowledge, enquiring minds and ecologically and socially responsible attitudes.

On the outside, looking in, the design industry rarely acknowledges or demands such positive attributes from graduates entering the work place preferring to seek the short term fixes of strong computing skills, current design practice awareness and the ability to work hard for long hours for little pay without question.

Matters may be no better from within: many educational institutions often placing more value on issues such as admission and retention rates, external accreditation and health and safety monitoring than providing a conducive learning environment. Too many courses in design have been trapped in a stranglehold of conformity, trapped by assessment regulations and inflexible modular structures, trapped by systems that work against and hinder rather than encourage and support the flow of creativity.

This paper explores some of the ways and means of addressing the external and internal demands as well as retaining the spirit of why we choose to teach design.

Keywords: *graphic design, collaboration, design education, design industry, risk-taking*

Introduction

"You will be able to work under pressure to strict deadlines."
"You should possess a 'can-do' attitude."
"You should possess an attention to detail."
"Superb XPress/Illustrator/Photoshop skills - a must."
"Fast and Accurate."
"You must be able to thrive in a fast-paced environment."
"Willing to be thrown in at the deep end!"

- Extracts from Appointments advertisements in Creative Review magazine (Jan 2005).

"This monitoring report has been written following information submitted by staff responsible for the delivery of units of study (course modules), from student evaluation and feedback and consultation, staff team meetings, external examiners' reports, cohort analysis, entry and progression statistics and health and safety reports regarding the learning environment. Feeding into the writing of this paper are reports on the 56 units of study, the total number of units from across the three years of the three undergraduate courses as well as the discussion regarding these individual unit

monitoring reports that have occurred at course level. Consideration has been given to the paper from The Strategic Planning Unit – Undergraduate Retention 2002/03 and the annual theme agreed by the Academic Board for 2003/04 – The Implementation of the Learning and Teaching Strategy, Widening Participation and The Research and Teaching Nexus."

- Extract from the Annual Monitoring Report 2003-2004 for the Academic Programme in Communication and Media Arts, School of Arts and Communication, Faculty of Arts and Architecture, The University of Brighton (Sept 2004).

Sat between a rock and hard place, the best courses in design education seek to create forward-thinking, motivated and talented designers with a thirst for knowledge, enquiring minds and ecologically and socially responsible attitudes.

On the outside, looking in, the design industry rarely acknowledges or demands such positive attributes from graduates entering the work place preferring to seek the short term fixes of strong computing skills, current design practice awareness and the ability to work hard for long hours for little pay without question. Unfortunately, too often the industry looks solely for those fresh-out-of-school juniors with knowledge of up-to-the-minute contemporary practice demonstrated by portfolios of work that follow fashions and trends rather than diagnosing, challenging and solving communication issues.

Matters may be no better from within: many educational institutions often placing more value on issues such as admission and retention rates, external accreditation and health and safety monitoring than providing a conducive learning environment. Too many courses in design have been trapped in a stranglehold of conformity, trapped by assessment regulations and inflexible modular structures, trapped by systems that work against and hinder rather than encourage and support the flow of creativity. Breaking boundaries, challenging rules and attempting new, untried and untested methods can move knowledge and understanding of the discipline forward; taking risks is integral to successful design education. And that is risk-taking by staff as well as students.

Taking Risks (or not)

"Soyez réalistes, demandez l'impossible." - Be realistic, ask for the impossible.
"L'ennui est contre-révolutionnaire." - Boredom is counterrevolutionary.
- Slogans and graffiti from the student riots in Paris (1968).

Unrest on the streets of Paris

"The worst rioting ever to hit mainland France took place in Paris, leaving scenes of devastation, not seen since the Second World War. There was turmoil on May 6th 1968 when some 10,000 left-wing students fought with CRS riot police, armed with teargas, fire hoses and batons, in the streets of the Latin Quarter. Cars and buses were overturned and burned. There were 600 injuries and 422 arrests. On May 10th, further pitched battles took place between police and students, who dug up paving stones for barricades. The rioting was followed by a five week occupation of the Sorbonne University and a general strike."
- The 20th Century – The Pictorial History.

Scenes as described above are rarely seen today. Confusion still surrounds the actual events that kick-started the May '68 student riots in Paris but one thing is clear; the students involved were prepared to take real and dangerous risks, to make demands of their educational system and their government. Nowadays, students are increasingly regarded as customers or clients; their demands are for material possessions rather than ideological or theoretical nourishment. Politics, for many students, is an alien concept, and perhaps their apathy for getting involved should be viewed as a revolt against the idealistic attitudes of their parents.

A website, www.phd-survey.org, with a section dedicated to advice written by students for students about aspects of PhD education confirms suspicions. "It is a long, discouraging but sometimes

rewarding path with no guaranteed job prospects at the end of it. Consider it carefully," writes one student about studying a doctorate in art history. Another offers the following advice: "Think twice about the decision and be aware 1) of the abysmal job situation in certain disciplines and 2) of the realities of an academic life, e.g., low pay for long hours, egocentric colleagues, and struggles for tenure." Hardly the stuff of dreams and little wonder then that the risk-taking attitudes of a previous generation of students cannot be attributed to a gene prevalent in all students. With attitudes appearing quite so bleak, it is no surprise that some academics are wondering the worth of their teaching.

3 The Joy of (being in) Education

"He who can, does. He who cannot, teaches."
- George Bernard Shaw (1856-1950) British dramatist, critic, writer

Education has had to fend off those that would knock the profession for more years than one would care to imagine. In 1918 Henry Brooks Adams, the US historian and writer, exclaimed in his book - The Education of Henry Adam: "The chief wonder of education is that it does not ruin everybody concerned in it, teachers and taught." In the UK it was poet, dramatist and critic Oscar Wilde in his essay, The Critic as Artist, who stated: "Education is an admirable thing, but it is well to remember from time to time that nothing that is worth knowing can be taught." Bertrand Russell, English philosopher, mathematician and writer, went as far to say "Men are born ignorant, not stupid; they are made stupid by education." Clear evidence, if required, of the disparaging views many, outside of the area, have written about the discipline.

American editor, critic and writer H.L. Mencken (1880-1956) considered the function of the university professor as simply to pass on to fresh generations of numskulls a body of so-called knowledge that is fragmentary, unimportant, and, in large part, untrue. His whole professional activity is circumscribed by the prejudices, vanities and avarices of his university trustees. Mencken's view of an academic pushing forth half-truths and lies without wishing to offend the university's trustees is controversial but, in truth, the present day reality could be viewed as not entirely dissimilar. Although today, trustees may not be the enemy of the design academic, there are certainly other factors that contribute to the pressure to conform and play by the rules. Where once the art school was considered the epitome of creative chaos, today's art school is a different place. Now run more like businesses, greater emphasis is placed on issues of health and safety, annual monitoring, admission and retention rates, and widening participation than fostering creative freedom, pushing back the boundaries whilst pushing forward the notion of originality. Gone are the really dangerous days where spontaneity and risk-taking were the norm. The combination of student as customer with purely career-driven aspirations, and academic as law-enforcer, have seen to that.

How to Teach Design

"2-D - 4-D

Once graphic design meant flat, static, two-dimensional.
Now it encompasses multiple, hybrid media. It is not just visual, but involves a variety of senses, more like life itself, which plays out in a four-dimensional world."

"Object – Experience

Once what you were making was an object.
Now it is more often an experience."
- Chris Pullman, Vice President for Design WGBH Boston, Some Things Change… The Education of the Graphic Designer.

"There are designers employed as teachers who even feel like teaching design is in principle an impossibility, because the field of design moves too quickly and develops in so many directions at once."
- Hugues C. Boekraad, Academic at Post-St Joost, Copy Proof – A New Method for Design Education.

With both the external and internal pressures mounting, how do we as design educators ensure the provision of a truly creative learning environment that challenges preconceived notions and theories of design whilst equipping students for the rigours of the 21st century workplace? How do we offer a curriculum that nurtures, supports yet confronts change? As design educators we have a responsibility to equip the next generation of designers with the knowledge and skills to effect design solutions that communicate truthfully, responsibly, that enrich lives and life-styles. We must seek to endow our students with the ability to empower, rather than be empowered by, technology, to harness new ideas and ways of thinking and to understand and comprehend the past whilst looking to the future.

The teaching of design is not exact science, far from it — in fact many argue that the teaching of design is a near impossibility because there is confusion about what the practice of design really is. With digital technology came new working methods and approaches that have initiated new patterns of communication exchange. A minority of educators and practitioners have started to move away from the previously established rules in design education, focussing less on specific outcomes and objects as well as styles and working methods and starting to concentrate on the design method itself, looking at the combination of models for communication and aesthetic criteria. In her essay, How High Do We Set the Bar for Design Education?, Meredith Davis, professor and director of graphic design at North Carolina State University, acknowledges that this is still a small minority. "Teaching strategies in most design schools discourage systems-level thinking by asking students to design products (a book, brochure, multimedia presentation, etc.), usually outside the context of the systems to which they belong and even, in some instances, outside the context of use." Davis recognises that in many cases "project briefs are written by faculty, not students, and the criteria for success (legibility, good composition, original idea, etc.) are usually known before the student begins work."

In essence, focussing less on outcomes and style and instead concentrating on working with a client to determine the most appropriate mode of delivery and the essence of the communication task in order to establish the context of the problem should be formulated before the brief is written. Working together as designer and client in collaboration may be a simple enough sounding approach, but one that requires a huge shift in established patterns from those in education and in practice. Not exactly rocket science but then design is not an exact science.

5 Collaboration

"The reward of a successful collaboration is a thing that cannot be produced by either of the parties working alone." - *Harlan Ellison, US Film Writer.*
"You have to be part psychologist and part politician to work creatively and collaboratively..."
- *Nina Sadowsky, US Film Producer.*

Recognising the importance of relationships with both those outside and inside the design institution is the first step in the right direction towards establishing the perfect creative environment. External and internal links can be successfully fostered, building relationships and partnerships where collaboration and communication are the building blocks of innovation and change. Our students are expected to recognise and evaluate peer learning, that mysterious mist that often occurs in the studio environment when we are elsewhere, but are we as design educators and practitioners practising what we preach? Are we learning from each other, communicating our intentions, evaluating our failures as well as our successes and creating an open dialogue regarding our own performances in the educational and vocational needs of the next generation of designers?

A course curriculum that acknowledges and embraces professional practice and that invites design practitioners and design clients into the programme with a view to fostering productive links, enhancing and progressing the relationship between education and industry by re-evaluating the nature of the collaboration offers an educational experience to each of the participants. Whilst Davis admits that many design courses fail to create relevant projects, she notes that they also fail to ensure that they are critiqued appropriately too. "The outcome is usually critiqued by faculty and students or other designers" (rarely by clients or audiences) she explains in The Education of the Graphic Designer.

Gert Staal, in Copy Proof – A New Method for Design and Education, envisages similar problematic issues with working solely for an audience made up of a peer group. Understanding how to develop and critique project briefs through careful liaison and discussion, looking at ways of incorporating both professional and educational realities whilst underpinning the brief with the opportunity to take risks and experiment can be challenging yet should ultimately be a rewarding process for all involved.

6 The Politics of External Projects

"Is it morally acceptable to maintain a system in which (as one designer puts it), 'Advertising and, more importantly perhaps the desire to mass-manipulate people for financial gain has become perfectly acceptable, and in many ways desirable'?"
- Nigel Whiteley, Design for Society.

Within the Academic Programme in Communication and Media Arts at the University of Brighton in the UK we are constantly developing 'live' projects with external partners for the undergraduate courses in Graphic Design and Illustration. Due to the high standing that the courses have locally and nationally, we are regularly approached by outside agencies to participate in real projects for real clients. Requests come from all sectors of the community and vary enormously in terms of their expectations, level of development, creative opportunities and timescale. There is no official channel for the requests to follow and much of the decision-making process regarding which projects the courses wish to get involved in, is mainly due to instinct and gut feeling. Many of the successful requests have yet to be formally formulated into a written project brief and so require less taking apart and putting back together than others that arrive signed, sealed and immovable.

The challenge for the course team and the potential client is in constructing a project that will benefit all three participants – the client, the student and the course. And this process is arrived at by face-to-face discussion between staff, students, normally student representatives, and key members of the client team about the perceived communication issues, perceived modes of delivery and any perceived audiences. Research is undertaken that starts to gather in-depth information about the organization, company or group.

It is only through conversation and communication that project briefs start to emerge that allow enough freedom and flexibility, as well as promoting that all-important ingredient of creative risk-taking, thus ensuring that the design process can get underway without fear of creative or commercial failure. Of course, commercial concerns are important, many clients demanding that a project that has their involvement and support even though initiated from a new perspective, still meets their commercial needs.

Not all projects require commercial success though, and plenty of the 'live' briefs commence from an entirely different starting point. Working with charities and trusts is a vital aspect of the process of ensuring that students receive first hand experience of working on projects outside of the commercial arena. The aim is to create an opportunity to investigate, understand and communicate issues that are more important to the wider community than the selling of consumer goods. Clearly articulated in the preface to Design for the Real World, Victor Papanek stated in 1971 – "There are professions more harmful than industrial design, but only a very few of them. And possibly only one profession is phonier. Advertising design, in persuading people to buy things they don't need, with money they don't have, in order to impress others who don't care, is probably the phoniest field in existence today."

Papanek's views may still be considered extreme and Naomi Klein's call to arms in No Logo covers the intricacies of advertising and branding in more meticulous detail, but it is Nigel Whiteley in Design for Society who communicates a manifesto-style plea to the design community. Whiteley states – "The design profession needs to be both introspective and outward-looking. It must look at its practices and values, and their implications: and it must look at the condition of society and the world. Designers can no longer take refuge from responsibility for their actions and continually repackage the same old type of consumer goods at a time when issues about consuming and its

relationship to the world's resources and energy need urgently to be acted upon." Introducing students to projects that insist upon communication that is truthful, responsible and that will enrich lives is the first small step: for some students it can be their first initiation into politics and the ethics and responsibilities of working as a designer.

7 Case Studies

"Think with your heart." - *Gert Dunbar, Studio Dunbar. Behind the Seen, Design without Boundaries – Visual Communication in Transition, Rick Poynor.*

Born Free Foundation

Born Free, based close to Brighton in the UK, is an international wildlife and conservation charity, working throughout the world to protect wildlife and endangered species. Projects in India include a major initiative to help save wild tigers from extinction, plus a natural habitat sanctuary providing lifetime care for rescued tigers.

Working with Born Free, a 'live' brief was conceived and developed that looked at raising awareness of the organisation and its work.

Initial discussions with the head of marketing and publications, Celia Nicholls, around the themes and issues at the core of the charity's work provided a useful starting point. The Foundation relies heavily on donations and funding is always a constant concern; it was clear that Born Free's intentions were to create a series of paper-based products, such as a range of cards, that would aim to increase revenue and awareness.

Working together to push the project's potential whilst investigating further areas for possible funding led to involvement and part sponsorship by Mapp paper merchants. The funding and enthusiasm brought to the project by this third party allowed the project coordinators to be far more ambitious in scale. Students, part of the crucial target audience for Born Free, raised the idea of creating a range of T-shirts as well as a set of greetings cards and postcards. Mapp sponsored the project and in return were allocated a run of each T-shirt design to be given as gifts to their sales teams.

T-shirt designs were created that used the Born Free campaigns for elephants, lions and monkeys in upbeat, contemporary and humorous ways. The intention was to raise awareness through designs that would be a talking point: that would relate to the charity as well as the wearer and would be a unique, but fashionable statement. Students submitted over fifty design proposals that were critiqued by members of the course staff team, by staff from Born Free and Mapp and by students themselves. The final range of shirts and cards that went on sale promoted through the annual merchandise catalogue and website and revenue from sales has well exceeded any expectations.

Born Free's chief executive Will Travers was delighted by the students' designs: "The new t-shirts are a fabulous addition to our merchandise catalogue, bringing up-to-the-minute style to our range. What a great way to raise funds to protect wildlife. Thank you Brighton University!"

The Royal Sussex County Hospital

The Royal Sussex County Hospital, based in Brighton, first opened in 1828 and in 2004 one of the UK's biggest and most specialised renal units was established at the hospital.

Renal patients have diagnosed problems with their kidneys and although not considered 'in-patients' are often long-term, visiting the unit three times per week for kidney dialysis. Patients may have to continue visits for the rest of their lives unless they have home dialysis or until they have a successful transplant.

The first stage in initiating a project with the hospital was to meet with members of Brighton City Council's Arts Development Board, the Royal Sussex County Hospital Arts Advisory Board and members of the Renal Unit Patients and Family Group to discuss the parameters of any possible collaboration.

It was clear that whilst the new unit would offer medical facilities surpassing anything previously offered in the city and although the environment itself would be far easier for staff to work in, the visual stimulation for patients was less than satisfactory. Renal patients can experience feelings of nausea whilst on dialysis and may have to sit in a static position for many hours so their immediate surroundings are vital to their general outlook and well-being.

Through discussion, a project brief was conceived that would result in a series of artworks being created that would be situated in various locations within the unit. A number of site visits were organised, although at this point much of the construction and refitting work was still very much in progress. Students were given the opportunity to meet with patients and staff to discuss their needs and adequate time was allowed for project research into the effects of kidney and renal failure. It was decided that key words raised by patients were to be the main content of the brief – 'up-lifting,' 'warm,' 'friendly' and 'approachable' being the headlines in their discussion with students.

A brief was written that although creatively open, reflected upon issues of health and safety as well as the practical requirements for the works when sited in the renal unit. Students worked both solo and in groups to produce a vast range of design proposals for a first stage presentation at the hospital. From seventy initial proposals ten were short listed for further work. At the final presentation four students were commissioned and a period of three months given for their creation, construction and installation.

The work produced was creative and varied: one student Andrew Merritt, created two hanging sculptural pieces entitled 'HELLO' and 'HI'. Letterforms constructed from thousands of small pieces of interlocking plastic washing machine, dishwasher and refrigerator components sprayed with day-glo orange and pink car paint spelled the words HELLO and HI. These were hung inside Perspex boxes and mounted in each of the two reception and waiting areas. Merritt explained: "I wanted the works to appear to change depending on the location that people viewed them from (close, faraway, round the corner, through the doors etc). The pieces would never look quite the same. This is an important point for the patients, staff and visitors as they use the renal unit on a very regular basis. 'HELLO' and 'HI' are like fish tanks - same components but different situations every time you look, except the pieces are smarter than goldfish!"

For "Gingerbread People" Josie Brooks baked numerous different gingerbread people of both sexes, each naked and with varying sized anatomical proportions. She photographed the results and digitally printed onto canvas three large multi-faceted images. "The gingerbread people piece is based on the notion of bringing a bit of light-hearted relief in to the hospital environment to make people smile. The work contains 100 individual characters, of all shapes and sizes, to represent the diversity of people coming in and out of the hospital. The volume, along with the scale of the piece, provides a significant amount of visual stimuli encouraging the viewer, even if seen on numerous occasions, to spot something new in the image. It also provides a great talking point as people can try to spot a relevant gingerbread person that they identify with or maybe, more importantly, that they are glad they are not!" explained Brookes.

Bloomberg

The London headquarters of Bloomberg, the global financial news and communications company 'dedicated to new technology, dynamism and creative thinking' collaborated with Scarlet Productions in London and members of the staff team to create a brief offering a unique design challenge. Fifteen one-minute student films were commissioned that were to be played continuously for one month in the street entrance and reception of the architecturally inspiring Bloomberg building in Finsbury Square in the City of London.

The project brief incorporated the following text from Bloomberg's own statement about their sponsorship of the arts – "In recent years there has been a move away from traditional notions of the working environment and Bloomberg's art and design installations represent a significant shift from the conventional corporate art collections that often place status before innovation. The

extraordinary becomes part of the everyday, and creativity is brought right to the heart of the company. Bloomberg's close relationship with the arts and education builds loyalty and motivation among staff, encouraging new connections and new approaches within teams throughout the company as a whole."

Staff and students visited Bloomberg's offices in London to gauge the space and meet with staff from Bloomberg and Scarlet Productions. The visit was an important one as it enabled students to ask questions about how the space was used, examine the working habits of the staff and generally delve into the inner workings of a creative-looking financial news institution. The team at Bloomberg were asked to respond to many of the immediate ideas and themes that students wished to express through their work. Ten one-minute films were chosen from a shortlist of twenty, the main deciding factor being the depth of creativity explored and the ability to work sequentially within the confines of the timescale allowed. Other considerations included how the audience would engage with the films and how the pieces displayed a recognisable narrative from beginning to end.

Subject matter varied, techniques varied too – from analogue animation to digital Flash movies and the results reflected the diversity of work created on the course as well as the open brief and approach that Bloomberg, Scarlet and the Communication and Media Arts teams collaborated to provide.

Conclusion

The road from the student riots on the streets of Paris in 1968 to the pavements outside Bloomberg in 2004 may appear to have a tenuous link but there is some method in the madness. Education and particularly design education may have its critics and pressures from external and internal sources may continue to mount but remaining sane, positive and inspired are ingrained into the psyche for many educators.

To combat internal institutional pressures – keep recruitment figures high, maintain retention rates, approach various boards and committees in a proactive manner, use studio space, facilities and equipment wisely and don't let students disobey health and safety guidelines – all straight-forward really.

To alleviate the stresses caused by external pressures from industry, invite them into your institution, speak to them about their needs and requirements, talk about the requirements of the course and move forward from an equal stance. The riot-torn days of Paris in 1968 are well and truly over - it may now be up to the educators, rather than students, to be the catalyst for change, although it is wise to remember it is not the winning, it's the taking part.

"The Future is not inevitable. We can influence it, if we know what we want it to be. We can and should be in charge of our own destinies in a time of change."
- Charles Handy, British oil executive turned academic and populist social philosopher.

"The great aim of education is not knowledge, but action."
- Herbert Spencer (1820-1903), British philosopher and sociologist.

"Graphic Design will save the world right after Rock and Roll does."
- David Carson, US graphic designer.

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Using Electronic Learning Contracts In Art and Design: Experiences and Reflections on Learning and Teaching.

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Birmingham Institute of Art and Design (BIAD), at the University of Central England, has, during the last six years, pioneered development of work-based learning contracts within masters' courses. The contract represents an opportunity for widening participation, which brings with it a close and careful consideration of the traditional values of scholarship and within the value systems that define art & design education. In recent years, an electronic version of the contract has been designed to better support the negotiation process and to provide a virtual presence of the learning environment in the workplace and at a distance. The operation of such contracts has provided surprisingly interesting learning experiences and scholarship within a collaborative environment of University, student and employer (Jerrard et al 2002). This paper presents new research into learning and teaching via these contracts.

An initial evaluation was carried out from the students' perspective and centred on the learning experience (Jefsioutine & Jerrard, 2004). Feedback indicated that students found the electronic learning contract to be an effective and stimulating mode of study. They felt that teaching became more individually focussed and appreciated the flexibility and the emphasis on independent learning. It was noted from the student experiences, that tutors continued to be influential in the operation of the contract. The literature suggests that tutor involvement in e-learning technology is a strong indicator of success, and that involvement is dependent on attitudes to new technology and their level of technical skill within the online environment. This paper reflects on feedback from students and tutors and considers the role of the tutor and the nature of the learning experience in the contracted process.

Keywords: *work-based learning, learning contracts, negotiated study, e-learning, art & design*

1 Work-Based Learning Contracts: What Are They, Why Have Them?

The development of contracted work-based learning represents a way of managing reflective learning in the work place. It offers a new set of opportunities for masters students as well as for the international development of masters' courses. It also widens audiences in a climate of socio-economic change and provides for a new internationalisation of educational experience.

Charles Handy has argued that individuals will need to continually update and develop their skills to survive in the new economy (Rapaport 1994). Handy further claims that "companies have a responsibility to ensure that workers have skills that can help them find work after they leave the company" (Rapaport 1994). Rapaport also quotes Kate Owen of BP "…we are moving toward providing development which is designed for individuals, to enhance their skills and personal portfolio" (Rapaport 1994). However, involvement by a student in professional work alone may not allow for the appropriate qualification process to occur. It is here that higher education has a role to create opportunities for critical reflection-on-practice, and convert the skills into transferable knowledge that can benefit the individual, the company and the profession.

Widening participation may always require a closer and careful consideration of the traditional values of scholarship and a consideration of the value systems, which define art & design education. The conflation of a variety of personal goals within an experience of higher education increasingly requires additional learning and teaching styles. This added to a new internationalisation of educational experience leads many art and design institutions to think globally in their provision. How can this be achieved without diluting the art and design experience? Specific personal reflection of real world events has always been central to education in art and design.

The art and design student's view of their educational system assumed a complementary relationship between student's internal and external experience, which may or may not have been closely related within a single course experience. Although the UK Art and Design educational community particularly avoided a single prescriptive view it did stand for a newer more pragmatic view of what may be described as the 'external curriculum.' Other assumptions have also formed our view of design education including the nature of experience outside the institution as being a sort of character building experience which at worst may well have been a damaging equivalent to armed forces basic training. On the other hand those who opted for a sandwich course were often provided with a set of perceptions which clearly motivated and provided for choice throughout the following years including those beyond graduation.

Learning contracts are a means for structuring learning and assessment, which allow students to significantly direct their own learning within the overall goals of a course. This provides a formal agreement between an individual student and an institution. Specific arrangements about time, projects/milestones, learning outcomes and course elements are listed in the agreement. Contracts allow for credit-based accumulation, through work or professional based learning in collaboration with an exterior organisation. Contracts may be part or full time and may be operated internationally provided all conditions are met and that good quality data communication is available at the student workplace. Most of a course may be included within a contract, or block periods, for example long periods within industrial or professional placement. Alternatively those in 'course related employment' may find this a convenient way to integrate work and study with little or no course attendance. The general conditions that apply in relation to work based learning contracts at Birmingham Institute of Art and Design, University of Central England include those linked to the prior assessment by the University of contract elements. All contracts normally involve credit accumulation of work-based learning, assignments within the course and remote assignments.

2 The Student Experience: Self Direction, Negotiation, Competencies

Learning Contracts may be described in a variety of ways in relation to their perceived use and value. The planning of a set of interrelated activities at the outset becomes a plan of work and ultimately a record of achievement. This then is a tactical document and represents, to the learner, a strategic learning process. Building on past experience requires learners to associate such experience with the various future-based aspects of learning. Within a holistic personal programme past achievements become a framework with potential starting points at a variety of different levels. Through a negotiated process surrounding the contract, the individual starts to develop a sense of a personal learning agenda. The process of developing a learner's model of current and future competence involves the

self-diagnosis of needs. This is more complex than assessing a skills gap. A competency model, as a single representation of mixed proficiencies, contains knowledges, understandings, skills, attitudes and values. This means that a particular set of constituent parts need to be selected, and their relationship understood, before determining a level of competence in each. The initial competency model is of course a constant concept in the learner's progress through the contract, but one, which develops and changes. Assessing the gap between where a learner is and where they would wish to be suggests an early development of learning objectives and an understanding of learning styles.

This process, according to Tough (1979), highlights the motivational aspects of self-directed adult learning. It is also suggested that self-direction and self-initiation provides for a deeper and more permanent learning experience (Brocket & Hiemstra, 1991). The domain where the initialisation of a contract takes place is very complex and a number of potential competing themes need to be reconciled. In particular an employer's expectation may appear in tune with a learner/employee but may conflict with regard to ultimate objectives. The use of structured learning within traditional courses may represent an imposition leaving most personal references out of the experience. Thereby a lack of mutual understanding could be developed between learner and facilitator. When the contract is in use, mediation is achieved which not only centres the learning on the learner but also allows practical activities away from the institution to be made clear and explicit.

A personal competency model is a view of what the learner believes or can demonstrate, thus the contract allows for self-assessment. The personal nature of the contract acknowledges the individual way in which people learn and their need to exercise a degree of control over, and ownership of their learning. This, from the individual learners point of view, may be more accurate than a separate '3rd party' assessment because the learner is able to be subjective in his/her dialogue. However, the objectivity of employer and University makes the transfer complete. Ultimately confidence in the quality of learning is not held, in our view, entirely by those formally assessing. The University uses 'conventions of warrant' (Gergen, 1989) where reputation and status are set together with an individual student's performance.

What we understand as competence in art and design higher education varies with the 'stakeholders' involved. Kerka (1997) sees the key competencies of the 'portfolio worker' as being "versatility, flexibility, creativity, self-direction, interpersonal and communication skills, facility with computer and information technology, ability to learn continuously and ability to manage work, time and money." Most agree that transferability from one learning or professional domain to another contributes significantly to such a definition. Within the experience of using the learning contract this is not a one way process, the workplace not only exports knowledge to the University it also 'learns' alongside the employee/learner. One tutor stressed, "The work is directly related to their professional needs and those of the organisation with which they are working. The student researches the relevant theory then gets to apply it in a way that has direct and immediate value to them and the organisation they are working with, this maximises their learning"(T3).

This is more than cross curricular (Bridges, 1992), as we would always acknowledge that the curriculum is both internal and external to the institution, but exclusively internal to the user. This, in a narrow sense may contribute to the development of employability, which traditionally defines the competency curriculum. By encouraging the learner, to personally assess their capability they make their own assessment of issues like employability. This, in an increasingly unstable cultural environment has given way to 'employability security' where an employee is able to hedge against unemployment by developing transferable skills of value beyond the need of the current employer. Eccleston (1997) warns that the competency approach neglects the social and cultural aspects of learning in favour of feeding economic needs.

Within the context of the University, this may be contentious. Higher education is a place of traditional values and retained and valued knowledge. The contract, being both distant and work-based, may be seen as a weaker curriculum alternative to that which is known, tried and tested. However the art and design curriculum has its routes in current practice and is often said to be founded on a fusion of skill and applied knowledge. In this way a work-based curriculum assessment is warranted twice, from the University with its parity of standards, and from the workplace with its progressive and

practical real-world values. Such a 'parity of esteem' may be seen as a significant feature of the contract. The context of higher education brings with it a level of critical reflection on the real world activity. Boud et al (1985) identify 3 key elements in the reflective process: returning to the experience by describing it in some way; being aware of and addressing the feelings associated with the experience; and re-evaluating the experience as a result. Through this process of reflection-on-action, students become reflective practitioners, aware of their own knowing-in-action, their knowledge-in-action and becoming more reflective-in-action (Schön, 1983). One tutor observed that in traditional teaching, "the process of reflective practice for many students is not acknowledged or practiced, being rather an intuitive or semi-conscious process"(T1). The contract makes it explicit by drawing the student to reflect on the learning within their practice.

Cohesion between the work place and the University is aided by the practical nature of assignments, which may involve the use of common learning tools in both domains. Also the contract itself, available on the ubiquitous web, is not only personally identified it also appears not to be owned by any stakeholder except the learner. It is universally available and at the same time, not a part of either domain. By placing the learning at work, the university, the course and the contract become present in the mind of the student, one tutor observed, "We occupy their imagination and their intention – to a greater extent at work"(T3). One tutor stressed the opportunity for reflection on experiences in professional practice. "The work is directly related to their professional needs and those of the organisation with which they are working. The student researches the relevant theory, then gets to apply it in a way that has direct and immediate value to them and the organisation they are working with. This maximises their learning"(T3).

3 The Role Of The Tutor: Guide, Facilitator, Teaching Presence

There are a number of ways in which people are categorised in relation to new technology. These, typically described as technophobes, technophiles in technological utopianism/anti-utopianism, are found in all professions including university teaching (Winner, 1977).

A study, described by Fox and Herrmann (2000), shows a number of typical attitudes from Bruce (1977), (fig 1). These included the view that technology both dehumanises and fails to add value to the educational process. Such a view was tempered by the assumption that the technology aided the management of students, which by itself may have originated from an association of technology with business volume processes. Another view showed efficiency gain expressed in terms of both staff access to larger student groups but also their access to common learning material. In this way a tool for convenience has been identified but one which only adds to subject learning value as a by-product of efficiency. Similarly views by teachers, which name web learning as a novelty, appear to downgrade its serious potential integration into subjects. More positive views state that a 'transparent' technology transforms both the subject and its appearance to the student. Thus students who may have associated traditional learning and teaching with mature curricula encounter an increased 'real worldliness'. Anderson observes that "an effective online learning teacher must have the type of resilience, innovativeness, and perseverance typical of all pioneers in unfamiliar terrain" (Anderson 2004:290).

Figure 1. "Educators' typical stances about online educational technology" Source: Bruce, B.C (1997)

Neutralitarian	Online approaches make no significant difference to learning or curriculum. Online teaching is a tool that can improve efficiency.
Boosters	The new online approaches will improve learning and make education more effective and efficient. New developments in educational technology are inherently good and non-problematic. New technologies offer solutions to many teaching and learning problems.
Oppositional	Technology over-simplifies complex teaching and learning processes and practices. The danger is that ultimately, machines will take the place of teachers.
Sceptic	There is a significant gap between the rhetoric and reality of online practices. Sceptics are hesitant to use technology unless the advantages in doing so are obvious.

Transformationalist Online approaches radically change teaching and learning processes and curricula. Clearly attitudes are derived from a sense of ownership (or not) where the course or modules move into a stakeholder position from a planned change process, which has involved staff. A broad view of shared ownership is required where the traditional securities associated with perceived expertness moves partly from the subject to the process. This, together with an acknowledgement of the holistic nature of web based learning, underlines the important aspect of staff attitudes.

Our own survey displayed a range of attitudes to the learning contract, which did not show the range identified in fig. 1 but are still important in the adoption and effective use of the contract. Our own sample largely represents a group of tutors who could be described as early adopters who have chosen to use the contract as a new mode of study. It is thus in the spirit of transformationalism that they have engaged with the process.

Garrison & Anderson (2003) describe teaching as "direct and proactive interventions that support an effective and efficient learning experience." An "experienced and responsible teacher" therefore, "can identify the ideas and concepts worthy of study, provide the conceptual order, organize learning activities, guide the discourse and offer additional sources of information, and diagnose misconceptions and interject when required" (Garrison & Anderson, 2003:71).

The role of the supervisory tutor in a work based learning contract may be perceived differently in that the students takes on much of the responsibility for their learning.

Tutors observed that the emphasis is placed "on the student to take the lead in planning and deciding their own course of action leading to learning experiences"(T1). One tutor noticed the difference as one of "becoming a facilitator of learning rather than providing knowledge" (T1). The role of the tutor in the contracted process has been described as that of the 'guide on the side' (Jerrard et al 2002). Garrison & Anderson, 2003 argue that the 'guide on the side' concept is limited as an approach to e-learning in separating the content expert from the facilitator (Garrison & Anderson, 2003:70).

On closer observation, the role of the tutor in the contract is more complex and meets the requirements identified by Anderson in creating a teaching presence. He argues that there are three critical components of a teaching presence: "Design and organisation, facilitating discourse, and direct instruction" (Anderson 2004:291).

Design of the course, and to some extent organisation, emerges from the process of negotiation between the student and the tutor. In much e-learning, Garrison & Anderson 2003 (p68) point out, there is a greater emphasis on organisational issues. Much of this is embodied in the contract itself. The organisational framework within which the learning takes place is pre-designed, but the design of the curriculum and organisation at the micro level is very much the responsibility of the student. The role of the tutor becomes much more one of guiding the organisational and design aspects through negotiation. For this reason the electronic contract was designed such that the emphasis was placed on the communication between tutor and student.

The contract thus represents a discourse between the tutor, the student and the employer. By making the student/tutor message board the starting screen, the discursive nation of the contracting process is stressed. The intention was that this would contribute to and facilitate a reflective environment. This is in addition to discourse embodied within the learning activities themselves, again facilitated by the tutor. The student may see the separation between the University and the work place as a knowledge/practice split, and so the learning contract is key to bringing the two together. The supervising tutor is associated with the contract and is, therefore, not a provider of knowledge but a learning coach. The student is coached in the art of reflection in and on practice (Schön 1983).

Direct instruction occurs in the first instance when the student is told how to use the contract and how the process works. The delivery of curriculum content is then independent of the contracting process. The student may or may not identify learning activities that involve direct instruction, and this may or may not involve the supervising tutor. Garrison & Anderson point out that direct instruction

can take the form of "specific content issues, such as diagnosing misconceptions" (Garrison & Anderson, 2003:70). Within the contracted relationship, a tutor may indeed deliver a great deal of content, often without realising, both about the subject matter, and about the learning process.

The relationship, therefore, retains the roles and responsibilities of teaching, but places them in a different context. The tutor becomes a resource for the student's learning at the same time as a facilitator of the learning process. Indeed, it is the role of the tutor to help the student identify the teaching presence in their work and other experiences. One tutor observed that this represents a large shift for tutors being both "conceptually difficult" and representing "a change from traditional course design"(T3). The contract recognises the student as an individual learner, and more importantly, requires the student to recognise that. Identifying learning aims and appropriate learning activities necessitates a developed understanding of their own learning styles, their existing personal knowledge and how to extract knowledge from their prior experience. The supervising tutor takes on a cooperative role, helping the student to achieve this. It involves developing a trust in the student and enabling an appropriate level of self-direction.

Kerka (1994) points out that the degree to which students are willing or able to be self directed learners varies, and may involve 'an internal change in consciousness.' This is echoed by one of the tutors in our study, who felt that for some students the learning contract was frightening. "Students do not feel that their knowledge and experience base is sufficiently developed to contemplate taking control of the learning experience… For some the learning contract seems like a lot of work that they feel they do not have the capacity to complete"(T1). One student "was not able to conceive of putting their current practice into contractual learning for development of new practice"(T1). Long (1990) suggests that successful self-directed learning is dependent on learner psychological control. One tutor had a very bad experience with a student perceived as not committed. This particular student was inherited from another tutor, and so it is interesting that the psychological commitment to the contract, in the absence of the negotiating partner may have been diminished.

Garrison (1987) argues that the concept of self-directed learning is often confused for a completely autonomous activity. In fact, "self-direction is highly dependent upon quality interaction and collaboration between a learner and facilitator." (p.311) Several tutors observed that the relationship was indeed more involved than traditional teaching. "The setting up of a Learning Contract requires time and an understanding of the individual needs of the student and the organisation they work with. As each Learning Contract is unique the time involved in getting a student up and running is greater than full time taught students"(T3). It is noted from the experience of the authors that learning contracts represent, to a certain extent, a return to one to one teaching. This represents a particularly favourable environment for the individual student within what often appears a personal timetable (contract). Indeed, it has been noted that the online environment presents a temptation for some teachers to be over involved, checking emails and message boards at all hours of the day and night. Online teaching calls for a particular vigilance in time management on the part of the tutor (Anderson 2004:286).

Webster (2004) observes that there is very little research on the tutor-student relationship in the context of design. In her own study she found a mismatch between student and tutor perceptions. Tutors felt that the 'coaching' ideal was only possible when students were already high-level learners and competent designers. Students described their ideal design tutor as 'giving assistance with managing and planning work,' 'being enthusiastic,' 'understanding the problem from the students' perspective,' 'accepting the student's ideas and helping to develop them,' and 'offering design guidance which the student understood.' She suggests that this is close to McLaren's 'liminal servant' who adopts a student centred approach, "assisting the student to manage and construct his or her own learning through critically reflective dialogue" (Webster, 2004:109).

Brockbank and McGill (1998) argue that whilst the movement towards facilitation invites students to contribute, the power over how and what is to be learned often remains hidden and in control of the teacher or institution. They argue that transparency over those hidden and unarticulated processes

enables the student to recognise and work with it. The learning contract makes these compliances explicit. The student is bound, within their overall learning aims, to match the masters degree core course aims, and to identify learning activities and assessment criteria at a level sufficient for the award. Other compliances are made transparent in that final level credits, equivalent to the final project, must be separately allocated in advance. One tutor stressed the importance of flexibility within the context of compliance, in that although there are agreed and specified aims, objectives and deadlines, the contract "allows freedom and flexibility of study" (T2). The ability to amend the contract is seen as important by both tutors and students. As Tough (1979) notes, learning goals change no matter how carefully the initial objectives are constructed.

The value of the contract as a communication tool seemed to lie in its shared accessibility from any place at anytime. One tutor observed "It was useful to have the contract available from wherever and available to both the student and the supervisor" (T4). Tutors access the contract for a number of reasons. As well as communicating and negotiating with students, one tutor accessed it as a reference when marking work. Generally use of the contract is up front at the negotiating phase. Many tutors used the contract in a face-to-face setting. One observed that it was "a useful 3 way scene" (T3). Another used it to evidence deadlines missed.

Anderson describes the ideal qualities of the e-teacher: "They like dealing with learners; they have sufficient knowledge of their subject domain; they can convey enthusiasm both for the subject and for their task as a learning motivator; and they are equipped with a pedagogical (or andragogical) understanding of the learning process, and have a set of learning activities at their disposal by which to orchestrate, motivate, and assess effective learning" (Anderson 2004:290).

4 Conclusions: Future Orientation, Autonomy, Learning Competencies

Schön (1987) called for a 'reflective practicum' in which learning by doing is brought to the core of the curriculum (1987:310). The recognition that curriculum exists outside an institution represents a key cultural shift by universities and the ownership of exterior curriculum naturally require transportable structures which represent discipline and familiarity. Seen as a wider movement, the work based learning paradigm is a step towards a phenomenology of practice called for by Schön (1987:321). It serves to improve the profession and to open the field of knowledge.

The contracted process may offer a model of learning more suited to current and future generations. One tutor observed: "This process is responding to initiatives that are part of a wider approach to innovation and change. Differing populations requiring new initiatives" (T1). Kerka (1999) suggests that new generations, brought up with the web may develop a naturally self-directed learning orientation. She quotes Confessore and Baron (1997) who studied the learning approaches of three different generations, and concludes that institutions will have to evolve to provide more opportunities for self-directed learning.

It is important to make a clear distinction between self-direction and the increasing drive towards *one to many* teaching within cost conscious teaching environments. Such an approach to distance education may be disappointing to many students who require masters level work to be supported with more considerate ratios. Distance learning need not represent a distant pedagogical experience. As was observed, the contract appears to return to a *one-to-one* experience, even for the international student. This experience is as rewarding for the tutor as for the student. One tutor described the teaching/supervision experience as "much more interesting and rewarding because of the "real" nature of the challenges" (T3).

The contract, involving, as it does a 'future orientation' presents a positive view of learning to the user. The assumption is that the contract will lead to the qualification and that the qualification leads through transferability of stated learning objectives to life beyond. It is often with anticipation that the students use the learning contract, they are aware that it leads somewhere because the end is included within the planning process. One tutor noted that students often enter higher education as a method to exit current employment rather than to make changes pro-actively within it.

The potential for a variety of work based students was identified by one tutor, "It seems to me that it is ideally suited to people who want to (have the intention to develop a plan of working life as freelance or autonomous) or who have already some experience of making proposals (applications for funding) as a part of their working practices as artists. It is my experience that the contemporary work place often has a methodology of project working that involves moving from one piece of work onto another piece of work. This often involves submitting proposals for the development of new work as an existing work practice" (T1).

The learning contract, especially in its electronic form, has provided particularly interesting learning developments. It has also provided unusual insights into the way in which learning takes place.

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Practise Learning Through Practice: Learning Software Through the Process of Designing.

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The study had two objectives: to develop a curriculum model for visual communications subjects that integrates rapidly expanding subject specific software; to investigate learning and teaching methods appropriate for the delivery of embedded software skills related to creativity and subject specific knowledge.

As a consequence of the rapid development of new technology education is faced with the problem of incorporating the software skills associated with visual communication design within an increasingly congested curriculum (Justice 1999). The software is complex and is required by many areas of the industry resulting in students' perception that software training is essential. The students' understanding of software is situated in the process of generating solutions to problems and in implementing design concepts. It could be argued that the software is the vehicle through which they articulate their practice rather than the medium through which they translate their practice. Treating software skills as abstract, unrelated to subject specific knowledge, either through training courses or the use of training manuals, does not take into account the discipline that the software application is to be used for.

Visual communications courses at the researchers' institution are to be re-validated in the near future. One of the issues to be addressed, in the light of increased use of specialist computer applications in this discipline, is how these software skills can be meaningfully incorporated into the teaching and learning of subject specific knowledge and skills, alongside contextual and theoretical studies. The paper investigates the way software is taught in relation to other aspects of design education, taking into account pressure on the curriculum to maintain subject specific knowledge and the breadth of its content, alongside incorporation of specialist software. The investigation addresses how students can become sufficiently conversant with appropriate software in the context of developing their individual creativity.

Keywords: *creativity, technology, curriculum, visual communications*

1 Introduction

Rapid developments in software programmes, essential to production in visual communication design, have resulted in pressure on educators to increase the content of courses, whilst at the same time accommodating constant change. The teaching of software programmes is additional to existing subject knowledge, skills and the contextual and theoretical underpinning of the curriculum. This software is essential for what are, in effect, vocational courses preparing students for the visual communications industry.

The argument for providing industry standard software skills is compelling both educationally and economically as indicated in the recent Government White Paper, which highlights the need for 'work-focused programmes' (DES 2003 p. 58). The new Foundation Degrees, developed in the United Kingdom as vocationally orientated study, are seen as supporting this growth, and therefore it could be interpreted that skill-based training is highly valued and provides employment. This is a message that may well influence prospective students (and their advisors) but such skills are short lived within this rapidly changing environment (Swanson 2000).

Job advertisements, where specific software skills are stated as a prerequisite for employment, provide evidence of the need for students to be trained in software such as Freehand, Photoshop, Quark and Illustrator. There is an argument that students need be educated in a broader context in order to be prepared for a more varied range of career opportunities to accommodate rapid developments and change in the visual communications (Swann 1997, GLAD 2003). Bassnett (2003) considers students should be educated for more than a specific job: "…a set of transferable skills essential to this inter-cultural age. Any good degree gives students more than subject knowledge. It gives you a life skill: how to think." As well as proficiency in the use of industry standard software students need to be adaptable and flexible in order to ensure continued employability (Keskeys 2000).

Although visual communication courses recognised the need for technology training relatively early on, knowledge and use of software programmes evolved in an ad-hoc way as a result of the need to quickly address industries' urgent requirement for technology trained graduates (Marshall & Meachem 2004). More often than not software training was bolted on to the existing curriculum in the form of separate modules which were often delivered across different locations and with different staff.

Subsequently the rapid change and development within the visual communications industry, over the past twenty or so years since the introduction of desk top publishing has affected its entire portfolio, for example, discussion around the 'dumbing down' of content (Novosedlik 1996). Added to this is the move towards a more traditional academic method of delivery incorporating lecture-based structures, which replaces the studio model, used predominantly in art and design undergraduate education. This has been caused by a number of factors: the introduction of a modular scheme that was based upon a three-hour student contact time model; the necessary instruction in new technology software; a rapid increase in student numbers as a result of the UK government agenda for widening participation and the resulting funding implications (GLAD 2003).

In order to achieve cohesion between on-going software developments and the creative curricula a more embedded approach to visual communication higher education needs to be considered.

2 Methodology

The research was seen as a scoping study, exploratory in nature with a view to its contributing to a more in-depth study.

Three staff from the visual communications division of the researchers' institution were interviewed for their perceptions of the need to include software in the curriculum, how they currently incorporated software into the curriculum, how they envisaged the curriculum evolving to include rapid developments in specialist software and how students acquired the necessary software skills. The interviews were semi-structured to enable a conversation to develop around the themes in order to co-construct meaning.

The first interviewee, Marilyn, is course leader in Animation, a fairly recent course, which has experienced dramatic growth in its use of software over the nine years of its existence. She has developed this course, from its original base as an aspect of illustration, to incorporate traditional and digital animation techniques alongside the development of the students' creative potential.

The second respondent, Kevin, is a course leader in Graphic Design, both print and multimedia - another area that has seen a strong increase in software use over several years. Since taking over course leadership, five years ago, he has been responsible for overseeing the development of multimedia design as a facet of the graphic design curriculum and teaching on both aspects of the course.

The third member of staff, John, is a course leader in Design for Multimedia and has also been involved in curriculum development issues as a member of the School of Art & Design Quality Committee. This has necessitated an awareness of teaching and learning issues within the validation of new modules.

All the staff interviewed are responsible for subject or divisional meetings and annual monitoring and are aware of issues raised through these as well as attendance at committees and informal discussion. They are all teachers with direct experience of student behaviour and expectations.

The staff views and perceptions were considered alongside literature such as discussion at TLHE 2004 (Teaching and Learning in Higher Education) conference, Singapore, to inform the development of the visual communications courses' curriculum in the forthcoming re-validation.

A number of themes emerged from the interviews, which helped to identify whether the acquisition of software skills is affecting student expectation of visual communication design courses.

3 Further Identification of the Issues

The importance of software skills within visual communications subjects has become increasingly necessary for even relatively basic design activities. The ability to produce mock-ups of design solutions with extremely high production value has now become the norm, and although it could be argued that this is merely a production skill rather than an intellectual or creative ability, the pressure from both students and industry necessitates that software training is an important part of undergraduate study. Students relate to the use of technology because they see that it enables them to produce highly finished work, which has always been an essential feature of visual communications courses. However, if students concentrate upon purely technological skills in order to obtain work as junior designers, they risk becoming solely reliant upon the technology rather than their own ideas (Swann 2000).

The influence of the computer in design education goes beyond the acquisition of software skills for production. As the ability to conceive and produce design artefacts direct from the desktop becomes easier the need to develop a range of skills, previously unnecessary for a practicing designer, becomes increasingly important. The ability to write coherently, proof read copy, and type proficiently are just some examples of skills previously undertaken by other professionals, that now fall within the domain of the designer (Roberts 2000).

It was apparent from the interviews that the staff thought that the graphic design industry required newly qualified applicants to be competent in the use of industry related software packages and that students also regarded the acquisition of software skills as important for gaining employment in the graphic design industry. Although all the staff interviewed stated that the industry required proficiency in the software, they all added that a thorough knowledge of the packages was impossible in a three-year graphic communications course.

Marilyn related this dependence on software skills particularly to multimedia: Some of the students just specialize in Photoshop, Flash and Director (industry standard software) as they assume that that's where the money lies at the end of the day. Kevin thought it particularly applied to first years and that the staff tried to adjust that view to one where software integrates with the rest of the

programme. John thought that although probably the majority of students regarded software as the most important part of their course, not all students felt that way. He, like Kevin, mentioned first years, referring to his impression that there seemed to be more complaints about modules that did not have an element of software training than those that did. He made an interesting point relating to this, that students in their first year of study were more likely to complain about modules that had no software acquisition content whereas modules incorporating the use of software seemed more popular. He considered that students felt they had definitely achieved something if they had learned part of a software skill set. He finds that a lot of them really enjoy using the Macs and getting to grips with the software; and that quite plodding students blossom when they've got onto a Mac and used Quark Xpress (industry standard software) – not necessarily any better work but a greater confidence in themselves.

Kevin thought that for a lot of students the software is important, particularly early on but that, quite often later on in the course, the confidence developed through one aspect would lead to confidence in the more difficult areas of creativity and risk-taking. Some students seem to see mastery of a software package in itself as an achievement, not necessarily linked to the intent of becoming a designer but as a separate skill that they can acquire.

John used the term 'Mac monkey' (artworkers - people who specialise in production and/or technical aspects of design) when he discussed past students' concerns that the testing for software in job interviews had excluded them as they were not up to the standard required: 'But these are usually junior artworker/designer jobs where they're quite often just glorified Mac monkeys.' In an analysis of job advertisements (Marshall 2002), a third of the examples seem to be aimed at these Mac monkeys/artworkers, requiring no qualification other than the software skills.

When discussing the demand for the most current version of a software package, Kevin posited that students who are very specific about the version of a particular piece of software are invariably at the more skill, job-based end of the design market. In the print industry these people would be employed as paste-up artists rather than designers. Typesetters and people who are involved in processing video or multimedia from a production side, would be more interested in training in specific software than people who are for example in design consultancy work because there is a difference between having the production skills and an ability to produce something that is meaningful. He makes the point that design education gives people different outcomes; not everyone can or will become a designer. Traditionally, artworkers were trained in the skills of paste up and other aspects of production, most of which are now done using a computer and, in small firms, the designer will often take the production role as well.

All three respondents had similar views regarding an ability to use industry standard software enabling people to consider themselves qualified as designers even though they would have no understanding of the design process. They all considered the discipline of visual communication design to be an essential background to learning the software.

4 Embedding Software Skills in Studio Practice

Developing individual creativity within the context of design is complicated by the necessity to acquire knowledge of the interface, namely design software.

Often, when software training is prioritised above generic and specific design skills and knowledge, the tendency is for students to confuse the built-in capabilities of computer software with genuine design decisions and problem solving (Marshall & Meachem 2004). This may be compounded by visual communications courses, in many cases, duplicating the science and engineering model, based around the teaching lab (rows of machines), an example of which can be seen at www.computerlabs.ucla.edu/list.asp. This model has proved to be inappropriate for visual communications, based on the researchers' experience at their home institution as well as other institutions nationally and internationally. This method of teaching encourages software to be viewed as a separate activity, divorced from the practice of design.

Students who prioritise software expertise over design thinking and conceptualisation will limit their potential within the design industry to entry-level production work. This point is illustrated by John Ross, head of Graphic Arts and Design at Leeds in 1996, reported as saying: "It's important the traditional methods are in kilter with the hi-tech stuff otherwise you're producing Mac monkeys – very good at using the Mac (Apple Macintosh computer), but letting the tail wag the dog because they don't have that proper understanding of how to organise text nor have a clear understanding of what the text means and they are letting the computer do it for them (Stout 1996 p. 77)."

Taking into account industry's requirements for graduates to have a good working knowledge of key software applications such as: Quark Xpress, Adobe Photoshop, Adobe Illustrator, Macromedia Flash, there is a need to ensure this is acquired alongside subject knowledge, understanding and skills. Therefore, rather than learning software skills via training sessions or similar, which are not sufficient by themselves (Orr 1990), students need to learn them in relation to projects. As Wenger (1998) says, people learn from each other and in relation to the job in hand.

An in depth knowledge of the capabilities inherent within and between software packages is an essential aspect of creative design practice. As Marilyn said: "The use of software is part of the modern design process in the same way as knowledge of modern fabric technology is essential to the fashion designer or construction technology to an architect."

The need for software skills to be acquired in the context of the complete design process was described by John: "…Compare the magnifying glass metaphor, which is obvious to everyone, to the text linking tool which, as a metaphor, is meaningless unless you have designed editorial matter and know its use. Level One training would not be long enough for a detailed analysis and description of each tool and, in my experience, students would only remember what they actually used. How can a student learn how to add or subtract space between characters if they don't know that this process is called kerning in graphic design language and in the software programme?"

All the respondents considered that the teaching of software needed to be in the context of other aspects of visual communications design. However, they all stated that there were companies that did provide software training out of context, but, without the background knowledge, they thought it would be far more difficult to learn and, as Marilyn put it: "It would largely be a pointless exercise. It would be like learning to drive a car with no intention of ever going anywhere." Although this metaphor does not seem entirely appropriate, it fits the concept of learning to use a piece of software without the context of its background or use.

Kevin described his experience as a freelance software trainer prior to taking up his current post, saying that quite often people on training courses would be learning Quark Xpress in order to design company literature, without any background in graphic design. He found teaching such people difficult, because they didn't understand the terminology, which resulted in him having to explain, as simply as possible, essential graphic design knowledge. Related to this, he complained that one of the most frustrating experiences with such training was when they got excited over some trick like blends, 'which no self respecting graphic designer would use – obviously there are times it's useful – but rare.'

Analysis of staff interviews suggests an underlying theme of embedding software skill currency within the creative curricula. This needs to be addressed in the opportunity provided with the revalidation of visual communication courses.

5 Curriculum Development Model

Three main issues complicate the development of an appropriate curriculum model for visual communications. Firstly the model needs to be robust enough to deliver across a broad range of students with varied levels of software skills. On the one hand, mature, often under skilled (in computer software) part-time students, and at the other extreme, highly computer literate — often younger — students who just need to be trained in appropriate software. This problem was raised in

the discussions with the interviewees, all of whom found younger students, often direct from study at school, more likely to have prior understanding of technology and to take it for granted whereas more mature students, from a variety of backgrounds, may not have such an affinity with technology.

Secondly most visual communications courses encompass a range of specialist practices, from graphic design to multimedia and animation. Therefore a flexible approach to software training would be needed in order to embed the technology and make the learning of software relevant to the student. As Marilyn observed: "They'll only pick it up if they need to use it now or yesterday."

Thirdly, although the study indicated that a successful curriculum would rely on the way in which the resources are modelled within the teaching spaces, inevitably financial constraints would not allow the duplication of resources, i.e. if the computers are configured within studio environments then they are unlikely to be available to place within more generic computer labs as well.

Staff interviewed recognised the need for the retention of separate training sessions for some students mainly in basic computer hardware and software as 'primers' for the more advanced software skill acquisition embedded in the subject practice.

All staff interviewed stated that they found it difficult to incorporate the software into the programme. This was related to the lack of time for staff development, which in turn was related to the speed of change in software, where a programme would be updated frequently and have major changes, in some cases, on a six-month cycle. Both Kevin and John thought that these frequent changes were largely dictated by the software industry. Marilyn and John gave instances where they considered that the software tuition had been integrated well with other aspects, both in print- and screen-based design, for example (John):

> An example of successful integration would be in the Level Two module, Editorial Design, where students are using/learning Quark to set up magazine double page spreads including baseline grids, and they are also learning manual methods of designing baseline grids so they're integrating their prior experiences from Level One in terms of typography and page layout with the software and that module is very successful on the whole and very popular. This works very well as do other modules and projects but it is becoming increasingly difficult to cover all the essentials such as all the typographic information needed, just the terminology without even touching on use, and cover the software that will be used to produce the finished work.

The speed of software development was the reason cited for many of the problems found in integrating the software into the programme. Kevin expressed concern that staff had no time to learn the new software and John explained that as well as there not being enough time to include all the necessary knowledge and skills, he and colleagues could not find time to update themselves on the software and keep current with developments in industry. He expressed concern that he had only touched the surface of Flash, even though it is widely considered an essential tool for the realization of ideas.

Kevin, Marilyn and John all expressed concern that there was no room in the curriculum for the increasing amount of software skills required by the industry. Visual communication design now includes time-based design for multimedia and web-design; Kevin explained that the expansion of areas covered by the discipline results in students having to specialize within the discipline.

The respondents all demonstrated an awareness of the necessity for vocational courses to be responsive to industry but were concerned that this led to a broadening of the curriculum on what seemed to be an almost continuous cycle of integrating new software. Kevin described this as happening first with photo retouching for designers, which then moved on to film techniques, sound and time-based issues. He explains that these are all requirements of the industry, but again each new thing is very time consuming and may affect the curriculum in that it can result in a fragmented experience for students.

Alternatively, as mentioned before, students run the risk of becoming over specialized. Such specialization closes down options for students resulting in them ending up being narrow specialists fit for one particular career rather than creative thinkers who can develop in different areas.

The speed of development of new software was seen as contributing to this narrow specialization. For example, Marilyn expressed concern that a piece of software had changed significantly three times in the past three years which entailed users having to relearn the software each time as the interface and actions had altered.

One of the points raised by Marilyn, in relation to integrating software skills into the curriculum, was that the quality of work could suffer because many students prefer to work directly on screen rather than generating concepts on paper and then moving on to the screen to implement the chosen idea. If students concentrate on acquiring a software skill set in order to get employment in the industry, they will not be prepared for the higher level posts in terms of ideas generation and development as they will have spent the majority of their time learning software. As John states: "We have students that come back after placements (work experience) saying they don't do anything like we do – no research and analysis, not many thumbnails or roughs on paper, but straight onto the Macs."

Both Kevin and John felt that the physical location of the computer resource was as important as the computer itself. Kevin says, "If I take my students from the computer lab on the second floor to the studio on the third, then back to the lab I would lose half of them on the way." Although this is an extreme example, it illustrates the importance of the resource being appropriate to deliver the curriculum outcomes.

Another important physical factor highlighted by interviewees is the amount of space given to the computer. Generic computer labs within the researchers institution tend to allocate very little desktop space to the computer and the number of peripherals required by design specialist computers such as large format scanners, drawing tablets etc, often aggravates this situation. The need for desk space adjacent to the computer for drawing and other activities as well as cutting mats and spray booths for model making was seen as essential to the design process.

Taking the above factors into account, any curriculum development will need to match the learning and teaching of subject specific knowledge and understanding, software skills and physical resources.

6 Conclusion

Although knowledge of software is important in design education, evidence from literature and staff interviews supports the view that developing a student's individual creativity alongside subject specific knowledge and skills, such as typography and semiotics, is the primary focus of a visual communication design education.

Visual communications courses are vocational in nature (Yeomans 1996) preparing students for the needs of industry and therefore need to include the teaching of software applications used in this field. Based on the message from industry, many students regard software skill acquisition as the most important aspect of such courses. However in the rapidly changing environment of this industry students need to be prepared for a wide range of career possibilities.

The adoption of technology into visual communications courses has been historically reactive due to the speed in which the industry was re-structured. Consequently the way in which this all-pervasive technology was integrated was often ill considered. The opportunity now arises for a more integrated and structured approach where software skills are situated within the curriculum i.e. the practice of designing.

In the curriculum model proposed, students will acquire software skills in the process of responding to design briefs whether set as tasks to enable students to achieve module outcomes or as live projects and placements to provide students with an understanding of life after university.

Software will be available on computers located in studio settings, based on the model used in industry, to enable students to learn by moving seamlessly between design and production. A small computer lab will be made available for software 'primer' workshops, when new software for different stages of the three-year curriculum could be introduced.

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Pushing Against an Open Door

Ambient technology and the learning experience

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This paper describes an experiment in course delivery that, through careful management of the physical, pedagogic and social environment, has facilitated the creative exploitation by students of the ambient technology and ambient knowledge. The transfer from staff to students of the responsibility for teaching digital media topics has allowed the re-discovery of aspects of a central design curriculum that have been demoted in recent years. The paper makes the case for a 21st century design curriculum that acknowledges the benefits of a learning rather than learner-centred approach in which "both the learner and teacher are part of the larger process of learning."

The paper describes the evolution of a Product Design MA in which the enthusiasms, knowledge and skills that students bring with them are encouraged through the availability of carefully specified educational technology. Course design has been based on the assumption that, at this postgraduate level, every student owns a computer of some sort, and that the associated variety of specification, configuration, operating system and software, together with widely varying skill levels, rather than being a problem, are a rich learning resource. The course requires the use of digital media in presenting design concepts, the results of product analysis and research, and the detailed conclusions of personal projects. The development of ICT experience is fostered by matching skilled and less-skilled students in teams, allowing informal learning through 'buddying'. The adoption of ICT in group work is encouraging students to attend university rather than work at home, which runs contrary to one of the basic assumptions that drives the institutional policy for ICT development, that students increasingly will work independently in isolation and at a distance. Instead, the course gains from student experience, recognises the role of the designer as a team member and encourages accidental learning.

Keywords: *creative exploitation, specified industrial technology, student experience*

Biographies?

Keywords?

Pushing Against an Open Door - Ambient Technology and the Learning Experience

'There was a regular education to be had from eavesdropping. So much of what was learned was accidentally overheard, just half a sentence when walking through the door.' – Ann Patchatt, Bel Canto 2001, Fourth Estate (Harper Collins), London.

Introduction

This paper addresses the theme of the changing nature of ambient technology, and the lessons for course design. In doing so, it attempts to unpick several intertwined narratives that are based in the contrast between alternative approaches (proactive/reactive teaching presence, formal instruction/ informal peer learning), emphases (delivery/content, analysis/synthesis) and context (undergraduate/ postgraduate, multi-cultural/national issues). The principal components of these narratives are introduced as essential context for the specific case that is presented: a central argument is that technology issues (in this case communication technologies for teaching and learning) are inextricably linked in a symbiotic relationship with both learning and teaching styles, and product design course content.

Tradition and Modernity in Product Design Education.

In the UK, the subject of product design is well established, and to some extent, standardised. Some of the standard features are a result of its location normally being in faculties of art and design (philosophical stances, tacit assumptions about the role of the artist/designer, learning and teaching styles). Others stem from the demands of professional design practice (syllabus topics such as drawing and modelling, materials and manufacturing processes).

Against this background of stability and standardisation, there have been developments over the past 10-15 years that have great significance for the future of the subject, although they have yet to be fully reflected in course development.

First there is the expansion of academic research in the design sector. In the UK this was accelerated by the inclusion, in 1992, of Art and Design in the periodic Research Assessment Exercise that for the first time made available substantial public funding for research. The Taught Masters programme is on the boundary between the practice driven undergraduate experience and doctoral research. Increasingly, successful completion of a Taught Masters programme is becoming a requirement for entry into a doctoral programme, with the effect that topics developed at Masters level are influencing the choice of doctoral research topics.

Secondly, there is the changing relationship between universities and manufacturing industries. Traditionally, the relationship has been mediated by professional practice: practitioners working within industry became visiting tutors to design courses, providing a bridge between academic and commercial worlds. More recently, the development of practice-based academic research and the associated notion of design knowledge in a form that is both explicit (challenging the former reliance on tacit knowledge) and in a form that is useful to an industry keen to learn (cf Burns et al, 2001, 2003, 2004), challenges the traditional hierarchical relationship between education and professional practice. Increasingly, the first port of call of a manufacturer seeking advice on design is one of the many advisory services in universities across the UK. These advances in research and aspects of practice – the involvement of academics as 'knowledge partners' in collaborations with industry – have outpaced changes in the design curriculum. We have the situation where the best of design education has a healthy linkage to design theory (through research activities) and design practice (through linkage to industry). There is now an opportunity to reflect these positive attributes in course structures by undertaking a critical review of course content and delivery.

Critical Reflection

In his keynote speech at the Design Research Society's 'Quantum Leap' conference in 1998, its then president, Bruce Archer, reflected on the early development of the society, and its origins in the design methods movement. He recalled how Karl Popper's 'conjectures and refutations' (Popper, 1963) had provided a useful academic respectability for a design process that rarely was based on formal theory, or that tested formal hypotheses by experimentation. Popper's arguments could be seen to support design process that generates concepts through a variety of methods (including the mysterious 'flash of inspiration') and then evaluates them against criteria that are appropriate to the context of the project. Traditionally, Popper's case for challenging traditional scientific method has been adopted by design academics principally to justify the mysterious apparition of 'conjectures' that are subject to critical evaluation. However, for product design there is a case for developing an emphasis on the 'refutation' in Popper's proposal.

The Specificity Of Product Design

In the particular case of product design in a commercial context, the design process is continuous, in that the evolution of products through competition in the marketplace is continuous. The nature of competition in the marketplace ensures that successive new products are almost always heavily influenced by those they replace. The dynamics of the marketplace combine with new technological possibilities through the mediation of design to create a constantly evolving stream of products. This phenomenon is well recognised in commercial design practice, where in-house practitioners continuously move from the design of one product model to its successor, and even work on successive generations of a product simultaneously. Students design things once, then move on to a different product: there are advantages in this educational model (offering the possibility of structured experience of different design issues), but it denies the importance of product evolution. Competitor analysis is sometimes taught, but rarely given the importance it enjoys in the commercial world. Modifying Popper's model for the product design case of continuous iteration of a product theme, it can be seen that the starting point of any product design process is the finishing point of some previous process – an existing product. In starting with a critical analysis of existing products, seeing in which ways they fail to meet our newly stated criteria, we are starting with refutations. The post-Popperian concept of 'refutation and conjecture' has become a central theme within the course described here.

The Medium / Message Relationship

The theme of 'refutation and conjecture' has led to a reappraisal of the conventional wisdom that determines the 'what' of course design. The delivery methods described here are the natural outcomes of changes in content, in turn prompted by re-evaluation of the conventional syllabus. Re-evaluation was triggered by the adoption of an explicit philosophical stance.

Here is a summary of the reasoning, and the resulting topics that might be considered dominant in the postgraduate product design syllabus:

- Models of design process were originally formulated to describe projects in architecture and engineering that lack the essential product design feature of competition in a marketplace, with the attendant need to create differentiating features within conservative parameters. [Iterative models of design process.]
- In the commercial world of product design, products evolve through frequent incremental changes, rather than through designers' creativity acting upon a blank sheet of paper. There may be patterns to this evolution. [Predictive models of product evolution.]
- The most powerful justification of design process is the philosophy of Popper, summarised as, 'it is acceptable for conjectures to come from anywhere, as long as they are subjected to genuine attempts to refute them.' In other words, the critical analysis of design proposals is central to good design practice. For product design, design process starts with refutation – challenging the assumption of existing products. [Methods for critical analysis.]

(Almost) New Technology

The adoption of new technologies by design courses has been part of the debate about the future of design education for many years. The steady adoption of computer-based activities by the design professions has been the stimulus for (in some design areas a sometimes hesitant) inclusion of digital technologies into the curriculum. However, the debate has tended to centralise around the detail of tuition, rather than the general principle of adoption (or not) of new technologies. Undergraduate courses in product design have been faced with a difficult set of choices, as competing software options have fought for dominance in professional practice, and student demand for CAD tuition has taken up increasing curriculum time. The rapid pace of software development and the corresponding demands on platforms has made it difficult for courses to produce graduates with the skills and experience that match the range of expectations of potential employers.

For postgraduate courses the issues are different, and the graduating cohort of the Master of Arts in Product Design at Birmingham Institute of Art and Design in 2004 provides an example. Twenty six students, from nine countries (representing seven native languages) were drawn from undergraduate courses that include industrial design, engineering, interior design, photography, packaging design, applied arts and design management. The range of knowledge and skills was varied: some students were experts in the application of new technologies (web authoring, image manipulation, CAD, animation, etc.), others were familiar only with the rudiments of word processing and email). The course has the common UK structure of one academic year of twelve months, split into three trimesters of 15 weeks, with short vacations between. Within this structure, and given the diversity of skills and experience that students bring to the course, attempting to bring students to a common level of competence is unrealistic, but there is the opportunity for building on this wide skill base by setting educational objectives that avoid duplication of those at undergraduate level, and that spread among their peers the knowledge students bring to the course.

In this paradigm, the approach to new technology differs markedly from that at undergraduate level. For example, in product design, students often engage with new technology as a component of new product opportunities. The acquisition of skills in the application of existing technologies (by definition, representing the technological possibilities of the recent past) can inhibit an understanding of future possibilities based on yet-to-be-proved technology developments.

Dunne (1999) has suggested that when we use electronic products, we often do so by exploring (and mapping out the extreme limits of) the functions of which they are capable, rather than using them to achieve some preconceived aim. Product design students typify users who 'play' with technological possibilities. It seems strange, therefore, to instruct students in 'correct' procedures for the use of prescribed software installed on a particular hardware platform. Instead, if it is assumed that the use of information technology in design is normal, unremarkable and ubiquitous, and that students are skilful owners of digital technology products, design debate is left free to focus on issues that are at the centre of the subject, rather than being diverted into the peripheral and passing concerns of utilising whatever happen to be the current technologies that are available.

Learn*ing* And The Lear*ner*

Anderson and Garrison (2003) argue for a learn*ing* centred rather than a lear*ner* centred approach to education. "The focus is on learning, but not just whatever the learner capriciously decides. An educational experience is intended to focus on learning outcomes that have value for society as well as the learner" (p64). In the particular case of design education, this principle is generally accepted and reflected in the common practice of requiring students to justify their projects in the wider moral, ethical and cultural context.

However, they further say "A learner-centred approach risks marginalizing the teacher and the essential value of the transaction in creating a critical community of inquiry. In an educational experience, both the learner and teacher are part of the larger process of learning" (p64). "Teaching presence is

charged with shaping the right transactional balance and, along with the learners, managing and monitoring the achievement of worthwhile learning outcomes in a timely manner" (p65). This development of their theme challenges some of the orthodoxies of design education. We are used to the opposite case: that the individual student should pursue a personally chosen project, and students operating independently. Students interfacing with teachers in one-to-one tutorials do not make for 'a critical community of inquiry,' and one of the primary aims of postgraduate education should be to create such a community. We are used to teachers 'shaping the right transactional balance' and 'monitoring the achievement of worthwhile learning outcomes in a timely manner' – the challenge is to transfer the good practice that occurs with individuals to whole groups of learners, and to engender a communal sense of being 'part of the larger process of learning.'

The notion of 'teaching presence' needs to be put into context. Garrison et al (2000), in addressing the needs of an online education community, identify three components: cognitive presence, social presence and teaching presence. These components can be seen to be essential for any education community. In the example that follows, the identification (by Garrison et al) of these three requirements for an online community (and tacitly present in the best examples of studio culture) is useful in the conscious development of an institutionally based critical community of inquiry.

Postgraduate Learning

In the space between an undergraduate experience characterised by practical skills acquisition and doctoral research characterised either by the pursuit of new knowledge or, increasingly, reflective practice, there is an educational gulf. The skills gap is in the areas of research methodologies and critical analysis: few undergraduate experiences prepare students for doctoral research, as evidenced by the explosion of postgraduate course components in research methodologies. The knowledge gap can be seen as due to the need for a shift in emphasis from addressing one kind of knowledge to another.

Cross (2000) identifies three forms in which design knowledge exists. Design epistemology encompasses formal systems of knowledge (although design 'epistemics', 'the construction of formal models of the processes – perceptual, intellectual and linguistic – by which knowledge and understanding are achieved and communicated' (Bullock and Trombley, 1999), might be more appropriate to design than a formal philosophical theory). Design research can be seen as the activity that concerns itself principally with this form of knowledge.

In contrast, *design praxiology* is the knowledge (often tacit) embedded in practice: developed by practitioners, this is commonly the emphasis in undergraduate experience.

Cross suggests a third form, *design phenomenology*, the knowledge embedded in designed artefacts. In the following example of postgraduate course content, the critical analysis of designed artefacts is used to develop the 'critical community of inquiry' described by Anderson and Garrison, as part of the transition from an undergraduate culture into one in which teachers and learners join in the learning process as an explicit endeavour to develop subject knowledge.

The Example of Product Analysis

The 'design phenomenology' of Cross (ibid) is more than what is sometimes called 'reverse engineering': there are elements of precedent analysis, drawing on historical perspectives, product semantics, history of technology, commercial and cultural contexts, theories of consumption. Each detail, each design decision, in a product can be seen as an embodiment of a balance between aesthetic, technical and interaction factors, the balance influenced by commercial and cultural contexts at the time of the decision. This complex 'lash up' of diverse factors is well articulated by Molotch (2002), a sociologist whose perspectives on contemporary society complement the more traditional perspectives of design historians.

Central to a course philosophy that sets out to challenge conventional wisdom by championing the concept of product evolution facilitated by teams of collaborators over product creation by individuals,

is the notion that much can be learned from the study of existing products. Product Analysis is taught formally in two modules (30 out of a total of 180 course credits). Lectures introduce central concepts (models of product evolution drawing on engineering, anthropology, biology; product semantics; design knowledge; critical analysis), case studies (examples that in turn emphasise technology, interaction, aesthetic and commercial decisions). Group exercises require students to bring together competing examples of a particular product: the gathered examples are then compared using a structured 'game' which involves all members of the group.

Additionally, there are assignments: working in small groups, students compare similar details across competing products, speculating about the relative influences of the major sets of contributory factors that may have influenced detail design decisions. It matters not that in many cases it will not be possible to confirm the speculation. The importance of the exercise is to make explicit the issues that would have been debated when the design decisions were made, and by so doing generate a culture of critical inquiry. The inquiry is informed by a parallel series of case studies presented by teachers who have detailed personal knowledge of the design decisions for the products studied.

The mechanics of a typical product analysis assignment are as follows:

1 Teams are selected by the teacher to create a mixture of previous educational experiences, skills and knowledge.
2 Product details for investigation are assigned to team randomly from a list that has been generated through staff/student seminar discussion (typically details of products that are readily available to be photographed – street furniture, automobiles, bicycles, luggage).
3 Photographs of details to be compared are taken by members of a small team, working either singly or as a group, at the discretion of the team members.
4 Members of the team compare the photographic record to select images of exemplar products that illustrate design issues within the assigned details.
5 Each team constructs a presentation of the chosen images, with a commentary that shows students' understanding of the concepts introduced in the lecture series.
6 Each team presentation is in the form of a seminar to the whole course.

There is an additional requirement for individual students to undertake a detailed analysis of one particular example from the team presentation, but the team tasks described above have seen the greatest effects of changes in digital imaging technologies. The effects of these changes have been tracked in a project within the University of Central England's Learning and Teaching Strategy Programme supported by the Higher Education Funding Council (England).

Educational Aims

The first formal stage of the Digital Imaging and Learning Styles project (DIALS I) was launched in 1998, building on an informal pilot study that commenced in 1996. Its aim was to encourage students to make more effective use of the technologies that were becoming available, in order to develop their ability to learn from existing products.

The academic rationale for developing the role of formal Product Analysis within the design curriculum has been summarised above. For a subject in which praxiology normally dominates, and formal staff teaching is subservient to student creativity, phenomenology, as formal analysis of existing products, offers a route to product design knowledge that is compatible with the atelier ethos.

In the same way that a teacher typically works with a student to develop the details of a product proposal, product analysis encourages close examination and discussion of details of existing products. Speculation about the factors that influenced design decisions evident in the product introduces and contextualises both the importance of those factors and the ways in which conflicting requirements are accommodated.

Digital imaging offers facilities that facilitate the product analysis process:

i Close up detail is more easily captured, as digital cameras have good macro capability, compared with conventional film cameras (fig 1).

ii Digital image manipulation, annotation and animation allows students with weak verbal skills, yet strong pictorial and spatial reasoning, to show their understanding of underlying principles that have determined detail product decisions (fig 2)

iii Digital projection presents large scale images for class discussion: the facility for large groups simultaneously to view small details of objects that can be captured and displayed in real time enables engagement with issues as they arise in discussion. Previous technologies required teachers to anticipate issues in advance, preparing imagery that was often dependent on third parties for its processing.

Fig 1: Product detail (including manufacturing faults) using macro facility on inexpensive digital camera

Fig 2: Mechanical detail, bottle cap, showing over-centre principle (one of a sequence)

Technology, Politics and Practicality

A small project funded under the university's Learning and Teaching initiative was successful in encouraging postgraduate design students to utilise 'image capture stations' as additions to their own computing facilities.

When the project was initiated in 1998, most students owned computing facilities of some kind, although some overseas students did not. Surveys showed that specifications varied widely, as did the ownership of peripherals such as scanners and cameras, and software for image manipulation. Computing skills varied from basic word processing to professional standard computer aided design.

This early project aimed to minimise the effects of the inequitable ownership of computing facilities, by providing 'image capture stations' that were specified to be compatible with the variety of technology owned by students. They offered Internet connection, cameras, scanners and a variety of portable storage media, plus basic image manipulation software. Product design students have a natural interest in new products, and particularly those based on new technologies: there is a tendency to allow fascination for the technology override other design issues. In order to avoid an undue emphasis on the technology, and instead to concentrate on what it was to be used for, the decision was made to specify what was characterised as 'two year old technology' – technology that had become established and ubiquitous and was therefore lacking in gratuitous novelty.

The intention was that students would continue to work at home as much as they wished, using the shared facilities to supplement their own just as much as was needed to provide an equality of opportunity for the presentation of work in a digital form. The emphasis was on a standardisation of the presentation medium rather than of the source material: original sketches, photographic prints and transparencies and photocopies were equally acceptable, but the default presentation format

required was a Microsoft PowerPoint slide show. The benefits of this format for the presentation and publication of complex issues in product design research have been described by Rust (2001); in particular the benefits for establishing a structure for handling information that is contained as much in images as in text.

From Proactive to Reactive Teaching

The introduction of the analytical approach described above, with its specific requirements generated an enthusiasm for a more general adoption of analysis, team-working and digital presentation in student-led seminars. Teachers found that a 'critical community of inquiry' placed demands on them to modify standard course elements in order to satisfy the demands of students. The pace of change and degree of student enthusiasm created a momentum that required teachers to react quickly in order not to lose the potential of the situation.

The combined effects of providing shared facilities that minimise the differences of students' personal ownership of digital image technology, tasks of analysis that illuminate models of product evolution, team-working and group seminar presentations can be summarised in several ways:

Subject Development

The academic rationale that initiated the work was based in the belief that some of the assumptions that underpinned the learning and teaching methods for the subject had been limiting its ability to keep up with commercial design practice. In the case of Product Design, an emphasis on individual student effort and an approach to creativity that requires every project to start with a 'blank sheet of paper' fails to gain the full value of learning from existing products, and the role of the designer as a team member. Digital imaging facilitates the development of formal procedures for product analysis (Ingram, 1997; Ingram & Jefsioutine, 1999), but the spillage into other areas through student initiative has shown that changes in learning styles and students' work patterns are equally significant.

Learning Styles and Work Patterns

The intended shift of emphasis from a simplistic view of creativity to an appreciation of the value of product analysis was achieved. This required a close scrutiny of product details that might otherwise be overlooked. The choice of everyday products as the object of students' attention led to a realisation in design students that they can learn from everyday experience. The adoption of a formal analytical model helped students structure their thoughts. The use of digital presentations through packages such as PowerPoint facilitated group working by providing a common template that accepted content from a variety of original media (and encouraged the adoption of bullet points + images - a great advantage for students whose first language is not English). Careful choice of team membership mixed students of varying skills, allowing informal learning through 'buddying'. When team-working, students met up to share contributions to the team effort. In this latter respect, the adoption of ICT is encouraging students to attend university rather than work at home, which runs contrary to one of the basic assumptions that drives much institutional policy for ICT development.

Top-down and Bottom-up Conflicts

A major benefit of the project described, as perceived by the students and staff involved, is learning to work as part of a team. An extension of the team dynamic has been a positive effect on student social lives (the students on this international course currently are drawn from 10 countries around the world). Ironically, many educators assume that students increasingly will work in isolation and at a distance.

Conclusions

Experience of the developments described here suggest that the eager adoption by students of readily available ambient technology largely has been due to what Anderson et al have identified as

the 'social presence' component of an educational community. A key mechanism for the speedy development of skills and knowledge has been the 'buddying' that results from teamwork that is structured with some of the ethos of 'play'. Frequent changes in team membership, and the use of chance (in determining membership, order of presentations and leaders of discussions) helps establish a creatively playful ethos. Digital presentations that fit a standard template (eg Microsoft PowerPoint slide shows) are readily edited and re-formed to make teaching material for successive cohorts of students. Presentation of previous cohorts' outcomes, as part of project briefing, establishes benchmarks in a graphic form. Language differences, skill and knowledge levels are minimised by the characteristics of the chosen template, giving encouragement to weaker students.

The development of the social presence has led to wide-ranging educational benefits, and in the specific case of the uptake of digital technologies, it has all but eliminated the need for formal instruction. The frequent student-led seminars that follow from the habits instilled at the beginning of the course provide the vehicle for feedback and exemplars of good practice that rarely needs additional staff inputs. Typically, whole day programmes of seminars occur on a weekly basis for 20 weeks of the year, and the combination of both team and individual presentations total more than 200 shared experiences in a normal year. This combined programme represents a powerful teaching tool that has far outstripped its modest original objectives.

The challenge now is to spread aspects of this experience into undergraduate programmes, and to raise the expectations of teaching staff who increasing will find themselves trailing their students in the use of ambient technology. By focussing on the development of the social presence, there is a natural shift from learner centred education to learning centred education, and the resulting shared contribution to the larger process of learning will lead to changes in teacher roles that challenge some of the tacit assumptions of design education. For the subject of product design, where challenging (refuting) the status quo at the outset is argued to be good practice, these changes are to be welcomed.

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A Design Development Process of A Web-based Online Course: An Art Education Course Case Study

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This paper is a descriptive, qualitative case study of the design development process of a web-based online course for teaching art criticism at a major university in the United States. This study formulates a web-based online course design development process framework based on the findings from: the case study of the development of the art criticism course; development of other online courses in the department; interviews of developers from other colleges in the university; and adaptations of design processes from the author's review of pertinent literature. The overall process includes five key phases: DISCOVER, DEFINE, DESIGN, DEVELOP, and DELIVER. Each phase contains a range of core process steps that collectively encompass the essential qualities and structures representing different versions of design development processes in the disciplines of web design, multimedia-based instructional design, and visual communication design.

The discussions focus on the design problems and solutions occurring throughout this course development process, one of the first courses developed in an art education department. The author identifies key design development issues of concern to the instructors and course developers in the case development: online course design development approaches, visual design, team collaborations, and online course interactions. The faculty member who participated in this study chose "Instructor with design and technical assistance" when asked her or his preferred online courses design development approach. Team collaborations and online interactivities required faculty to rethink notions of communication, management, and shared responsibilities. Data collected from the case interviews illustrate that most participants were not fully aware of the value and approach of integrating visual design into the online course design development process. The author observes that it is a challenge for visual design as a discipline to be more fully integrated and appreciated by most online course developers in non-design departments at the university.

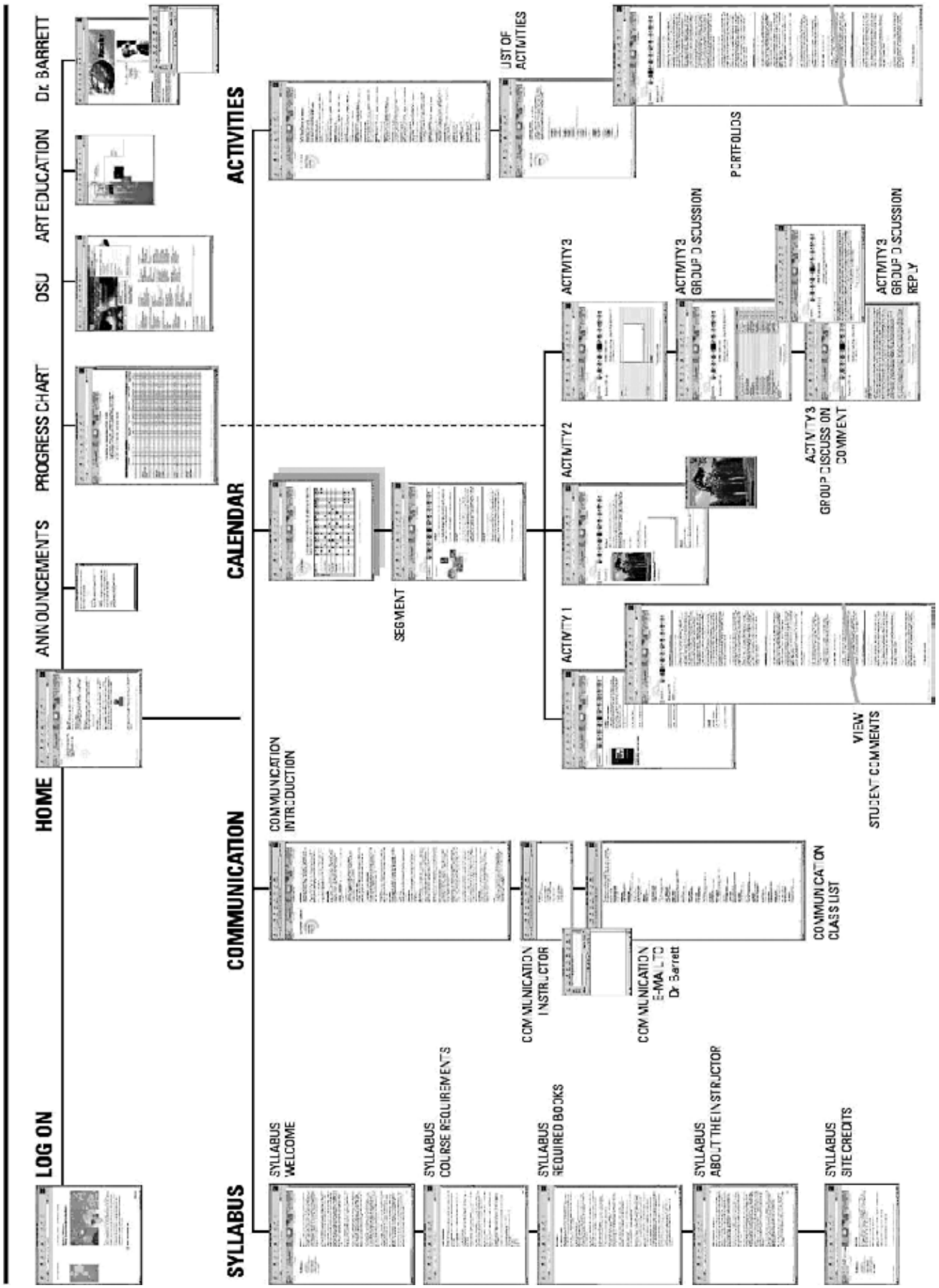
Keywords: *design process, web-based online course, visual design, art education*

1 Introduction

Looking to meet the educational needs of the twenty first century, a department of art education at a major university in the United States set the mission of becoming a centre for technology in art education. The faculty identified the need to infuse technology in their coursework for graduate and undergraduate students, as well as require art education students to develop proficiency with the use of technology in teaching. Another goal for the department was to increase their audience. For the administrators and faculty, offering course online was seen as one way for the university to address enrolment demands and at the same time extend access to premier courses for broader audiences. The faculty looked at taking the courses for which the department was known and offering them in a new way to students lacking traditional access, for example in-service teachers needing professional development credits in art education, and audiences geographically distant from the university. Therefore, the agreed upon goal of infusing technology in coursework evolved into the idea of developing Web-based online courses in the department.

In this study the author was intensively involved with a Web-based online course design, AE 640D (Figure 1), development project within the department. The course was one of the first three online

Figure 1: AE 640D site map



courses developed by the department. The design team included a course professor as the content developer and project manager, a Web designer/programmer, a graphic designer, and an educator who represented a potential user. The author served as a graduate research associate and graphic designer to create the visual design of the online course Web pages and the site structure. The author spent a considerable amount of time researching, interacting, and designing during the year-long development process of this online course. This situation presented opportunities for the author to examine the design development effort and formalize a design process framework.

2 Research Method

In this study data were collected through observations, interviews, and written and visual documents. The author conducted observations from five courses that were in the process of development or implementation. The author reviewed printed and electronic documents including Web pages from course sites, course assignments, and course evaluations that were available. A literature review of distance education, Web-design, instructional design, information design, and visual design provided information for consideration of the topic. The interviewing process provided the majority of the data. The author conducted three sets of interviews with different groups of participants: 1) the department chairperson and two instructional development specialists, 2) ten online course developers (faculty and graduate research assistances) in the department, 3) thirteen online course developers from other departments and colleges at university.

3 Result: A Web-based Online Course Design Development Process

This study formulates a Web-based online course design development process based on findings and knowledge gained from: 1) a case study of an online course design development; 2) studies of other cases developed in the department of art education; 3) studies of the online course development process and approach of six different colleges/departments; 4) adaptations of previously published design process overviews from literature review.

This process framework exemplifies the shared design experiences of these four perspectives about online course design development. Five key phases represent the overall process: DISCOVER, DEFINE, DESIGN, DEVELOP and DELIVER. Each phase contains a range of core process steps that collectively encompass the essential qualities and structures representing different versions of design development processes in the disciplines of Web design (Van Duyne, Landay, & Hong, 2003; Kahn & Lenk, 2001; Badre, 2002), multimedia-based instructional design (Lee & Owens, 2000; Dick, Carey & Carey, 2001), and visual communication design (Bowers, 1999; Wallschlaeger & Busic-Snyder, 1992):

- DISCOVER—Gathering Information, Reviewing Existing Materials, Reviewing Similar Projects, Understanding the Web/Online Environment, Understanding the Development Process, Identifying Potential Resources, Understanding the Audience
- DEFINE—Determining Overall Goals, Assessing Needs, Defining Instructional Strategy, Outlining Content, Defining Interactivities, Defining the Structure, Determining the Look and Feel, Preparing a Brief Work-plan
- DESIGN— Organizing Content, Designing Page Layouts, Designing the Site Structure & Navigation, Evaluating the Design, Refining the Site Design, Creating a Design/Content Style Guide
- DEVELOP—Developing Work-plan & Formalizing the Final Team, Creating Content and Instructions for Use, Creating Content—Visual, Creating Content—Multi-Media, Building and Programming the Site, Testing Functionality & Usability, Refining the Site Production, Establishing Implementation/Production Guidelines
- DELIVER—Pilot Test, Training (Instructor/Student/Staff), Other Support Materials (CD, Booklet), Launching the Course, Maintaining the Course and Site, Conducting On-going Evaluations, Documentation

In this paper each of these core process steps cannot be fully described. The author learned that each phase of the design development process is not always a clearly confined stage. Most developers and designers acknowledge that the boundaries of phases are blurred and core process steps often overlap. They move back and forth between steps or stages when necessary. These processes are often applied in iterative approaches where developers combine certain steps, and rework early steps in order to have better outcomes for following steps. The number of phases defined by the designers and developers could vary. It could be as concise as a four-phase approach or as broad as nine-phases of iterative steps.

4 Discussion: Key Design Issues

The process of developing online courses undoubtedly will vary from one department or institution to the next due to differences in strategies, resources, and design approaches. A design development process is only one aspect of the complex process of creating an online course. Other aspects of online course development could include issues of distributing, maintaining, marketing, administrating, advising, certifying, and financing. These issues cover areas that are learner-related, instructor-related, and educational institution-related (Bunn, 2001; Fawcett, 2003).

This paper is primarily concerned with the instructor-related issues, particularly from the perspectives of the instructor and design development team. Some of these concerns include the appropriate allocation of development resources, design objectives and priorities established by course developers; customisation versus conformity to a department visual style; comprehension of roles and responsibilities in the various phases of a development process; and the perception of the task and the inter-relationship of the tasks within the process. The nature of a "task" could be visual design related; technology related, as in programming; or it could be content related, such as the writing of instructions for the course site. The author identified four key design issues for further discussion pertinent to the developers' perspective: 1) Design Development Approaches, 2) Visual Design, 3) Team Collaboration, and 4) Online Course Interactivities.

4.1 Design Development Approaches

Developing a college course for online delivery can be a complex task, depending upon the scale of instructional content to be presented, type of Web technology to be applied, level of resources provided by the institution, and the experience of the course developers and end-users. There are four different scenarios for developing online course sites that are common approaches in various case studies (Luck, 2001): 1) instructor as sole developer, 2) instructor with design and technical assistance, 3) university/college-directed, and 4) commercial vendor.

The faculty in the department of art education who participated in this study indicated they did not want to, or did not have time to, learn the technical skills that would enable them to be the "instructor as sole developer" of their online courses, and expressed frustration with the constant change of computer hardware and software technology. Technical complexities overwhelmed those faculty members attending the varied online course development workshops offered in the department and on campus. Other faculty acquired basic technical skills and felt they could develop online courses themselves if the need arose, but questioned whether "instructor as sole developer" was a wise expenditure of faculty time.

The chairperson and faculty in the department explored the "commercial vender" approach, but the high development cost of external agencies proved prohibitive. The unpredictability of the final deliverable product, as well as the inflexibility of an external design production schedule additionally concerned faculty members, because online course development requires the ongoing involvement of both the faculty and the developer. Faculty members said collaboration with a commercial developer might be possible if it was a funded project with a well-defined phase, a technically complex task, and a clearly specified delivery expectation.

Faculty members considered the "college-directed" approach a great support system. They thought if the department could designate a special unit to address their needs of infusing technology in courseware and for online course development, then they would be able to concentrate on course content, design of learning activities and assessment, and rely on other members of the development team for input in those areas that are outside his or her expertise. However, they expressed it would be challenging to implement this approach with the department's limited fiscal resources.

The faculty in the department chose "instructor with design and technical assistance" when asked her or his preferred scenario for developing online courses. In this situation, the instructor received support from his or her department to utilize graduate students or staff to provide technical assistance for the development of the course. The instructor was responsible for the course content and managed the overall progress of the Web-course design development process. They acknowledged the approach's learning curve was more complex than anticipated in the beginning of the development process, but the body of new skills and knowledge would allow them to develop future online courses more effectively and efficiently.

4.2 Visual Design

Michael Moore, editor of *The American Journal of Distance Education*, in his editorial comment on "Is distance teaching more work or less," expressed his surprise about how "little time and effort" are put into the visual design of online courses. He feels there is a "mediocre" expectation by both the institutions that offer the courses, as well as from the new generation of distance learners who lack comparisons. Moore's states that "not nearly as much time is being invested in decisions about layout, graphics, illustrations, etc." than the printed study guides of earlier, pre-Web distance education courses (Moore, 2001, p. 5).

It is a challenge for visual design as a discipline to be more fully integrated and appreciated by most online course developers in non-design departments and colleges at the university. This observation stems from the author's personal experience and practice as a graphic designer in both professional and academic environments, as well as information gathered from participants in the study. The author attributes the attitude of course developers to the: 1) limited resources allocated thus preventing the addition of a visual designer; 2) lack of appreciation for visual design; 3) perception that while visual design is important to the project, the task could be performed by a Web designer or programmer; 4) lack of understanding of the visual design language and process; 5) concern that the inclusion of visual design aspects to the project will increase development time; 6) perception that visual design is a distraction to the instructional content, and deviation from the academic quality and look.

The above discussion is not solely about visual design, but also concerns functional and technological aspects for designing usable Web course sites. The visual designer and the Web designer should believe that "A careful, systematic approach to page design can simplify navigation, reduce user errors, and make it easier for readers to take advantage of the information and features of the site" (Lynch & Horton, 2001, p. 81). Appropriately applied visual design integrates visual structure and content organization. Thus, a visual designer "should always be a full member of a Web development team, not an afterthought" (Barrett, Levinson, & Lisanti, 2001, p. 44).

4.3 Team Collaboration

The rapid progress of computer technology makes it increasingly demanding for a faculty member or developer to possess all the knowledge and skills necessary for developing a quality Web-based online course. The situation lends itself to collaboration with a project team or with different support divisions within an institution.

Collaboration required faculty in the department to rethink notions of communication, management, and shared responsibilities. It was a difficult shift for a faculty member, used to being in sole control of his or her intellectual activities, to work in a team environment. There were team communication problems that occurred due to the inherent challenges of interdisciplinary collaboration.

Collaborative work with graduate research assistants was a critical part of the support system for the faculty in the design development of online courses at the university. The length of time a GA stayed with a project varied from just one quarter or, in some cases, as long as two years. In the beginning of the process, faculty members commonly hired graduate research assistants to develop the online courses before having a clear understanding of the direction or complexity of their projects. It was important for the faculty members to have a clear project scope to provide the necessary criteria to recruit members for their teams. Faculty members lacking a well-defined project plan could have lost control of the process and been led by the graduate research assistants' visions rather than their own.

Team composition varied from course to course, and project phase to phase because each faculty member differently approached the design development process of the Web-based online course. Course development projects utilizing a courseware software system allowed the streamlining of roles within the team. A course created from scratch or a course with custom design structure and functionality demanded a broader skill-based team. One team member could perform various roles and responsibilities in some situations, and in others several members shared a role. A typical Web-based online course design team might include the following responsibilities: Project management, content development, information architecture, instructional design, visual design, multimedia design, production design, programming, usability and quality assurance, networking and system administration, technical support, software and application development, and legal support. Team collaboration may be more costly and complex, but with a good development process, planning, and clear project objectives definitions a well-balanced interdisciplinary team could develop a Web-based online course addressing online course design fundamentals, and enhancing the overall teaching experience.

4.4 Online Course Interactivities

One of the key challenges for the incorporation of Web-based interactivities into online courses was predicting interaction outcomes. The replication of classroom discussions that maintained the value of face-to-face classroom interaction is of great concern to some faculty members. The challenge for them was to foresee the flow of online interactions, anticipate the progression of an online learning community, and motivate students to share experiences and explore ideas. The faculty experienced a paradigm shift when some re-evaluated their authority as instructors and democratised dialogue. The immediate response and delay feedback cycle, and the intuitive flow and planned sequence of activities were also challenges.

Faculty and developers need to clearly define the purpose and intent of each activity by identifying the context within which interaction occurs to ensure a meaningful outcome. The context of interactions in online distance education consists of: "institutional and departmental policies, technologies employed, the teacher, number of students enrolled in a program, and course content, among others" (Glass & Vrasidas, 2002, p. 38). It is important for the faculty to revisit steps within the DISCOVER and DEFINE phases of the online course development process in order to fully comprehend these specific contexts. For example, faculty members need to discover the students' comfort levels in using Web technologies and conduct faculty self-evaluations of their own comfort with and capabilities to engage in technology-mediated interactions effectively. Another critical step in the process for faculty is "Identifying Potential Resources." They need to know the range of activity features the selected-technology applications provide, and the "affordances" of these activities, that is an interaction or a thing refers "to the properties of the thing that allow it to be used in certain ways" (Glass & Vrasidas, p. 37). In addition, other supplemental or support materials for Web-based courses, such as textbooks, printed notes or images, CD Rom or DVD disks, PowerPoint presentations, PDF files, and multimedia modules, are important content components that potentially influence the design of course interactions.

Some of the common forms of Web-based interaction features the art education faculty included in their courses were: syllabus, calendar, assignments, mail, single-topic discussions, threaded discussions, peer reviews, announcements, instructions and help, frequently asked questions, progress reports, and student home pages. Most faculty members considered and tested synchronous chat

during the early development of course design, but perceived it difficult to control the interaction because of learners' scheduling conflicts and the lack of meaningful dialogue. A few faculty members used online quizzes for students' self-assessment and for motivating learners' interaction with course content rather than as a formal student learning evaluation.

5 Conclusion

Faculty members in the department of art education completing the development and teaching of their first online courses gained new insights and experiences. They said they would take full advantage of evolving Web technology when it becomes more accessible, reliable, and user-friendly. They would consider more advanced interactions and multimedia applications as part of ongoing course refinement and future development processes. The faculty experienced a paradigm shift in pedagogical thinking that expanded their perceptions of Web-based courses as a means for distributing content and acknowledged the online teaching environment as a medium of potentially meaningful interactions.

The processes identified in this study provide a general guide or a flexible model tailored by developers and designers to accommodate a variety of development situations. Circumstances could apply to the design of a new online course, or to the improvements made to an existing online course. Developers using different development tools can appropriately assemble the process phases and activities to adapt to either a custom designed Web course site or a course design using courseware applications. Developers and designers could implement the processes in a formal approach for complex and larger team collaborative development, or a flexible arrangement for straightforward and individualized development. They could also streamline or extend the processes to serve different development resource and time constraint situations.

The author hopes these shared practices, insights, and knowledge provide suggestions and alternative approaches for the design development processes of the selected online courses of this study, and for all future online courses within the art education discipline and similar environments.

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Foundation Studies and the Paradigm Shift from Hand to Digital Skills

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Foundation Studies directors everywhere are asking themselves the same set of questions: Of what value is the relationship of touch to seeing in today's educational landscape? And how do both touch and seeing influence problem solving skills? How do we add to the curriculum while maintaining our traditional values? What classes, skills, and subjects do we let go and what do we promote as replacements?

We are currently in a romance period with the computer. And we will probably remain here for some time until the designers who grew up on the computer finally become mature and we discover what the computer can really do. When a material or technology becomes mature it disappears. It becomes transparent and simply serves the concept it is attempting to convey. When something new is first introduced there is a romance with the material that eventually gives way to pragmatism. In the meantime design educators must persevere. We must continue to teach hand skills and selectively introduce the computer as a tool for problem solving. We must not allow teaching software to be mistaken for teaching solid design principles. And because the computer allows for a multi-dimensional layering of images and text, which creates a kind of gazing into time and space we must bolster our Foundation programs with quality Liberal Arts classes investigating history, narrative structure, research and conceptual thinking to support an understanding of context and authenticity or at least an intelligent deconstruction of the two.

Keywords: *traditional values, romance with material, investigating history, intelligent deconstruction*

Just as spoken language defines the philosophy of the speaker, the tools a designer employs also give definition to the design itself. This is an important concept to keep in mind as the field of design moves away from hand skills into the realm of the digital world.

I remember, in my first digital design class the instructor told a charming story about two former students who were trying to design a logo with a brush stroke as a prominent feature. Try as they might there was nothing they could do to replicate a brushstroke on the computer to their satisfaction. Everything looked too digitized. After watching the two frustrate themselves for a good while, the instructor walked over, dipped a brush into India ink, made a gestural stroke on a piece of paper and scanned it in. The two boys looked at each other in amazement breathing a sigh of understanding.

This anecdote was, of course, a way of explaining that the computer was merely one of many tools and the best way to use the computer is to understand what it does well, what it does poorly and what it cannot do at all. I think it also illustrates the fundamental differences between the computer and any other analog hand skill that an artist/designer could master – and that is mediation versus immediacy, representation versus materiality and (computer) logic versus the happy accident.

The computer is unique with regard to Foundation Studies in that it tends to emulate all of the tools that have come before. The computer is not a pencil or a brush but it emulates those tools and others. The result is not a drawing or a painting but a digitized image of a drawing or a painting, with no apologies to Rene Magritte. If the final output is converted to a print there will be no trace of the

artist's hand. The computer is especially good at photographic collage creating a pastiche of images culled from many sources presenting them seamlessly.

The computer is exceptional in that it allows the practitioner to see (and therefore to understand) space and depth with real objects in reflected light. It allows the designer to walk around an object with ease, in one's mind, so-to-speak. And in this sense it also engages time in the design of an object. It is perhaps the only tool that comes the closest to our own imaginations. The computer is a thinking/ visualizing facilitator and it functions best when the artist/designer exploits its problem solving attributes to represent an idea, a thought, or a notion… in space with reflected light. The computer operates most efficiently somewhere between the mind and the eye. The hand has a different function. The hand is for making broad gestures. The hand is for holding something tenderly or for making grand or even small offerings.

The result of this schism between the best of what the computer can do and the best of what the hand can do is an interesting set of problems for the design educator precisely because the computer comes with an a priori set of design decisions, which may or may not be the most appropriate decisions for any given problem (especially with respect to colour selection). Then, of course, there is the issue of "touch."

Prior to computers, a Foundation Studies program had the luxury of requiring several hand/eye development classes while students were slowly introduced to sophisticated visual concepts. But that was when craftsmanship was one of the main gateways entering onto the world of art and design. In many ways the computer has usurped the value of hand skills. After little or no training virtually anyone can crank out something "acceptable" with Photoshop. This poses a dilemma for Foundation programs worldwide, which gives rise to a myriad of important questions.

Foundation Studies directors everywhere are asking themselves the same set of questions: Of what value is the relationship of touch to seeing in today's educational landscape? And how do both touch and seeing influence problem solving skills? How do we add to the curriculum while maintaining our traditional values? What classes, skills, and subjects do we let go and what do we promote as replacements? In the future computers will be programmed to respond more intuitively, so the notion of "touch" will return to the design process. However, at least for now, drawing with a mouse, or even a Wacom pen and tablet are clumsy and counter intuitive. In addition, the computer has a levelling effect – it raises the quality of the poorest craftsmanship while not necessarily also raising the quality on the higher end, elevating concept and aesthetics over pure skill. However, it would certainly be a mistake to remove all hand/eye skill classes from a Foundation program, condemning the current students to rely too heavily on the computer as their only tool.

Students are certainly aware of how much easier it is to execute certain design problems on computer. Drawing a perfectly straight line with a consistently light touch is now accomplished with a single keystroke. A watery or flakey paint surface is a non-issue. Students are able to complete complex and difficult design compositions in less time but what are they gaining by working on the computer and what have they lost? Clearly, the ease of craftsmanship allows them to concentrate their time making compositional and design decisions. But grappling with real paint in real time produces an alchemical experience for students that cannot be duplicated. There is an undeniable transformation that new students undergo when forced to physically master materials. Author James Elkins points to the relationship between painting and alchemy by asserting that, "Alchemy is the old science of struggling with materials and not quite understanding what is happening…[something] every painter does each day in the studio."[1] The philosopher's gold in this case is the experience and appreciation of difficulty – it sharpens the eye and steadies the hand and makes for more thoughtful design decisions overall.

So, how does a program director begin to integrate the computer into a Foundation Studies curriculum effectively? I believe these are a few specific questions that must be addressed when making these decisions. First, how are the practices of various disciplines affected by the evolving computer? Also,

what is the final desired outcome of an individual project? And finally, what does the project teach the student about design decisions and practice? The answers will differ depending on the discipline but those answers will help shape the curriculum.

To illustrate the questions put into practice I'd like to briefly discuss two particular classes and share with you some of the decisions we have made in this regard at Art Center College of Design, the institution where I work as Associate Chair of Foundation Studies and sometimes as Design 1 instructor. I am by no means suggesting that Art Center's approach is definitive but looking at our choices as a case study may prove to be informative.

The first class is called Form and Letterform. This is a required class for Graphic Design, Illustration and Advertising majors. As recently as two years ago we required two classes of lettering, neither of which dealt computer skills at all. The instructors who teach this class are also practising graphic designers. When we asked them how the computer had changed the practice of logotype design they all agreed that designers still begin with hand drawn letterforms, which are then scanned into the computer for development and finish. "[Human] Anatomy is much more conducive to the creative process than the mouse. After all, type has its roots in the anatomy of the hand and in the pen. If students don't draw by hand they don't internalise an understanding of the letterforms. It doesn't become their property."[2]

So that's were we began. Our terms are 14 weeks long, so for the first seven weeks students apply themselves to drawing letterforms by hand. They learn not only how to draw individual letterforms but how letterforms come together to form words. During this time they also learn vocabulary, what's an ascender and descender, for example, or the difference between a serif and sans serif font. We give them a brief history of typography and require the Graphic Design students to take a more thorough history class in our Liberal Arts department. The purpose of this first seven weeks is to allow students to become proficient enough at hand skills to sketch letterforms to design logotypes, to sketch ideas with letterforms and to teach students how to read their own sketches determining which are the best and ready for development.

After researching either the corporation or retail business their logotype will represent students select their best sketches, cut and paste them by hand and scan their roughs into the computer. Currently we work with both Illustrator and Font Lab using Bezier curves to digitise as well as refine the logotypes. Students often make the mistake of not wanting to look at their designs printed out after they make the move to the computer. But our instructors insist that interim critiques are all printed out and viewed from a distance. Adjustments are made the old-fashioned way, by cutting and pasting, and then students go back to the computer to make their final changes.

A word here about faculty expectation of student performance: if only two years ago students had 21 weeks of hand skills before they were asked to design a logotype. It's absurd to demand current students have the same expertise with only 7 weeks practice. This adjustment is perhaps harder on the faculty than on the students. Faculty must make it their goal to have students *understand the condition of seeing* and trust that the computer, as a finish tool, will enable students to produce the same high quality work that we once demanded exclusively by hand.

With the introduction of the computer we have eliminated an entire required class from our curriculum; students continue to learn enough hand skills to enable them to work proficiently and, perhaps most important of all, students learn a practice that will most effectively serve them as professional designers in today's market. We teach the class based on current industry standard.

The second class I would like to outline is Design 1. Unlike Form and Letterform, Design 1 is our basic composition and colour theory class and there is no "industry standard" to guide our decision-making. Design 1 is the only class required by every major during the first term. In order to teach it efficiently we divide the sections into specific groups of majors whose interests, materials or conceptual approaches to design problems share common ground. For example Photo, Environmental and Fine

Art majors all take the same class. For the purpose of this essay I will discuss the class composed of Graphic Design, Illustration and Advertising majors.

Students in Design 1 are expected to learn about line, value, proportion, Gestalt principles, colour theory, colour mixing, design vocabulary, craftsmanship, and visual awareness – a tall order in just 14 weeks. Just as in Form and Letterform, students begin with hand skills for the first seven weeks. Students do line and values studies by hand and paint small gouache geometric abstract compositions based those studies. They also paint and assemble a grey scale and colour wheel, which teaches them craftsmanship while they train their eye to understand "middle-stepping" and the transition of value and hue from primary to secondary to tertiary colours. Other painting assignments include the Fibonacci proportional system and de-saturated colour choices. So far, this sounds like pretty standard faire for most traditional Design 1 classes.

From here the class moves to the computer lab. The hand drawings executed in the first half of the class are now scanned into the computer. Students essentially repeat all of the hand assignments on the computer. They work with line and value and do a digital colour wheel, including exercises that demonstrate a variety of colour contrasts. (Visual Examples) The purpose here is to enable students to understand through practice the fundamental difference in colour mixing on the computer as opposed to mixing paint. The instructors engage in a careful discussion of additive versus subtractive colour. Prior to the computer these students were not able to personally mix paint using an additive colour mixing system, rather they simply learned about it abstractly with examples from film. Now they do it themselves, sitting in front on an illuminated screen.

I am very curious, and a bit disappointed, that the engineers who designed the computer chose to mix colours primarily with the Munsel colour system, which uses black and white to de-saturate hues. At Art Center the majority of Design 1 instructors prefer teaching Itten to Munsel not just because complimentary colour mixing is most often found in nature but also because the clarity of a complimentary blend has so much more punch than a chalky tint or a deadened tone or shade. And while it may not be possible to get a full range of values without adding black or white to some colour schemes, the computer's built in pallet favours this system over any other. At Art Center we teach students to create their own pallets with complimentary blends on the computer so that they can be in control of their colour choices (visual example) and not be forced to only use the default colour system programmed by an engineer.

In both of the classes just described we maintain a commitment to hand skills prior to accessing the computer. While we do offer a very small on-line version of Design 1 (only 5 students may be enrolled) we prefer that only Graphic Design students take the class, who will be enrolled later in Design 2, which continues with both hand as well as digital skills. Design 1 On-Line presupposes a greater level of sophistication from the students because of the ease of craftsmanship and subjects such as transparency and translucency are covered, which are usually reserved for a more advanced class.

I have not addressed the introduction of the computer into the drawing and painting classes designed for Illustration students. While we have had a drawing instructor who, from time to time, taught elements of his class on computer and occasionally a student will bring his computer into a painting workshop and executed a digital "painting," at present we leave the digital painting classes to the digital media department. When or if we decide to integrate the computer into analog drawing classes we would again look to industry standard practice in illustration as a model. For the time being, we feel that the more experience Illustration students have with traditional media the better it will serve them.

We have one Foundation Studies class devoted entirely to digital skills. It's called Model Construction 3, which teaches three-dimensional rapid prototyping. Students learn a variety of software programs, which operate automated CAM equipment to actually build 3-D prototypes. We are fortunate to have lasers, starch printers, and several CNC and FDM machines. (Visual examples) Unlike the other classes mentioned here this class is not an iteration of an existing class with an integrated computer

component, rather it was added to the curriculum in response to developing technology with industry application and is really in a category by itself, which may be the subject of a future paper. Product and Transportation Design majors are required to take this class only after they have been through two traditional Model Construction classes, which teach students how to conceive of three-D projects and make them by hand, maintaining our commitment to traditional design education. However, Model Construction 3 is offered as an elective to other majors without Model 1 and 2 as prerequisites. We find that Environmental Design and Fine Art majors most frequently choose to learn this method of production.

We are currently in a romance period with the computer. And we will probably remain here for some time until the designers who grew up on the computer finally become mature and we discover what the computer can really do. When a material or technology becomes mature it disappears. It becomes transparent and simply serves the concept it is attempting to convey. When something new is first introduced there is a romance with the material that eventually gives way to pragmatism. In the meantime design educators must persevere. We must continue to teach hand skills and selectively introduce the computer as a tool for problem solving. We must not allow teaching software to be mistaken for teaching solid design principles. And because the computer allows for a multi-dimensional layering of images and text, which creates a kind of gazing into time and space we must bolster our Foundation programs with quality Liberal Arts classes investigating history, narrative structure, research and conceptual thinking to support an understanding of context and authenticity or at least an intelligent deconstruction of the two.

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2 Lindstrom, Nils, Art Center Faculty, personal interview, November 17, 2004.

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Teaching Brand Design:

A Visual Communication Design Course Case Study

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Brand is defined as "a person's perception of a product, service, experience or organization" (Neumeier, 2004, p. 14). Brand design is about rational strategy and creative thinking in developing, building, and managing the brand to build loyalty, drive perceived quality, provide differentiation, and create credibility. Brands are integral parts of design, business, everyday experience and culture (Atkin, 2004; Holt, 2004).

Design education and the design profession are constantly in transition. Visual design students who are learning graphic design, visual communication design, experience design, interactive design, packaging design, brand identity, advertising, and the business of design will involve branding in various scales and entry levels. Learning formal principles, theoretical concepts and technical skills are still the core subjects for a design curriculum. However, it is becoming more critical that design students be trained to think, strategize, collaborate and understand the fundamentals of brand design.

This paper was prepared to summarize the author's reflection on teaching brand design to undergraduate seniors in a Visual Communication Design programme. The author presents a case study of brand identity design process of an educational experience; key learning objectives, activities and outcomes of a 10-week academic quarter; lesson learned from the student's perspective; and includes additional brand design practitioners' perspectives for refinement and improvement of future course design.

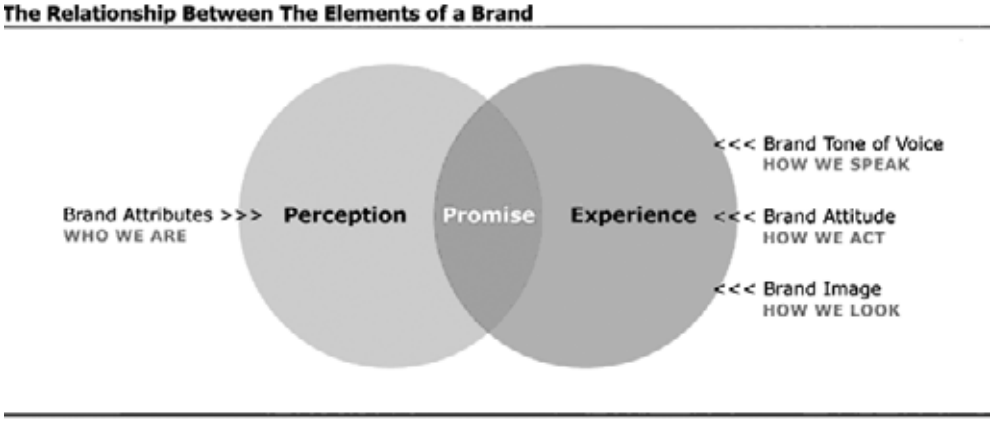
Keywords: *branding, identity design, visual communication design, design process*

1 Brand Design

A brand is "a name, term, symbol, or design, or a combination of them, which is intended to signify the goods or services of one seller or group of sellers and to differentiate them from those of competitors" as described by Philip Kotler in his classic marketing textbook (1984, p. 482). The term "branding" was embraced by marketing, business, and design communities since *The Economist*'s December 24, 1988 cover story. "The Year of the Brand" brought the attention of "Brand" to a broader audience. As new brand theories and strategies have developed, the contemporary brand has been elevated to more than the functional aspects of "what the company is" or "what makes it different." Brands are now perceived and interpreted on an emotional level (Gobé, 2002; Travis, 2000). Brand is defined as "a person's perception of a product, service, experience or organization" (Neumeier, 2004, p. 14). Brands are integral parts of design, business, everyday experience and culture (Atkin, 2004; Holt, 2004).

Brand design is about rational strategy and creative thinking in developing, building, and managing the brand to build loyalty, drive perceived quality, provide differentiation, and create credibility. The key elements of a brand (Figure 1) are represented by brand perception of customers, brand experience by customers, and brand promise to customers. Brand attributes are key components that create the perception of the company—who we are; they are the qualities or characteristics that the brand should personify in the way it interacts with its customers and employees. Brand tone of voice, attitude, and image are the three main components that evoke the customer's brand experience. When perception and experience of the brand resonate and are in balance, a core promise is stated.

Figure 1: The Elements of a Brand (Molitor & O'Brien, 2000)



2 Course Design

In this case study, the brand design course outline was based on an adaptation of visual communication design problem-solving processes that are defined by four key design phases during a 10-week academic quarter: Design Research, Design Definition, Design Concept, and Design Demonstration/ Expression. These processes emphasize the user-centred and iterative design approach that starts with understanding the business goals, core value proposition, market, and mission statement of the sponsored organizations. Then, in the second phase, the approach progresses to identifying the brand attributes and brand strategy. The third phase progresses to developing brand identity design concepts, and finally demonstrating the brand expression to a range of hypothetical touch point applications in the design demonstration phase.

The brand design course was a combination of studio and seminar-style, incorporating class discussions, face-to face peer reviews, lectures, written and oral presentations, group work sessions, individual and group meetings, field trips, case studies and required readings. Throughout the course, students were introduced to theory, principles and case examples of brand design with focuses on designing a brand identity mark and graphic system that reflected the defined brand perception, experience, and essence of each sponsored client. The pre-requisites for the course included basic design, typography, graphic form, colour theory, intermediate level visual communication design, information design, design history and design methodology,

The Visual Communication Design senior class was divided into project teams to promote the students' understanding of the importance of teamwork and the dynamics of team communication. At the end of each design phase, each team summarized the outcomes of each brand process with an oral and visual presentation accompanied with a printed report to the client, the class, and design instructors. The sponsor client met with the instructor after each presentation to discuss the students' progress and design. The author conducted two additional discussion sessions with the students, one on week two and one on week eight of the quarter, to collect and summarize each team's educational experience with brand design.

3 Key Learning Objectives, Activities and Outcomes

3.1 Discovery Research (week 1 to 3)

3.1.1 Objectives:

- Gain internal client perspective (product, service, or environment) and external market perspective (industry, competitor and customer)
- Understand the preliminary project goal
- Identify potential resources and limitation

3.1.2 Activities:

- Learn the general history and development of brand design from literatures, lectures, and guest presentations
- Become familiar with the fundamentals and common language of brand design and branding from literatures, lectures, guest presentations and discussions.
- Attend introduction workshop at client facility
- Apply various research tools and methodologies for date collection (interviews, surveys, observations, usability testing, literature reviews and on-site and online audits)
- Analyse and synthesize the significant characteristics of various brand architectures and successful case examples from class lectures, literatures, field audits, discussions and case reports

3.1.3 Outcomes:

- Summarize collected data regarding vision, mission, value, culture, history, products, services, market, competitors, expertise, user experiences and perceptions, and the existing brand design.

3.2 Design Definition (week 4 to 5)

3.2.1 Objectives:

- Understand the key components of brand strategy development: brand promise, brand positioning and brand identity
- Develop the brand essence by identifying the brand values, brand attributes, brand association and promise statement
- Develop a brand positioning by further defining target audience, key competitors, value proposition and positioning statement
- Develop a brand identity design direction by establishing naming approach, tone of voice, and look and feel.

3.1.4 Activities:

- Conduct brand attributes definition brainstorming sessions
- Create written statements, verbal and visual attributes that echo the future positioning and personality (traits desired) of the brand
- Define the brand design strategy and users' perceptions by building scenarios, conducting metaphorical description exercises, visualizing brand attributes, identifying customer profiles, selecting benchmarks, and reviewing brand architectures.

3.1.5 Outcomes:

- Summarize the design definition phase in a brand design briefing report that clarifies the design objective and identifies relevant brand positioning architecture scenarios
- Define the visual and verbal drivers and create distinctive look and feel mood boards

3.3 Brand Identity Concept Development (week 6 to 7)

3.3.1 Objectives:

- Explore multiple visual identity design concepts based on identified design strategies from previous design definition phase.
- Create defined contexts for students to integrate their prior visual communication design knowledge and skill into the larger scope of brand design process
- Engage in the intelligent decision making process in selecting a final brand identity concept that is based on aesthetics, creativity, functionality, and positioning criteria

3.3.2 Activities:

- Translate the desired rational and emotional brand attributes, attitudes, and look and feel into meaningful graphic representations (typography, colour, imagery, and graphic composition)
- Conduct preliminary user perception testing (semantic differential survey and informal client review) to collect feedback for concept refinements and recommendations
- Present the distinct qualities of each concept and make appropriate recommendation for the final selection

3.3.3 Outcomes:

- Develop preliminary concept sketches, colour palettes combinations, typography choices
- Examine and select relevant and distinctive brand identity applications (3-5 components) to demonstrate the validity and expressiveness of each proposed design concept

3.4 Design Demonstration/Expression (week 8 to 10)

3.4.1 Objective:

- Apply visual communication design capability to demonstrate the key brand identity design expression (8-12 components)

3.4.2 Activities:

- Express the intangible emotional quality of a brand through tangible applications of key identity design components (brand mark, colour palette, typography, imagery, and graphic elements)
- Refine the design concept
- Present the final brand identity in a selected range of touchpoint applications

3.4.3 Outcomes:

- Summarize the final brand identity in a design document that presents a unified visual design language and a basis graphic system through consistent and flexible design applications

4 Lesson Learned

The brand identity design exercises inspired the students to approach and examine a visual communication design project not only as a creative and aesthetic expression, but also from a broader perspective that touched on business and marketing, socio-political, technology, trends and cultural implications. They learned that brand identity is more than just logo or letterhead design. They began to understand brand design is about the personality of a company, product or service that is defined by the customers' experience and their perception of the company.

Students acknowledged that the new brand design vocabulary they learned which embodied terms such as "brand values, brand attributes, brand voice, and brand essence" allowed them to communicate more efficiently and effectively with the client and the class.

The instructor reiterated the importance of design research to the class during the discovery phase of the process. The students applied various research tools and methodologies they had learned previously in their junior design research class to collect internal (client) and external (market) perspectives. This discovery research process provided the students a real world investigation and defined context for design analysis. They recognized that their level of confidence about their design recommendation had increased with the support of grounded research data and a strategic focus.

Students also described their learning experience on the design definition phase as a new challenge that required them to practice the left-brain that serves verbal, analytical, sequential, and intellectual thinking. Most of the students did not comprehend the benefit of this approach until the later stage

of the course when they juxtaposed the left-brain thinking with the right-brain thinking that serves the visual, Gestalt, and symbolic intuition to create both logical and emotional design solutions.

5 Brand Design Practitioner Perspectives

In addition to data collected from the case study, the author conducted one-on-one interviews with thirteen brand design practitioners to broaden the perspective of teaching brand design. Eleven participants from these interviews had prior formal design education and over half of them had practised design for more than fifteen years. However, most of the participants had been actively involved in brand design only for the last five or seven years. Seven of them are principles of design consultant firms, and they all work with senior and junior designers on various brand design projects.

The interviews focused on three main questions: 1) What did you learn from your former undergraduate design education that prepared you to do brand design? 2) What additional knowledge and training (that was not provided by your formal undergraduate design education) did you acquire to support your current design practice in branding? 3) What would you like to see in the class design and course outline in the teaching of brand design to seniors in a formal Visual Communication Design program? A summary of their perspectives is presented in the following discussion:

There are three core competencies as the practitioners recall to what they learned from their design education that prepared them to do brand design. The first is the ability to solve problems that involves research and strategic thinking. One design principle and brand strategist said: "I was always encouraged to go out and look at packaging in the stores, and go out and look at products that I was going to design against. And in branding, that is critical. You have to know what is out there. You cannot do branding in a vacuum." The second is the mastering of basic design elements and principles: "I learned the impact of communicating visually, and the importance of arresting elements in my works" as expressed by an experienced brand identity designer. Some recalled their lessons on colour theory, which provide a strong foundation for their brand design. The third is the broad based knowledge gained from courses outside the design curriculum, courses like liberal arts, psychology, anthropology, sociology, history, marketing and writing: "because of my writing skill, I am more involved with naming, developing positioning statement and brand architecture."

The above knowledge and skill these designers learned provided them with a strong foundation for their design practices. Most practitioners believe it is not realistic to expect a new design graduate to be handed a brand design project. The on-the-job training to build expertise in brand design entails doing pieces and parts of projects with guidance from senior designers, researchers, and marketing consultants. They added that more and more young designers are aware of the importance of brand design and are interested to learn from senior designers, researchers, and marketing consultants. These participants recommended three additional areas of experience and skill to acquired: 1) communicating and working with interdisciplinary team, 2) understanding the basic of your client's business, 3) mastering the skill of persuasion.

Brand designers understand that brand is more than a name or a logo, they reference what Marty Neumeier, a brand consultant and author, says: "Many of today's brands are too large and too complex to be managed by one person or one department. They require teams of specialist, sharing ideas and coordinating the effort across a creative network" (2003, p. 52). It is important for design students and young designers to gain collaborative work experience and understand most of the successful branding developments are the results of interdisciplinary team creativity.

Most practitioners state that branding is very much about designing a business. They think to be good at branding; a practitioner has to know enough about business, especially the business of your client. They know that they don't need to become an economics professor or get an MBA, but they need to learn the basics of business and marketing. They say they learned by investigating, listening and reading; and as one of the participants shared: "I learned just as much of that by listening, reading *Business Week*, listening to my clients talk about their business, seeing the consistencies

between different businesses. To me that is the big thing. I think at design school I thought that I could just sort of be sheltered and just be a designer, but unless you going to be a pure artist, you've got to bridge the gap with business. You've got to understand how to speak their language. Cause everything you do [in branding] is done for a business reason."

Brand consultant and author, Wally Olins, writes branding is about "persuading, seducing and attempting to manipulating people into buying products and services" (2003, p. 7). This seems to be a bold statement, but from the marketing and consumer psychology perspectives there is a certain truth to it. Practitioners think creating great design is important, but knowing how to win your audience is as important. Selling a concept to a client or a brand to a customer is a unique skill by itself that demands emotional and rational interpretations, clear objectives, creative expressions and calculated presentation. Doing great presentation and connecting audiences with creative solution is definitely a very important skill for a successful brand practitioner or for most designers.

The following course outline summarized the practitioners' suggestions when they were asked about their approaches to teaching branding:

Week 1: Introduce the history, definition, cycle and components of branding through class lecture, literature and discussion

Week 2-3: Present basic brand strategy model, process and touchpoint application examples through class lecture, guest presentation, case studies, benchmarks, storytelling, and literature

Week 4: Students experience and interact with brands in the real world through benchmarks, case examples, customer journal and fieldtrips

Week 5: Students document, analysis, and present the real world brand case study from multiple perspectives (designer, customer, and client)

Week 6-9: Students demonstrate their basic branding knowledge through a brand strategy (Figure 2) project in given category of industry with specific criteria and restrictions. Students work in small team to collectively plan the process, conduct unbiased research, develop visual communication strategy, create scenarios and build solutions.

Week 10: Student teams present brand projects with end product being more conceptual and strategic than refined design applications

Brand Strategy Development

Brand Promise	Brand Positioning	Brand Identity
brand values	target audience	brand voice
brand attributes	key competitors	brand name
brand affiations	competitive advantage	brand slogan
promise statement	value proposition	brand imagery
	positioning statement	brand logo

Figure 2: A Model for Brand Strategy Development (Galvin, 2004)

6 Conclusion

Design education and the design profession are constantly in transition. Visual design students who are learning graphic design, visual communication design, experience design, interactive design, brand identity, packaging design, advertising, and the business of design will become more involved in branding in various scales and levels. Learning formal principles, theoretical concepts and technical skills are still the core subjects for a design curriculum. However, it is becoming more critical that design students be trained to think, strategize, collaborate and understand the fundamentals of brand design. Margaret Youngblood, an insightful and experienced designer, expresses that designers succeed best when taking a holistic approach. She adds, "Until designers (and the schools that train them) can demonstrate that design is more than just a visual experience, more than just cosmetics;

business, community and culture will not fully appreciate design—and designers will not achieve their full potential" (cited in Holland, 2004, p. 23).

To best educate and prepare students for professional practice, there needs to be an on-going dialogue among design educators and professionals about what should constitute the teaching of "brand design," and how an undergraduate design program approaches the growing need for this area. It is inarguable that there is more subject matter to teach and it is of great concern that the expectations of industry are exceeding the ability and scope of a four-year design program (Churchman, 2004). There is no single approach or simple solution for this problem for it would be based on different institutions' philosophies and priorities. Some programs focus on liberal arts, some on studio arts, and others incorporate professional internships. Therefore, it is critical for educators, professionals, and the business community to interact and rethink an education framework that would encompass the demanding and evolving landscape of the design world. Branding is playing an increasingly essential part in corporations, politics, the nation, sports, culture and even non-profit organizations and small businesses (Neumeier, 2003; Olins, 2003; Wheeler, 2003). It is imperative for any design educator to ask: What components of a design program are preparing students to practice brand design in the real world?

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Note: This paper is the author's ongoing examination of teaching brand design. Part of the data of the brand design course was originally presented in—Chan, K. P. & Sanders B-N. E. (2004). Exploring, interpreting, and applying emotion-driven design in brand identity development: A design student case study. In A. Kurtgozu (Ed.), *Proceedings of the Fourth International Conference on Design and Emotion* (pp. 11). Ankara, Turkey: Middle East Technical University.

View-like Drawing Skills in Graphic Design Education

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The spirit of art schools and art training is often thought to be synonymous with large format and carefully elaborated chalk drawings. Furthermore, the entrance examination system is, and has always been based upon skills in classical view-like drawing. It is not surprising then, that every candidate, who gains admittance to art institutions, must be good enough at this discipline. However, the digital revolution with the advent of the computer technology in art and design took place right in the middle of the author's studies. Computer technology and its related products have changed the designer's relationship to manual skills. He had a great opportunity to experience how the new medium intrudes in the 'golden temple' of 'tradition' and 'mastery'. Thus, the role of traditional drawing became a subject to constant debates in educational context.

To make decisions on whether view-like drawing as central part of the educational system still deserves its position or it should be replaced with something else, a clear picture is needed of its actual function. How and to what extent can view-like drawing reflect ability and how can it help students to be more successful in their future profession? With the emergence of digital media in graphic design, this clarification is very much on the agenda.

Education systems in general are supposed to prepare and enable students to fulfil the requirements they may face during and after their studies. Every element of the structure that is responsible for the effectiveness of this process ought to be monitored and updated in order to avoid any damage which may be caused by misunderstanding or by the misuse of certain methods. The signs of the malfunction of view-like drawing have been obvious in the past decade. True it does not necessarily mean that the problem lies within the discipline itself. It is probable that the present context is less favourable to its academic existence than earlier and some additional efforts are needed on the part of educators to re-establish its original function and former effectiveness.

Keywords: *view-like drawing, manual skills, reflect ability, re-establish original function*

Political Particularities that Reinforced the Tradition of View-like Representation in Hungary

For nearly 50 years until 1989, Hungary's official ideology was Marxism-Leninism. Consequently, official art ideology has also a rather clear-cut definition. Art was employed to express political thoughts and therefore it was to educate people in order to make them better members of the society. Artists were required to direct their artistic mission towards the masses. Thus, Hungarian artists, like their Soviet colleagues were supposed to be figurative and work in the style of Social-Realism[1]. Schools and art institutions in totalitarian regimes can seldom have even the slightest chance to be independent from official ideology. Art students and teachers were under constant control of the state. The national curriculum and the system of centralised assistance for young artists was carefully elaborated so that no 'harmful individualism' could settle in young artists' minds[2]. From 1949 Hungary was officially cut off from every changes that took place in the Western world. Therefore, those influences that contributed to the removal of representational drawing from its central position in art and design education never reached the Hungarian art institutions.

Analytic drawing skills were overall emphasized. To make clear visual statements for the largest possible audiences the mastery of view-like drawing was indispensable for every artist. Human figure gained great importance again in a newer context. Live drawing classes were to improve students' abilities to depict the heroes of communism. Classification of the works was easy. Correct proportions and illustrativeness counted the most. To copy light conditions and spatial situations of the models meant correctness. The criterion was always well defined. Control, similarly to other domains of the social life was a main concern. If students fulfilled such expectations their academic progress was secured. Solutions that diverted focus from this kind of view-likeness were banned. But the stiff stance on the part of old masters was not exclusively due to political views. Even those, who themselves were devoted to other than social-realist style in their oeuvre were determined in favour of view-likeness and analytic drawing[3]. The rigorous discipline represented the current ideology, but could have been also equated with the symbol of knowledge. The very fact that the presence of representational and descriptive art (although other 'non-official' currents equally featured the visual arts in Hungary[4] was basically uninterrupted in the country, could – I assume – reinforce that the practice of view-like representation has never ceased to dominate art education. Drawing has not only been a common routine for those involved in visual arts, but also a very characteristic body of professional knowledge that every master is supposed to possess. The mastery of drawing beyond its functional role became the symbol of mastership. Consequently, view-like drawing can be seen as a field within which 'masters' may define themselves as creditable. By this rationale it is easy to see that the discipline of view-like drawing can be considered as a completely independent entity of any particular ideological or educational concept.

The Possible Non-political Causes of the Prevalence of Old Paradigms – Conservatism as a Tool to Maintain the Professional Status Quo

> A psychotherapist had a new female patient. The session took place in his living room. When the lady asked him where to hang her coat, he told her to leave it on the sofa. She was reluctant to do so, saying, one never puts coats on upholstered pieces of furniture. When the psychologist inquired about the reason why she did think so, she replied that it had long been a custom. Everybody knows it, she said. The doctor insisted that she tell the reason, but she was not able to give an answer. Her mother told her this when she was very young and it never occurred to her to ask for an explanation. She accepted it as it was and, as we saw, passed it down to her therapist. Next time, when she came over again, she told him the story she had heard from her grandmother, and the secret suddenly got unveiled. At the turn of the century, a poor family lived in their neighbourhood. The children often came over to play. Poor things had fleas and lice, and grandma did not allow them, quite understandably, to put their coats on upholstered pieces of furniture. The context changed, the real reason was not valid any more, but the custom carried on to exist causing unnecessary misunderstandings.
>
> *(Peter Popper, 2001)*

Sometimes old and outdated practices are prevalent, though the reasons they were initiated have long been forgotten. But a less 'innocent' explanation is also available.

Academe is by nature conservative and a rigid hierarchical system. It is not surprising then, that certain methods perpetuate only because to change them would result in personal conflicts. The issue that arises here refers to the eternal clash between progression and conservatism.

There is an important human factor to be considered. Roots are to be found in the Freudian definition of the Oedipus complex[5]. The 'Father' or 'Master' helps his 'Son' or his 'Apprentice' in his way to become his legitimate heir. Oddly he produces his future follower in the power. In turn he falls, and his position is taken by the new generation. Nonetheless, the older generation takes a defensive stance in order to avoid being defeated. When it comes to face the threat of the newer, there are

basically three real options to maintain the status quo:

i To understand the new context and adapt existing values to new requirements.

ii To take a complete departure from old values and let the new ones to gain ground. Accordingly a new identity must be built upon new grounds.

iii No significant change in attitude. Arduous efforts are made to sell old concepts as the carrier of overall truth. Given a constantly willing audience, hierarchical frameworks such as art schools are ideal forums for thus maintaining the status quo.

While the first option needs the greatest intellectual efforts, the second one is probably the most risky, but the third one is the most likely to happen though it seems to be a rather selfish and dogmatic way to solve the problem.

Even outstanding scholars and respectful artists tend to become dogmatic and unwilling to accept new ideas whet it comes to realization that their well-deserved status is under threat. New ideas can only define themselves when juxtaposed and confronted with old ones. This results in a kind of denial of traditional values. However, this fact may exempt old masters from being dogmatic, because new ideals seldom show themselves in their completeness at first. Usually, in the very beginning new thoughts are so imbued with aversion towards everything that is old and therefore thought to be outdated that often, useful knowledge remains hidden before the 'newcomers' eyes. Though it is also true that many second-rate attempts can gain positive recognition before a thirsty audience for something unusual merely because of their 'otherness'[6]. It definitely takes some time to be able to distinguish the meritorious from the mediocre or worse. It is not always easy to see that something, which is not experimental, is not necessarily worthless and vice-versa. In the light of this assumption, the third option is slightly better understandable and hopefully it is more obvious that certain conservatism is not necessarily derived from complete narrow-mindedness or dogmatism.

The following examples may underpin my assumption concerning the possibility that personal reasons may contribute to certain prevalence of questionable practices or ideals.

Massimo Vignelli [7] provides us with one of the best examples of how astonishingly can a once progressive artist turn into a severe critic of the new (implicitly experimental) typography that has revolutionized contemporary graphic design[8]. He advocates no dogmas while becoming a dogmatist himself. He overtly asserts that the use of more than five basic typefaces is a misunderstanding of graphic design and every attempts made in the direction of different horizons are just waste of time. He fails to realize that the different value system[9] and the technological constraints of their time determine the disciplines, according to which he and his contemporaries build up their method. He completely denies the validity of new[10] efforts in general, instead of attracting attention to its obvious shortcomings.

I hope that the symbolic nature of this analogy is clear. The overall important role of contextual factors can be clearly seen in the following Hungarian example. Changes in academic climates are slower, than in other non-official intellectual environments. Though, due to its firm links with the current official ideology, academies have always been serving as political tools to a smaller or greater extent according to the nature of the current political system. This may explain that sometimes rather quick changes take place behind old walls when it is felt necessary within political circles to exploit the academe's influence on culture and therefore over the society. The shift in direction is absent or at least the process is not intense, when supporters of certain ideology are not in desperate need of using culture and art for their pragmatic aims. In such cases, debates tend to be more professional and progress sluggishly.

The Current Hungarian System

The mastery of figure drawing is one of the major concerns of the curriculum at secondary and tertiary level. Applicants have basically two options to acquire the necessary knowledge required to

pass the entrance examination and to fulfil the requirements of the above-mentioned subjects. Those who are determined enough to become an artist as early as at the age of fourteen may attend special art-schools at secondary level. There the curriculum is rather similar to that of the academy. Or, if they make up their minds later, numerous extra-curricular life drawing courses* are run by private teachers or by the art-schools all over the country. Methods are conservative in both cases alike. Even the 'Regional Talent Spotting' programme of the Hungarian Academy of Fine Arts[11] (which is a ten-week art-training course) is based almost exclusively on traditional figure drawing classes led by educators from the Academy. All these facts show that applicants are forced in a rather definite direction well before their selection begins.

The entrance examination system and the special requirements of the training process presuppose certain skills, which do not rely upon unlearned potentialities. In the given framework, creativity cannot be tested but through special, traditional drawing related tasks. If the absolute competence of the described particular field of visual studies cannot be proved, the danger of constructing false identity for students in the discourse of art education appears to be very real[12].

View-like analytic drawing is the major component of the entrance examination system at the Hungarian Academy of Fine Arts. Young people applying for admittance to the institution must meet rather high academic standards in drawing terms. Other tasks in the examination process vary according to specific departmental needs but the main tool for testing a candidate's ability is freehand drawing at every department except 'Intermedia'[13]. When I am talking about drawing I mean its representative form, which deals with right proportions of a human figure and a portrait situated in space. Also light conditions should appear correctly, elaborated with traditional tools like pencil, chalk, ink or painting usually on paper or canvas support.

A preliminary selection of the candidates by their portfolios takes place in the first round of the entrance examination in April every academic year. Portfolios are supposed to consist of analytic freehand drawings and design project as well. There is no strict absolute standard set up for the relative proportion of different kinds of works. However, the absence of live drawings is usually penalized. Those who are selected by their portfolio can attend the second round in June. The second round means exclusively technical tasks to be solved on the spot with traditional tools and material like pencil, pen, ink, painting, paper or canvas. No 'pre-cooked' or 'ready-made' objects are allowed. Candidates are to accomplish at least one (or more) portrait of a live model, and one (or more) solution for two different design problems (one at least per each) on the level of descriptive sketches, which means that drawing skills are indispensable for both tasks to fulfil the requirements. Once one is selected again, he/she undertakes the third round, which means basically the same series of tasks. The only difference is that the portrait task is replaced with a nude, which has to be realized the same way. Design tasks are somewhat more complicated than those in the second round are. A series of tasks are followed with an oral interview, which is to help the members of the committee to form an objective opinion if significant difference is detected between the portfolio and the works done on site. Forty-percent of the obtainable points can be given for the successfully achieved drawing tasks, another forty for the design tasks and twenty for the portfolio and the personal impression. Outstanding design solutions can be rewarded at the expense of the live drawings and the same applies to the other way round. As manual skills are indispensable in both cases, success largely depends on traditional drawing skills in the final decision-making. This fact is extremely painful for a new body of people for whom alternative tools like computers with design software are more familiar when it comes to realize creative visual solutions.

In the first two academic years (four semesters, 5 hours a day) life figure drawing classes constitute the main technical training. Anatomy and spatial representation are also compulsory for every student (four semesters, 4 hours a week). The first subject is relatively free of other restrictions than the students' drawings are supposed to be closely related to the models. Individual solutions are allowed, though correctness in terms of right proportions and view-likeness in the representation of light conditions are the main guidelines when it comes to evaluation of the works. The usage of traditional

techniques and materials like paper, canvas, chalk or pencil is greatly supported. Anatomy and spatial representation studies are rather textbook dependent. This subject shows the most scientific features which is to say that anatomic and space projection drawings must be completed by traditional techniques which basically has changed little in the past fifty years. The main emphasis is put on the accuracy of anatomic details of human bones and muscles. Students obtain knowledge about composition and structure via thorough visual and verbal analyses in a fairly objective way. At the end of the course, students are obliged to take a final exam, which is a combination of theoretical and practical tasks.

Objectives of Evaluation in the Current System

The common mistakes that are quite overtly criticized by secondary school drawing teachers and university examiners alike are typical. Inaccuracy features the growing number of unsuccessful attempts. According to the already described dominant set of criteria, the demonstrative and descriptive nature of a meritorious work is obvious. Formal properties are to establish a clear visual relationship between the view and the drawing. An active process of analysis and as a result, an unambiguous understanding of the visual problems of the view is to be demonstrated in the picture plane. Appropriate use of the set of given tools is evidently the prerequisite of creating visually articulated meaningful forms which constitutes the aesthetic merit of the drawing. Completed drawings fall into two categories. These classifications refer to the stage of the learning process. Drawings that show some sort of 'try and fail' effect are more likely at the earlier stage. They are similar to a log, which registers the process in detail. The second category incorporates those works, which can be called a 'final outcome' and are characteristic of the more progressed period. Here, the visual vocabulary of the drawings is more affirmative than interrogative.

Shortcomings of the Current System of Selection

Applicants can be classified in two main categories according to their competence in drawing: one having had assisted by professional training with some theoretical background knowledge, and another with no such experience, mainly led by self-guided ambitions. Mostly mediocre drawing skills and more routine than outstanding creativity can be detected in the former case; technical incompetence is dominant in the latter (in terms of presentation of creative ideas by traditional drawing). Due to the lack of sufficient competence in drawing the creative potential of the untrained group cannot be tested on the spot by the current system. The only reference points in this respect are exclusively the works in the portfolios. The vast majority of these works are done by computer-aided techniques. Interestingly enough, the same is true for the other group's portfolios. This shows that the lure of digital tools is intense even in those circles where traditional techniques have not ceased to be taught. If the negative tendency in drawing performance is (at least partly) due to disinterest in traditional drawing, the decline cannot be explained by the absence of guidance, or the lack of availability of traditional tools. The academic requirements and the institutional background of pre-academic training are seemingly in accordance. Nevertheless, the signs of ineffectiveness cannot be denied.

I think the demonstration of the recent situation of drawing at the Secondary School of Fine and Applied Arts in Budapest[14] can provide us with credible information. The school, which I intend to use as a test case has a special status among Hungarian art schools. It has a long history, and it has given an approximate forty-percent of those who apply for admission at either of the two major art universities in the country. This school was, until the early 90s, practically the only institution at secondary level that was tailored specifically for students with visual interest. Its importance is emphasized since practical preparation and theoretic training of students for further studies in art have long been the main objective of the educational process. Other cities have also art schools with fairly similar curricula, but incorporate other fields of art such as music and dance. The basics of the educational process at the Budapest school has long been following a constant practical line

which has changed little in the past thirty years. In 1973 it officially became the preparatory school for the students at the Hungarian Academy of Fine Arts.[15] Its constant standards, uninterrupted relationship with the Academy of Fine Arts and Academy of Industrial and Applied Arts and the almost unchanged teaching staff (since the early 80s) make it an ideal test case for the observation of relevant changes. According to the above quoted basic expectations of the traditional concept of view-like analytic drawing, student works tend to fall short of the absolute quality of previous years' results. The works are equally less successful, on average, in the appropriate usage of tools (chalk, pencil, paper etc.) and in the correct depiction of proportions, light and spatial conditions. The same applies to compositional solutions as well. The constant decline in view-like figure drawing can be witnessed over the past ten years and its intensity gradually increases. Local teachers and the external examiners have unanimous negative opinion. The poor quality of drawings is even more obvious on the occasion of entrance examinations where no guidance or assistance can contribute to the final result. The great majority of the drawings do not meet the aforementioned conventional and specific requirements.

The Contra-selective Effect of the View-like Drawing Based System of Selection

Sharing the collective opinion of the staff of our department and other art teachers of different art schools in Hungary, I experienced a very obvious decline in drawing standards at secondary and at tertiary level alike. Comparing the results of this field of art training on the occasion of final examinations, it is rather obvious that works falling into excellent category are much less than say ten years ago. It is important to note here that the mutual guiding principles of drawing teachers have always regarded view-like drawing practice as a flexible and creative tool. It has never been considered to be an activity with an end in itself, rather a device to formulate, and a vehicle to express original and creative ideas.

As the number of art institutions in the Hungarian higher education system is rather limited (there are only two art universities), a relatively clear picture can be gained about the dominant tendencies by the works, which are done and presented on the occasion of the annual entrance examinations. As an absolute hundred percent of the applicants intending to gain admittance to further art or design studies show up at either of these two universities, we can presume that a significant number of exceptions do not exist. The actual result of institutional or private pre-academic art training is all the more controllable since the examination process is almost similar for all art faculties they train people for. The general experience is that students are unwilling to push the limits of a domain that, according to them has increasingly "less relevance to more complex artistic ends because new and more effective alternatives are available." Applicants with sometimes less than average competence in drawing, and maybe with no real creative power, form the majority of those who eventually gain admittance. Applicants with maybe more talent stand an off chance to be selected, if they are more likely in other ways than drawing to perform best. It can be, therefore, concluded that the entrance examination system is unable to guarantee that students be selected by other than their ability of view-like drawing. The relative mastery of the visual language of view-like drawing cannot be an overall indicator of general creative potential. If a parallel can be drawn between verbal and visual language in communication,[16,17] the standpoint of *nativist*[18] researchers are applicable, according to which 'sometimes outstanding ability in speech can co-exist with very limited level of intelligence.' Although, the over-emphasized use of view-like drawing in the system of selection, by this rational increases the danger of supporting mediocrity, the application of view-like drawing in art education can have a more positive consideration.

What Can Make a Drawing Wrong?

The break in such causal interrelation between the learning process and the produced drawings is the most obvious shortcomings of the majority of works. Students tend to produce drawings by

imitating other drawings' formal properties. Instead of generating and presenting knowledge by drawing as an active process, they produce a series of physical things, which try to look like drawings with no real reference to the conscious observation of the drawn object. As a result, such drawings become an end in itself, not a means by which knowledge can be acquired. This is the reason why an unmistakable amateurish look characterises a great percentage of the submitted works. This is not necessarily a Hungarian phenomenon. Students coming from countries of Western cultures (mainly from England, USA, Australia, Canada or France) show the same general characteristic of a misconception about the purpose of analytic view-like drawing. They try to be imitative without knowing basic technical tricks.

American students from the Philadelphia University of Arts come to Budapest for a one-month professional visit every year. Their choice fell on Hungary years ago because the country's reputation of its traditional drawing training in art schools had attracted the attention of their teachers. On the occasion of such visits they attend summer courses led by competent experts of the subjects. I was appointed to lead the drawing course for mainly design students a couple of years ago. The group of twelve people of age ranging from 19 to 28 usually attended live drawing classes at home on average 3 hours a week as an elective. The first day I deliberately let them do everything as they usually do without any particular guidance or assistance. The first drawing of a female model they completed the first day was a massive failure. The effects they produced were to imitate the stereotype of a "drawing" instead of trying to understand and solve the visual problem of the view of the human body they referred to. In turn, we started to discuss the result. It became evident to me very shortly that they had no real purpose whatsoever with the drawings they made outside the drawing itself as a task. More precisely, they wanted to create a 'surface with some artistic merit.' From their answers I inferred that the kind of picture they had in mind about traditional drawing was by and large similar to those drawings that could be clearly associated with the Italian Renaissance. To my question, that what particular features of the drawn surface might be seen as artistic, only vague and obscure definitions were the answer. Next day I arrived with a special strategy. First I defined a set of possible visual problems in the view. Some of the instructions I gave are as follows:

- Draw the accurate outline of the model
- Distinguish the soft and hard parts of the body
- Make a correct pictorial definition of the volume and the direction of the light
- Make clearly visible smooth and rough surfaces in the picture plain
- Make visible that some parts of the view are closer and others are farther from the viewer

Some time later a bit more complicated problems arose, like
How to achieve the illusion of lightness and heaviness of different objects by visual tools, or
How to make perceivable qualities like flexible or stiff for the viewer

When the students realized that the set of technical tools they currently had was not enough to get closer to the solution, I showed them some of the possible ways to be more effective in order to fulfil the tasks. These demonstrations were aiming to explain the proper usage of tools like chalk (soft and hard), pencil, sponge, rubber, water and brush to achieve concrete ends. Gradually they find the link between purpose, tool and effect. Miraculously, the basic graphic tools they were already in possession, started to work purposefully. The students' drawing action took a certain definite direction, which aimed to achieve the illusion of shade, light, texture and correct proportions with their works. Once they understood the discourse, which was defined by the above-mentioned goal and by the constraint of the given set of tools, students were much more self-confident to assess each other's works. As the context and the reference points were well defined, they became more willing to talk about aesthetic merit, which consequently resulted in refining their visual literacy.

The set of the given instructions clarified the field, which the students began to explore by drawing. Drawing, which was a mere self-content action for them, gained a real subject and consequently

they became more likely to produce 'real drawings' with 'real content' than earlier. While instructions could help directly, 'constraints' that characterise this sort of view-like representation can motivate people and promote creativity in an indirect way.

The Benevolent Constraints

Frameworks that constrain people to do things in a particular way should not be entirely dismissed because of their presumably benevolent effect on people's creativity. My assertion applies to those typical situations where more people have to work together. Based on my personal experience in art education, certain limits, which are equally applied to every individual in the group, increase the sense of security. This is to say that new tasks and challenges may cause frustration and a general tension in people's behaviour, thus influencing their level of concentration and mental effectiveness to a smaller or greater extent. The sheer fact that they are not alone to face the problem can ease up the tension and help to regain a more relaxed state of mind, which is usually an important pre-requisite of a creative process. On the other hand, the constrained situation can trigger a reaction in people that enables them to map out the most possible options they have. Naturally, a sort of incompleteness begins to invade their psyche and in turn they start to push the existing limits in technical and creative terms alike. While doing so, a certain level of competitiveness features their actions, which may further intensify the whole creative process.

If we accept that situations in academic framework are similarly constrained by conventions and therefore help people to come up with new ideas, we can assume that view-like drawing by virtue of its objective constraints (which are in accordance with academic structures) would not block or decrease good performance. Beyond its direct practical purpose that might be irrelevant in certain contexts, view-like drawing's use as a framework is helpful to generate an active and creative attitude in students. However, the evaluation system that is rigid and too firmly bound to inflexible views about the notion of correctness could destroy all the possible benefits.

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Origins of the Teaching of Product Design at the Design Faculty of Politecnico in Milan

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In 2003 she became member of UdR Project Product. Within this venture she took part in project researches Design e finitura dei composti derivati dal legno. Un motore per l'innovazione di prodotto (Design and finishings of wood by-products, a driving force for product innovation) partner ANVER (National Varnishers Association) April 2004; Design and innovation of indoor footwear) partner InBlu September 2004; definition of new reference scenarios and development of new products for food preparation partner Whirlpool January 2005.

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This paper aims at explaining the inductive method used at the product design studio at the Faculty of Design – Politecnico di Milano. In this studio the teaching staff is made up of faculty internal teachers, company men and experts that convey their knowledge and experience to students. Training instruments and methods that are used today rise with the first teaching experiences of product design carried out by Marco Zanuso, a founder of Italian design, in the 1960s and thanks to the features that made Italian design successful.

This paper tries to point out the link between the historical and cultural context of Italian design and its influence on the contemporary training approach to product design.

Keywords: inductive, training instruments, design influence

1 Introduction

In order to understand the origin and the development of the Italian designer's training, it is crucial to show the industrial and cultural context of Italy which made the 'Made in Italy' successful. The nature of the products has mainly contributed to this success; however, the product is only the output of a given industrial structure. Italy was different from other countries with the same economic development – it took up a production system that was distinctly different from the big industry governed by economies of scale, standardization and serialization.

The reason for this difference is the handicraft shop tradition that was typical of Italian economy until the post Second World War period during which the shops started to expand, becoming a small firm under family management. These firms, thanks to their nature, were characterised by high specializations in several production divisions, with peculiarities that brought a production area to success, but redundant if not linked to other specializations/ production systems. It was thanks to this reasoning that a network of firms emerged, joining several specific competences to obtain highly innovative products.

The traditional handicraft skills, besides achieving a high degree of specialization, contributed to the origin of Italian industrial sector. Development of the Italian handicraft culture that was based on the use of certain raw materials and geographic characteristics, led to the emergence of certain specialized sectors. These highly specialised sectors subsequently turned into specific industrial sectors such as furnishing, footwear, textiles, machine tools, household appliances, mechanical engineering and so on.

In the post Second World War period, the Italian industry developed, thanks to the demand of the image-conscious middle class for domestic products such as furnishing and household appliances,

fashion, especially footwear and clothes, and even transport. The Vespa Piaggio, is a symbol of the Italian design of this period. Such products, characterised by an evident relationship between projects, techniques and production and developed in industrial contexts with different production and market structures, marked the origin of the 'Made in Italy.'

2 Discussion

In the 50s, development of specific production areas related to furnishing, textiles and household appliances accounted for the introduction of training in furnishing at the Faculty of Architecture in Milan, about the same period in which Italy began to think about design teaching. It was necessary to train designers able to interact in the relation between 'artistic culture' and 'industrial culture' existing in Italy.

With increasing exigency to train designers for the industry, the first design departments called 'Artistic Design for Industry' were established. According to the methodology followed at these departments, the students of Architecture were not trained as industry managers, because it was crucial to let them understand the process through which the designer's creativity was linked to the industrial culture. This concept was strongly emphasized by one of the first teachers of design at the Politecnico in Milan and one of the founders of the 'Made In Italy,' Marco Zanuso.

Zanuso's ideas emphasized an unofficial method of teaching design within the department of product design, based on the concept that design activity cannot be direct and individual, and that the usage of materials and speeches for the ideational and practical management and control are crucial to any design activity.

Zanuso's teachings focused more on the stage between planning and execution of a process than on the design subject. According to Zanuso, "conceiving, planning do not grow and do not live anymore within a production process, but outside, in a more complex process in which several elements belonging to any design sector interact. The designer modifies his identity as he is not completely focused on his intuition, his experiences and his job but he can be considered as a runner on a very complex field, trying to get useful information to improve and define his plan considering rules imposed by industry. It is not and cannot be subordinated to creativity, but industry becomes an important element of an interactive relationship, in which it represents a source of artistic creations, component parts, materials, systems, processes, essential items for planning."

This is Zanuso's approach at the studios of 'Artistic Design for Industry,' Faculty of Architecture – that design for the industry involves imprinting on a student how to 'manage a process' and not just 'how to draw.' Analysing the teaching approach used in these studios and the stages faced by a student to reach the task of a project, we can understand the reasons for some choices, both structural and methodological, used now within the departments of product design at the Faculty of Design of Politecnico in Milan.

As an example we can mention an experience of Zanuso and his assistants teaching with him at the design course, during a short-term project. Zanuso usually fixed a time limit of three to four weeks for his students to carry out a project. This was made up of three steps: The first one was based on deciding and introducing a brief of the project to the students, so during the first lessons the students were explained the groundings of the subject, and were shown previous similar projects and illustrated technologies useful for performing the task. In the second step students went on to the treatment of the subject and teachers helped them not mainly talking over an idea of a student but finding out the consequences of that idea, leading him to get the complexity and the implications of his/her project little by little, finally achieving the right degree of coherence and close examination of the stage between the starting idea and the performance of the task. The aim was to understand that a project could neither be just an idea nor a drawing, but a decision derived from the will of a designer through the elaboration of complex information aimed at the execution of the project as an *idea*.

In the third step, the teachers posed as clients. Knowledge offered by the teachers posing as clients emphasized the need to interact with industry. This method of teaching stresses that theoretical content should be compared with the practical technical knowledge.

These above-mentioned methods had never been applied until the 80s by Italian universities and most other European universities as they used a 'deductive' method of teaching. In this method training was seen as an orderly, systematic process in which theoretical contents and knowledge were the basis of a process of training and were taught before practical technical contents; the know-how, considered as a consequence, was left at the end of this process. In most disciplines this part was faced when the trainees started work.

The clear division between knowing and knowing how to do and the sequence of stages reflects the arrangement of the production sector, typical of Italy until the 80s, characterised by a strong top-down business administration, a strong division in the distribution of tasks, a distinct individuation in technical management and administrative roles.

It was at the end of this decade that the organizational method showed its frailties, and a reassessment of the business system in which roles and tasks were modified, hierarchies simplified and processes streamlined, was necessary. Through this conversion, manpower and knowledge were considered as essential to enter the market for material goods.

The new awareness of the importance of knowledge as one of the crucial elements of the productive-economic system, together with a reassessment of the business organization, made the University reconsider knowledge conveyance so much, that it doubted the potential of the 'deductive method' and considered a new method, the 'inductive method' that supports the parallel between knowing and knowing how to do, theory and practice. Consequently it connects the two different sources of Italian design: art and industry: the former is certainly based on theory and history, the latter on knowing how to do.

Tasks derived from teaching through an inductive method join these elements in order to let the new designer grasp the features of Italian design.

Being aware that knowledge was becoming a crucial element within the industry, in the 80s it was necessary to separate the discipline of industrial design from architecture, to subordinate industrial design to requirements and schemes of industry.

3 Results

On this basis the first degree course of Industrial Design was launched in Italy in 1993, established joining the tasks of the faculty of Architecture (centred on an artistic point of view) and Engineering (centred on technique), in which the training method is inductive. The courses of studies offered by this degree course are several and they meet the needs of the Milanese industry as it was for the first courses at the Faculty of Architecture.

The degree courses offered are Product Design, Fashion Design, Interior Design and Communication Design together with the recent Design & Engineering. Each course has its own training program but the structure is the same and the subjects involve specific tasks of practice, considered as the teaching centre at the Faculty: knowing and knowing how to do.

Students attend courses characterised by knowing, as they are characterised by theoretical contents, like Mathematics, History and Marketing called Thematic Courses and others focused on both the area of knowing and knowing how to do, offering overviews of ample issues that play a particularly important role in the contemporary context. They cover more than one discipline or specific context and are called Integrated Courses, for example, "Technology & Environment" or "Society & Communication."

Workshops are also based on the concepts of knowing and knowing how to do, characterised by disciplines partly practical and partly theoretical. This teaching method establishes some project activities for students, who conduct activities both to familiarize with the tools of design as in the case of Drawing and Visualization Studio and the Computer Graphic Studios and to learn professional routines as in the case of Industrial Design Studio.

As regards the above-mentioned workshops, the inductive method is considered crucial and this is mainly due to the existence of core faculty conveying "the knowing", and businessmen and professionals conveying the "knowing how to do."

The choice of having three different figures as such teachers means the need for leading the student to the outside world different from an academic context, providing him the necessary groundings to enter the working world.

Considering the Industrial Design workshop within the degree course of Product Design, a strong connection with the first above-mentioned courses/workshops of Italian Industrial Design emerges. Indeed students as future designers acquire management skills in the planning of a project – an element favoured by Zanuso. This means knowing how to correlate his/her own knowledge in order to perform a project of functional, technical, formal, aesthetic values.

It is evident that these features are connected to the socio-cultural context and to an economic-management point of view in order to interpret and satisfy business trends, demand and consumer's trends. These needs are showed within the studios of Industrial Design of the Product Design Course, during the whole training course, both in the three-year degree and in the two-year degree Masters degree, and in specialization courses of the Faculty.

In order to understand the course, the procedures and the results requested by the Studios of Industrial Design, it is important to tell the experience of a group of students attending specialization courses in design for the electric and electronic domestic appliance industry and this is one of the University specialization courses that the Faculty has launched to continue the relation between the university and the industry.

A Masters course provides for the involvement of students culturally trained but specializing in specific areas. Consequently the Masters course has been organized in order to have many classes on product design and to construct these products by an optimum level of production many household appliance firms have been involved. These firms were engaged in the course, first proposing a brief and then training the students during the development of the project providing the technical and specific tasks of the production.

The scheme showed on the next page explains the stages in the project of students following the brief given by a household appliance firm.

4 Conclusion

This teaching experience highlighted the capacity of the design faculty to catch the elements as a whole, necessary for managing a project, allowing the student to finish his studies with a store of well rounded knowledge, both theoretically and technically.

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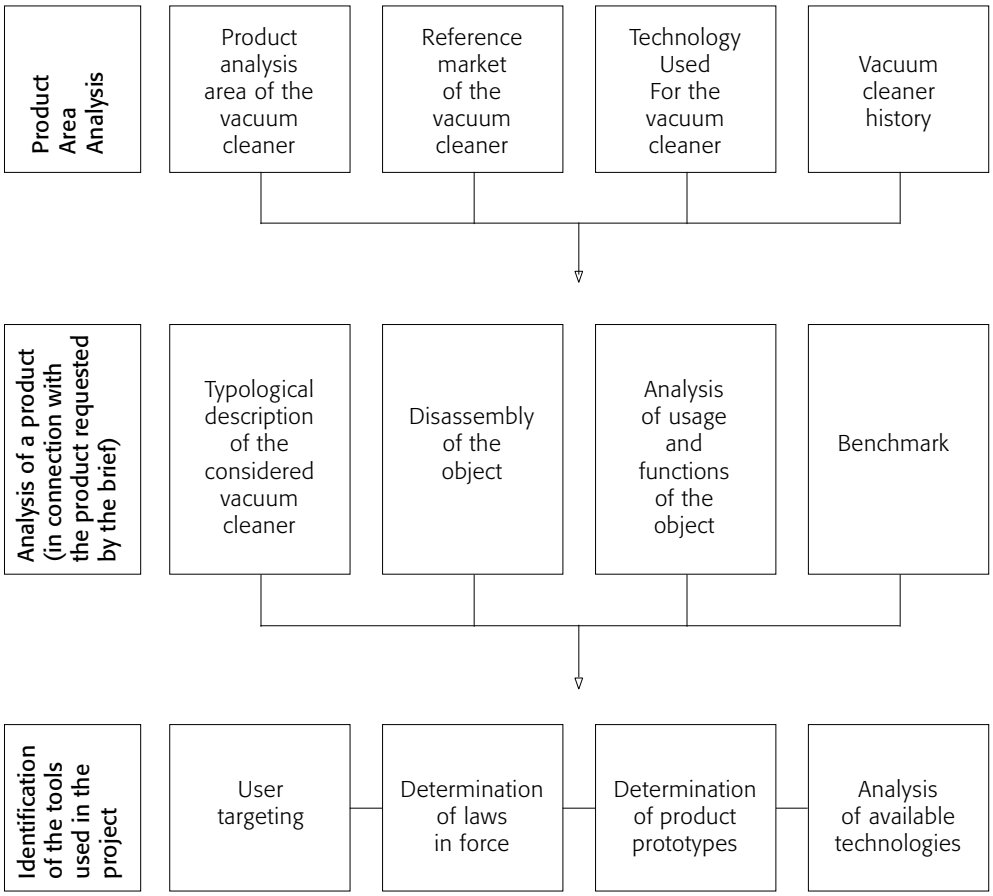
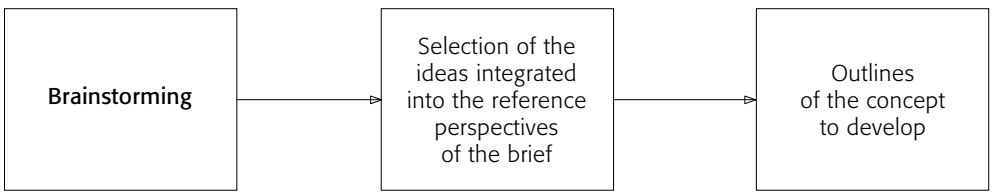
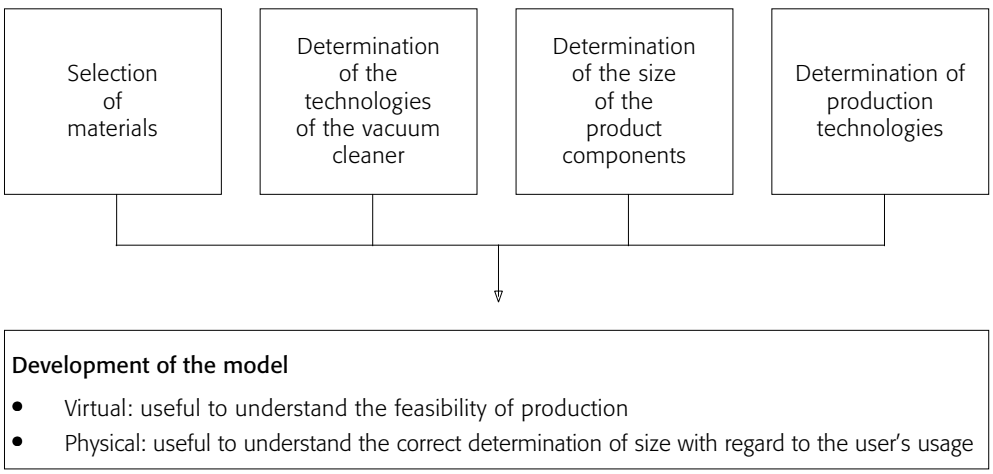
Step 1: Analysis



Phase 2: concept



Step 3: Design of one of the conceived concepts



Design Education for the Under-privileged

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The contexts of design and design education have been areas of immense interest for him as these have a major bearing on the design activity. He intends to work towards integrating design education to contexts where high traditional skill levels exist with low levels of formal education.

Presently working in areas as diverse as Stainless Steel and Bamboo, he is also involved in industrial projects at the NID's consultancy services department – the Integrated Design Services.

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This paper pertains to design education for people with little or no formal education. This is a reflection of insights gained while teaching such students at BCDI, Bamboo and Cane Development Institute, Agartala, Tripura.

The nation being rich in traditional skills with a rich cultural heritage to draw inspiration from, efforts towards reviving these skills and invigorating them with contextual design inputs would equip the craftspersons with a broad understanding of the skill, the products and artifacts, market segments for such products, costing and merchandising.

To this end, design education has to be customized to the sector specific and trade specific classes of craftspersons. The design tools should be very much identifiable with and easy to relate to. As far as teaching such groups is concerned, many innovative approaches specific to each batch of students needs to be adopted. It has to be a mix and match of the general design courses and those that would cater to the same end in a more effective way, customized with a local flavour. This helps disseminate simple concepts in geometry, freehand drawing, orthographic drawing, and complex aspects and intangibles of the design process such as elements of design, aesthetics and drawing and sketching in a playful and enjoyable manner.

The models of education to such students would be successful if it enabled them to shed the mind blocks that they come with vis-à-vis the material, its workability etc. Such programmes also need to include as imperatives, inputs from other craft sectors native to the region such as jute, coir, other fibres, wood metal, leather etc. These inputs shall serve as curtain raisers to the students and result in awareness and appreciation for collaborative efforts within the sectors.

An understanding of cooperative and collaborative efforts towards achieving mutual objectives of socio economic betterment as a self sustained activity would perhaps be the most desirable result for the students.

Keywords: *education, context, innovative, model*

Introduction

Design education in India has remained largely confined to institutes of higher education offering design programmes at the undergraduate and postgraduate levels where the models of education cater to students with formal education.

India as a large expanse of geographical, cultural and social extremes has myriad traditional art practices and region specific skills honed over the ages. These skills have evolved to perfection, producing artefacts with immense aesthetic, functional and semiotic attributes. The community specific skills and practices are mainly carried over to generations by way of lineage and household trade. The products are essentially sold at village fairs and some find a way to the city markets

through regional traders who procure the products from the individuals at very low rates. Some channels have also been developed through governmental intervention and state agencies that offer platforms for the sellers by way of trade fairs and exhibitions. With profits fizzling out for the producer and traders reaping the benefits instead, the sense of beauty, art and novelty in the products gets compromised for producing more and getting paid a little more. This apart, migration from traditional crafts to the lucrative urban centres has dealt the final blow to the craftsperson and the rural sectors for which crafts was the mainstay apart from agriculture.

In this context, with the majority of the population living in rural India, with farming as the main activity and traditional crafts as a substitute, a dire need has emerged to work out a programme of design education for this group of people; a programme to sustain and replenish the skill levels among the crafts persons.

These insights draw heavily from my experience as Faculty at the Bamboo and Cane Development Institute at Agartala, Tripura. The institute attracts matriculate level students from across the country. Two courses, the certificate programme (6 months) and the refresher programme (3 months) are conducted simultaneously throughout the year. Each batch of students is peculiar in itself in terms of language, social backgrounds and cultural composition. In such a scenario no single language can be selected as the mode of communication. Students, not necessarily having worked with bamboo as a material, come with an aspiration to 'learn something new' and carry back home a skill or two. This is apart from the certificate each one eagerly looks forward to getting at the end of the course which helps in availing financial help by way of loans etc. from government agencies and banks, and also in getting employment in technical centres run by local bodies and in government sponsored programmes.

The course programmes at the institute are an ongoing process of teaching, learning and evolving the programme itself as the batches progress. Actual, real time experimentation and innovation happens to help the students understand and assimilate design as a concept and to enable them to relate to the ongoing education process that they are part of.

Innovative methods are adopted to drive home in an easy fashion, topics such as elements of design, costing, product positioning, etc.

Experimentation and Innovation

In the eagerness to learn new things and learn fast, the students have a tendency to fail to appreciate the learning that happens during a process of an assignment or a course. The trend is to quickly see and memorize or register new and novel designs in products that they see around with the intention of going back and beginning to produce and sell them. It becomes quite a task to get them to go through the grind of doing things and convincing them of the learning that happens in the sheer activity of doing things. One way of doing this is to formulate activity based introduction to learning.

Introduction to basic geometry, measurement and dimensions

Most of the students in the batch I taught were not familiar with systems of units and measurement, dimensions and geometry. Thus, after initial introduction to geometric shapes such as circle, square, rectangle and triangle, the students were asked to identify and analyse the said geometric shapes in and around the institute. This activity was also to be done in groups as an option. In doing so, real understanding of geometric shapes happened. For example, measuring the radius and diameter of an earthen pot with a plant in it, serving as its centre, or measurement of triangles in the trusses of a metal structure, or measuring the dimensions of the omnipresent brick, which offered the dimensions of length, breadth and height. (figure set 1).

Coming to sketching and drawing it needs to be noted that the students have to be taught to do workable technical drawings. This does not imply that they be given intense courses in making standard engineering drawings. Instead, they need to be able to draw isometric and orthographic

Figure set 1: Measurement and dimensions

drawings to the extent that they put on paper the ideas and concepts that they can think of. This is a very important skill for a craftsperson. To be able to put on paper what they think and then explore its feasibility by doing the orthographic drawings complete with the plan and elevation up to a level where the mental concept becomes more refined as the drawing brings out the viability of the concept, its practical limitations etc. is desirable. This also develops the cognitive understanding of form and proportion. The fact that one starts with measuring common objects and appreciates proportion as a feature of the object, imparts an understanding of both dimension-measurement and proportion.

Elements of Design

Students take to sketching quite easily. It is only after overcoming the initial inhibition to sit and start sketching that they really start enjoying the whole process. Along with nature drawing, object drawing in free hand develops mental coordination of the student to see something, analyse and appreciate it and then reflect it as his or her understanding on paper.

This inhibition can be eased out in an environment where sketching, nature drawing and aesthetic appreciation happen in absolute oneness with nature (figure set 2). This environment ought to constitute all the quintessential characters and mundane elements of everyday life. Elements that the students have been seeing all along, but have not appreciated in a way so as to see the beauty, construction details and an inspiration in each one of them. This actually enables them to see richness and character in the work they do later with a profound sensitivity. Such environments to work in are not to be sought far off; in fact all of this is easily available everywhere around us, especially in a rural or semi-rural set up.

Figure set 2: Oneness with nature

A definite inhibition is observed among the students to confine themselves to dealing with complex concepts of mental imagination and perception of patterns in 3d-space like the ones prescribed by design curricula. There exists an inherent difficulty in getting the student to do this kind of assignment.

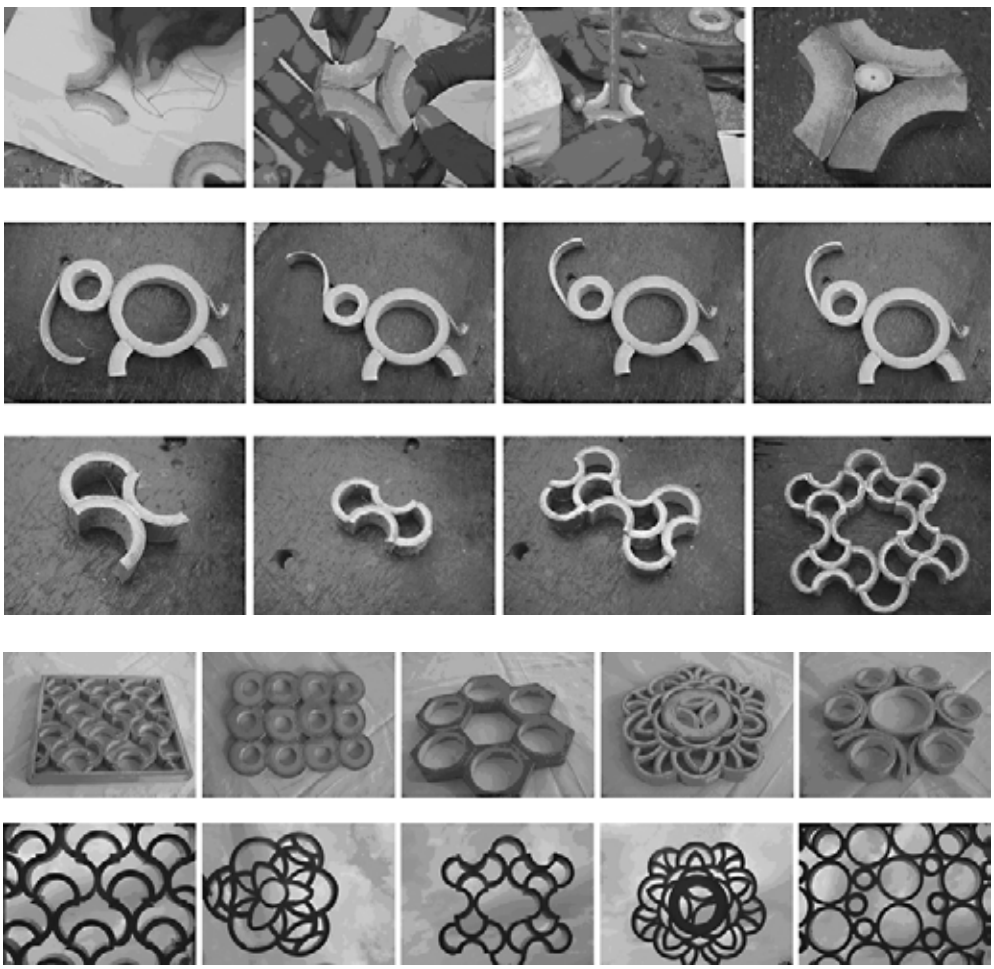
One can have small assignments where small products or just explorations are done with materials native to the region or the regions from where the students come. Not only does this generate a variety of design approaches that each one of them carries without being actually aware of it, but also helps each one of them see and appreciate the skills in the rest of the batch. This also helps the students appreciate new and different ways of doing things, peculiar forms and designs in the same material or different materials. The students see such work as the result of the process of thinking differently and it helps in overcoming mind blocks regarding the affordability of material as a medium of doing things. It is here that the student starts to develop a broader perspective of things and starts to think and see beyond the obvious and the conventional.

Beautiful examples are the strip based evolution of fish, the palm leaf based braiding, rope based knots, the cigarette case windmill etc. (figure set 3). Such exercises immensely help understand and appreciate complex concepts of elements of design and 3d-space in an enjoyable manner.

Figure set 3: Learning from each other – palm leaf based creativity

For courses in elements of design, the students need to be given assignments on repetition, patterns, tessellation etc. with the basic material (physical 3d material) that they feel comfortable with rather than the conventional methods of the black and white figure and ground permutations and the likes of it (figure set 4).

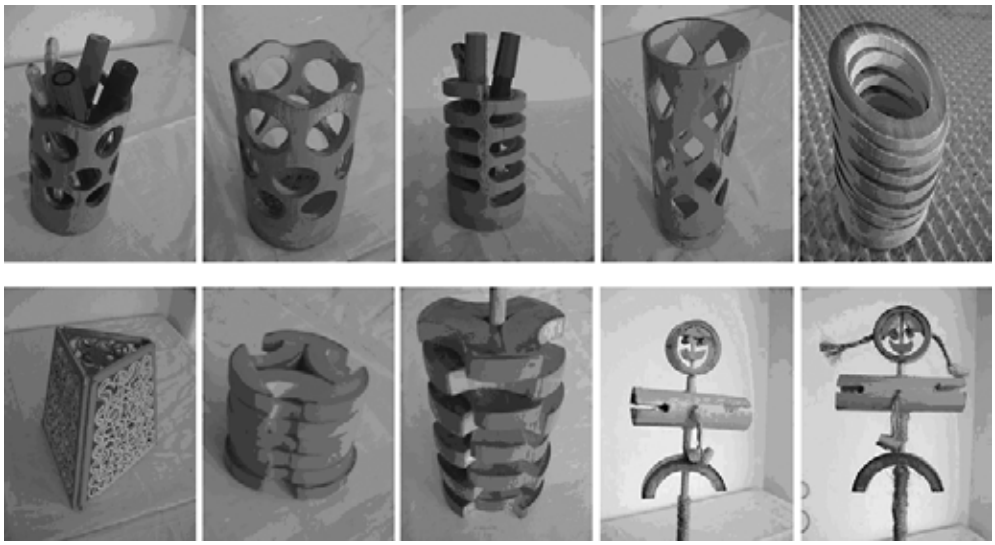
Figure set 4: Learning with the material



When I taught at BCDI, I developed assignments on elements of design with bamboo as the basic material. Students enjoy working on these, given the 3-dimensional physical aspect of the assignment. This apart, the students appreciate the assignment better if, in addition to its intended function of making them learn something, it also has saleable products as the outcome. The course in elements of design actually ended in saleable products like tea coasters, curtains, lampshades, decorative panels etc. (figure set 5). The realization that the learning process is leading to actual products helps the students maintain interest and energy levels throughout the course, which is not the case otherwise.

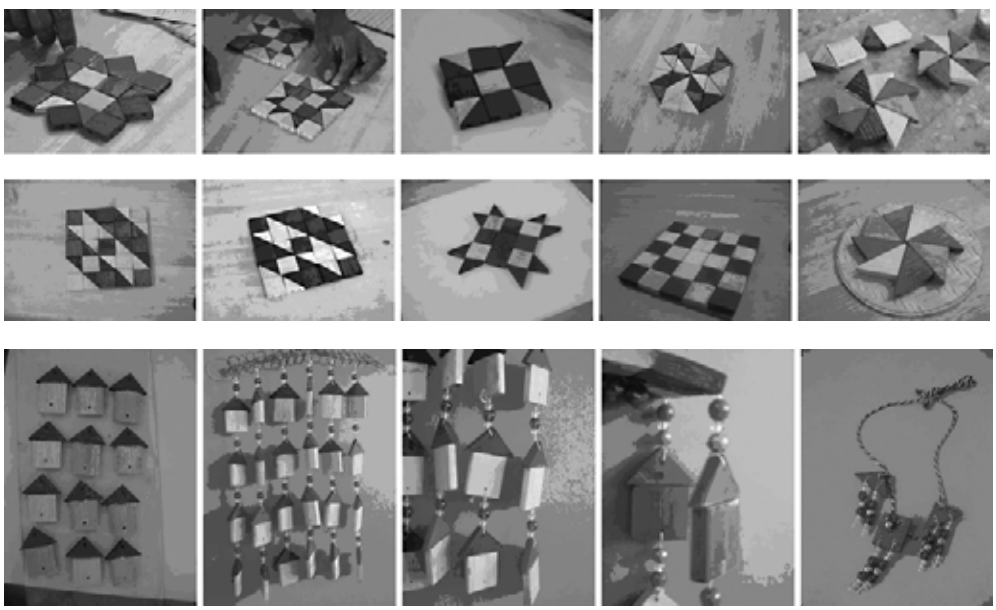
When students are made to do classroom based design assignments it is seen that they take it more as drudgery, without actually understanding and assimilating the gist of the course. It is essentially because the students at such levels come with an intention of getting trained in skill and physical abilities explicitly related to products they perceive as saleable as against the development of mental and cognitive abilities that are followed in the early stages of a design curriculum.

Figure set 5: Creating products while learning



This method of imparting concepts of design through workshop based assignments and tasks which actually take the form of products gives the students a sense of purpose in the activities they perform and confidence regarding where the course programme would actually lead them. One such assignment was to use small pieces of bamboo in different geometric shapes such as squares and triangles and conceive products based on explorative use of the pieces (figure set 6). This assignment was intended to drive home the experimental nature of design with the joy of serendipity and also for the students to think differently in terms of using the material in innovative ways against the conventional usage which is strongly embedded in their minds.

Figure set 6: The sheer joy of creating



These kinds of modules help the students extend the same understanding and innovative experimentation while designing and developing products later in the course. One can safely presume that this understanding would also reflect in the work they might do later, once they pass out of the institute, and are on their own.

Technical Knowledge

The students also need to have courses that upgrade their technical faculty. So, apart from the ability to do dimensional drawings (figure set 7), they were also imparted skills in using geometric equipments like set squares and drafters. The use of such instruments puts them in a different level of functioning.

Figure set 7: Proficiency in dimensional drawings

A greater sense of professionalism and seriousness sets in. This ability, even if not used regularly, would definitely be an asset in dormancy, to be exploited as and when the need arises.

As the institute imparted skills in use of bamboo, it was felt necessary to impart knowledge of structure and strength of material. To this end a module was designed for the students to understand the technical aspects of material like behaviour of different sections in bending, cantilever bending, free and constrained links, stability of three link frames etc. (figure set 8).

Figure set 8: Strength of 3-link system

As a logical step to this the students then went on to design and develop products (figure set 9) based on these principles. In doing so, the students not only understand the concepts of strength and structure, but also assimilate it as they see the physical structure in the products they design, corroborate the principles introduced to them.

Figure set 9: Some of the products

Skills in metal work wood like turning and fitting would be an addition to their overall skill-set this would equip them up to perform in a wider platform.

Worldview

To develop the understanding of the students regarding business and financial aspects related to manufacturing products and trading, insights were given from process and product costing points of view. The whole gamut of issues which contribute to the cost of a product, right from raw material procurement to transportation, processing, product development, overheads, labour, production processes etc., had been dealt with in detail by authorities in the area.

These discussions articulated the hidden costs in a process or system which do not get generally noticed but which nevertheless add to the cost of the product. Terms like cost, price, value and profit

were lucidly explained and discussed. Issues like time and motion analysis and its importance in reducing the cost of a product or process, its implication on profits earned, etc. were introduced to the students in an easy and understandable manner by getting them to perform the time study for the products they made and also arrive at cost price considering overheads like electricity, rent, labour etc. This session on costing was extremely useful in conveying the importance of issues that are usually neglected in a work set up but adversely affect the bottom line at the end of the day. Students could appreciate the significance of small issues like running a machine idle, wasting time between jobs in the workshop, right sequence of operations with corresponding layout of machines etc.

Also, with the intention to expose the students to the whole chain of farm producers, traders and retail sellers, visits were organized to emporiums, entrepreneurs and traders, local outlets of government agencies, SHG's (self help groups) state level trade fairs and village fairs.

Observations

Having taught the students and having evolved with them terms of understanding, their obvious and latent intentions and aspirations, many a step had to be taken to convince them of the feasibility of the whole programme. One way of doing this was to customize the course contents so that the process of assimilation and design education did not conflict with the objective of the students, which was to quickly learn how to do new products. It had to be a new approach, where the students were required to perform workshop based activities that actually helped imbibe the intangibles of the design process.

The basic principle was for the students to learn not by listening with concentration or by stressfully trying to learn things on paper, sitting in the class, but rather, learning by observing and learning by doing, learning by exploring. The students readily took to this method of education.

That these methods have been successful can only be inferred from the abilities the students developed over the course of the programme and this reflects in the products they have done and in their ability to sketch and draw and conceptualise with a good amount of ease.

Here, it would be pertinent to mention that a fair degree of nudging has helped the students arrive at products they have designed. This is primarily because of the fact that within six or three months it is difficult for an uninitiated mind to imbibe and appreciate most effectively the concept of design. Nevertheless the students, on realizing their concepts into products, overwhelmingly appreciate the bearing that the design modules and exercises have on products they design and this perception lays the mental frame for further design tasks. A programme of longer duration would be able to accommodate more effective ways of educating such students, giving them more room and space to gradually evolve with the programme.

Conclusion

Holistic design education as a means of skill development can provide employment opportunities to school dropouts and matriculation level students. It offers immense scope to instil a sense of purpose and confidence among the youth from skill rich regions, with little or no formal education, to earn a decent livelihood. The skills that each one of them carries shall die the moment the craftsperson migrates to work as daily wage labourer or as some other trade that would offer a livelihood. This is not to say that such people should not have the right to choose a livelihood option, but a crafts person who is willing to carry further his skills and elevate this livelihood to a level of decent earning ought to get an opportunity to do so.

Such models of design education will offer an opportunity to the crafts persons who are willing to educate themselves and enhance their skills. This would also offer employment opportunities in cooperative societies run by NGO's, government agencies etc.

These centres may assume the status of ITI's (Industrial Training Institutes), offering vocational courses and can specialize in different trades as is the current practice at the ITI's. The ITI's offer trade specific courses like carpentry, metal-turning, fitting, welding; electronics-radio and TV repair etc. On similar lines the craft centres may conduct programmes in trades specific to regions. The students from such centres can expect to get financial assistance to set up small ventures, and the produce may be procured by state agencies that promote sale of such products in fairs and exhibitions. The students can get employment in governmental agencies like the KVIC, Small Scale Industries Commission and also NGO's.

Such a step would help young people pursue their areas of skill based activities, develop them further and carry forward the innate traditional skills, their craft legacy and above all earn a decent livelihood.

Collaborative Learning Practices

The design process is increasingly becoming a collaborative exercise. The success of design — as the papers published in this section state — often lies is a collaborative approach. Design is a problem solving discipline and more often than not, requires designers to acquire multidisciplinary skills. In her paper, Stephanie Munson of School of Art and Design, Chicago, cites the example of Interaction Design, a complex discipline that requires its practitioners to acquire knowledge of graphic design, industrial design, information science, psychology, computer engineering, ergonomics, cognitive sciences, cultural issues, etc.

More often than not, collaborative exercises involve design, engineering, and management. Industrial designer and architect Anubha Kakroo makes a strong case for collaboration between design and management. Both these disciplines have much in common: both lay emphasis on tools like lateral thinking, holistic approach, strategizing, innovation, quality, etc. The effort should be in integrating the qualitatives of design with the quantitatives of management and helping shape individuals who can have a comprehensive worldview. Integration of the two streams could result in a holistic and robust curriculum, which will give us leaders of tomorrow, she says.

Collaboration between disciplines, between institutions, between institutions and industry or between institutions and the government or non-governmental organizations appears to have gained considerable ground as an approach to find solutions to problems – whether local or global. There is growing recognition of the importance of applying skills and thoughts to a shared understanding of a common problem. Peter A. Di Sabatino of Art Center College of Design, Pasadena, states that most of the funded studios are now transdisciplinary and collaborative, involving institutions, industry and governments. There is typically multiple and diverse representation from the corporate or industry partner, often with inclusion of their design departments, marketing, engineering, and management areas. Collaborations and combinations, with multiple perspectives, are key.

He succinctly sums up the spirit of collaboration when he states, “Design, designers and design education should not stay behind thick academic walls and narrow disciplinary definitions, but rather must actively engage broader worlds and cultures.”

Collaboration and Combination: A Trajectory for Design Education

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This paper calls for transdisciplinary education and practice. It argues for collaborative models of education and practice. It suggests greater diversity. Design education should open itself aggressively to others in, and beyond, the university. Significant engagement with the world is called for; an engagement that can be extremely educational, can provide social and humanitarian advantage, and can create corporate and industry benefits for us all. It argues for creativity and innovation – for creative talent and leadership that bring processes, perspectives and talents to collaborative, diverse and complex situations.

We can no longer wait to be called, and to typically be called too late. We are not simply problem-solvers; we are opportunists. We are strategists and leaders; and we should join, at the initial moments of an effort or situation, with other representatives of leadership and expertise. We are entrepreneurs in many ways, and this spirit of entrepreneurship may manifest within governmental, civic, community and/or corporate realms.

This paper uses various collaborative educational projects, processes and attitudes to make its arguments simply trying to provide a nudge, a call to action. And it is not demanding a replacement of other approaches and attitudes, but simply asking for its inclusion in the educational process and experience of emerging designers.

Particular focus, in addition to sponsored collaborations with global private sector (industry/corporate) entities, will be placed on a public sector project, process and body of work done in an upper-term studio at Art Center College of Design. The project is a village to be built in Kenya, Africa that will become the new home for orphans and elderly displaced by the AIDS pandemic. The Nyumbani Village is intended to also serve as a model for subsequent reiterations throughout Kenya and the continent. The process is highly collaborative, complex and transdisciplinary.

Keywords: *transdisciplinary, collaboration, global, leadership, complex*

Reciprocal (and modern) Relations

A primary and important direction of design education, and subsequent practice, is collaborative and combinative studies and work. In education this may best be expressed as multifaceted and complex transdisciplinary studies and practices. The design studios and classes immerse the students into the worlds and processes of others, and often beyond typical departmental and faculty structure. The form of design education may include corporate or civic partners and may engage with communities beyond the local context. Additionally this speaks towards a dualist and dialectic approach with more simultaneous and multiple attitudes. The inclusion of simultaneity and multiplicity as a pedagogical component to design education presents a more complex and possibly richer model. In other words this is not a search for simple processes and modalities of production, rather it is intentionally difficult and complex, with at least a bit of ambiguity added to the mix. Also, these issues present a fundamentally modern concept and practice of education. Learning is not simply linear, contained, hierarchical and centered; it can embrace the spectrum of modernity conceptually

and formally. It can be inclusive of dialectics such as modern and traditional, local and global, for example, and engage more influences, constituencies and partners directly in the process.

Art Center College of Design and the Corporate Community

To exhibit this approach to design education, and subsequent practice, I will share some projects and processes that have been executed at Art Center College of Design. I will start with, but not continue as the primary focus of this paper, studio projects that are collaborative with corporate/ industry partners. Art Center College of Design has established frequent and explicit relationships with industry and the professional community for decades. The Funded Educational Projects (FEP's) are administered by the Office of Corporate Relations, in concert with the various Department Chairs and faculty. These corporately funded design studios commenced in 1958 with Toyota and the Transportation Design Department at Art Center. While the early history of the sponsored studios engaged Transportation and Product Design students, the program has expanded to include Environmental Design, Graphic Design, Illustration, Advertising, Film, Photography and other disciplines. It is the intent at Art Center to further expand these studio opportunities to additional disciplines within the College at the undergraduate and graduate levels, and to further develop the interdisciplinary aspect of the program.

A new curricular structure has been created to further enhance transdisciplinary offerings college-wide, employing the sponsored project (FEP's) studios as a key component and existing model, in that strategy. Part of the intent within this college-wide curriculum is to expose students to differing design processes and perspectives – as well as end products and presentations. Perhaps, through this exposure and experience, students may re-conceive or re-combine disciplinary definitions and boundaries. This is not to say that there are no single-major sponsored studios at Art Center, or that all studios in the upper-terms are transdisciplinary. Single disciplinary studios still occur, and will continue; but the College, in collaboration with the sponsors when applicable, has been taking a more proactive role in crafting an appropriate mix amongst majors when that is felt – and it is more and more the case – to be best for the fullest exploration and articulation of the problem, project or opportunity at hand. In fact, most of the funded studios are now transdisciplinary. Further, there is typically multiple and diverse representation from the corporate or industry partner, often with inclusion of their design departments, marketing, engineering, and management areas. Collaborations and combinations, with multiple perspectives, are key.

These Funded Educational Projects are not the only instance of strong relationships with industry and the professional community. Some additional relations are accomplished by the Office of Recruitment – including assistance with internships during the student's time at Art Center and full-time job placement at graduation, and through professional advisory committees and ongoing interchanges at critiques. And, at Art Center, most of the faculty are practising professional artists and designers. This is a multi-pronged strategy of positioning the college, its students and faculty to be both in, and of, the world.

Fundamental to the sponsored studios is the concept, and reality, of relationships that are reciprocal and respectful. There must be a strong reciprocal relation between the studio and the sponsor. Both must have ongoing input throughout the design process and all must "benefit" from the process. The benefits from the students work in the design studio are not always immediately tangible. Typically, the problem is, and solutions are, open ended and oriented towards the future – a ten-year time frame is not uncommon. This aspect of distance in time helps foster the exploratory nature of the studio, and heightens the necessity and importance of research. The role of research cannot be overstressed. In many ways the studios simulate a research and design laboratory. The critical dynamics of the multi-dimensional composition of the sponsor's team is met by a collaborative structure at the level of the students and faculty. Working in teams is typical; and at least some group work is employed due to the complexity and scale of projects – as well as to achieve pedagogical and institutional goals. This also refers to and exhibits part of the "combinative" aspect of this paper.

It is, of course, required that these studios are always educational. They are akin to an incubator or laboratory situation even though they engage "real" problems and "clients" (or the possibility of such an impression at times). The studios serve as an exploratory environment where learning always retains the primary position. There is typically an evaluation or re-evaluation of a problem or possibility; the studios are not simply about a re-design of a given product. The students are not "working for" anyone, nor are they delivering a specific, narrowly defined product. It is critical to stress, again, that there is more re-evaluation and innovative, strategic design than simply "re-design."

The students and faculty within the sponsored studios bring a new, fresh perspective and point of view to the topic or problem. However, exposure, exploration and learning are not only in the domain of the students. The sponsoring entity similarly gains from this untainted, and not yet jaded, environment. The studio becomes a free zone - a neutral ground - where professional and academic worlds can meet. This new intermeshed world is where ideas, perspectives, experiences, dreams, expertise, assumptions and naiveté dance. It is where the known and the unknown collide. It is where "what if…?" confronts "we can't do that…we could lose our job…" Risks are taken. Innovation, creativity and entrepreneurship merge.

The students bring energy, enthusiasm, curiosity and creativity within an environment of current skills and technologies. The professionals bring interesting problems or topics with expertise and a breadth and depth of experience and knowledge, while the Department Chairs and faculty ensure educational appropriateness and overview, and the pedagogical strategies and tactics. Within the sponsored studios at Art Center there is both a grappling with, and (at times) suspension of, realities allowing freedoms and constraints to creatively simmer. The research and design that occurs benefits the students, faculty, sponsors and institution alike – and perhaps the world at large.

The sponsor also makes a strong statement of support for education and for the institution. Beyond support, there is a message that education, exploration and experimentation combined with broad/radical thinking and beautiful craft is valued. It is a powerful message from the sponsor towards its staff, management and clients. Internally, at Art Center, theses studios also send a powerful message to the students and faculty. It is one manner that allows us to clearly state that design does matter, and that it ultimately exists significantly in the actual world – not solely in the academic studio. Art Center is teaching future professionals and leaders in their fields – the FEP Studios are one way to assist in that process.[1]

Art Center College of Design and the Non-Profit Sector

In addition to direct engagement with industry and the professional community, the college has recently increased the amount of studio work undertaken in collaboration with the non-profit sector, civic society, governmental and community organizations. Art Center has formalized and strengthened design work within the school that has an expressed social and humanitarian focus through an initiative and committee/office structure entitled *designmatters*. *designmatters* administers and advocates this type of work at the college by serving as a clearing house and facilitator, and has also provided the leadership that has resulted in the school being awarded NGO (Non Governmental Organization) status through the United Nations. Art Center College of Design is the first art and design school to attain such positioning, and has already significantly engaged in projects and topics both within and beyond the United Nations.

I will now shift primary focus to a particular project, and the broader implications and intentions, which engage this type of work. This very collaborative and complex project – the design of a village and its systems in Africa with students and faculty from Art Center and many other contributing parties, including United Nations, governmental, public and private agencies – addresses numerous issues of the DETM 2005 conference.

Nyumbani Village will become the new home to approximately 1,000 orphans and elderly facing a desperate aftermath of the AIDS pandemic. The children have lost their parents, and there is no

capacity in the remaining family structure or clan to care for them. It is estimated that there are over 12 million orphans due to the pandemic. The elders have lost their middle-aged sons and daughters, who in the prime of their lives would have normally provided for those who now have become elderly, extended victims of the HIV/AIDS pandemic. Nyumbani Village will merge these populations to create a new inter-generational family and community structure, with symbiotic relations to existing local community.

Nyumbani Village is to be sustainable and at least self-sufficient; actually it is hoped that the villages will go well beyond self-sufficiency and become educational, cultural and economic models for the country and continent. The first village to be built will serve as the prototype for subsequent reiterations throughout Kenya and Africa, providing a systematic response to the pandemic and offering the fullness of life's opportunities for the community. Research and design in an upper-term design studio at Art Center College of Design has been applied to a hypothetical site (since the actual site had yet to be fully secured at the start of the studio) of 1,000 acres, with a large agricultural component, in the region surrounding Nairobi.

Preliminary research and design work was undertaken by students at Art Center over a fourteen-week period in a highly transdisciplinary environment. Students from Environmental Design, Fine Arts, Graphic Design, Media Design, Industrial/Product Design, and Film collaborated on this project. I served as co-faculty with Annie Chu. Additional collaboration came from the Kenyan community in the United States, diverse professionals and academics from the college and beyond, other lead project partners and *designmatters*. A folio publication containing 58 project-cards, double-sided for 116 layouts, and a short video documentary were also designed and produced by the students during the semester. Additionally a poster version of the work was created for reviews, presentations and exhibitions; all work was designed and produced internally. The work has been distributed to a wide and diverse audience, and has been very well received. It has been selected for various publications and exhibitions, and has won numerous design awards to date. It has been used as a public relations and communication device internally by Art Center and externally by other lead partners; and, as well as increasing awareness and activism, the work produced to date is serving as

a fundraising tool. Importantly to the process of the project, it is acting as a stimulator for discussion and future decision-making by the lead partners and the local and professional community in Kenya.

While a large, diverse body of work was produced, it is imperative to note that it is preliminary; it is, in fact, "pre-design" work, and best viewed as speculative expressions of intentions, ideas and needs that will be discussed and reinterpreted with other lead partners, and local professionals and communities in Kenya. It is not intended to be a final design proposal; we are not imposing an external design. It is a starting point via design and design processes to be discussed, acted upon and redone. Importantly, at Art Center, we are viewing all of this as an incredibly rich and meaningful educational opportunity for our students (as well as an offering of our abilities and efforts), with the intention of significant study abroad in Kenya and direct immersion with the project, people and place. This process is particularly relevant for the Nyumbani Village project and its complex prototypical nature, further compounded by the diversity and breadth of the collaborating partners, and the inherent complexities of the project.

This project is very much about collaboration and process. The other lead partners include the governments of Kenya and the United States, various United Nations agencies, and numerous global public and private entities. Special mention must be made of Father D'Agostino who founded Nyumbani Orphanage (for abandoned children that are HIV/AIDS positive) in Karen, Kenya; he has provided key vision and stamina for the villages. That design sits at the table with these entities is incredibly significant, and that we are present throughout the process of discussions and decision-making is essential. For example, I had gone to Kenya, with the department chair of photography and a product design student attending Art Center (and who is from Nairobi), about a year in advance of the studio for a series of meetings with the other lead partners. This initial trip was also to gain primary experience, research and foundational design assets primarily in the form of photography, film and sound. Art Center, representing design, creative leadership and education, has been present for conceptual, policy and procedural formation of the village project. To continue the example further, the president of Art Center, Richard Koshalek, was asked to join the American Nyumbani Village Board of Directors. The people in positions of leadership amongst the key partners confer frequently. I was able to bring these discussions and issues forward to the students in the design studio to provide part of the content and context in our explorations and articulations. Design education must connect with and affect the world at large, in many ways, at the earliest possible moment and throughout the process. Following additional discussions with key partners and others, all of the planning and design work will be done again with the actual site, local community, and local professionals.

The studio explored ideas, issues and approaches. Nature, community and weave became three key anchors – joined continually with issues of culture – and were examined at large, medium and small scales, and through various typologies. The students worked on overall village planning and design, on the graphic identity and environmental graphic system for the village, on housing units and districts, on sacred spaces and places, on land form, landscape and other systems inclusive of lighting, solar power, signage, seating and irrigation/drainage/water reclamation.

Nature is a dominant component in the village design, and provides an overarching character for Nyumbani Village. The predominance of nature, natural systems, and the interface with the built components of the village extends to responsible and ecological design through appropriate systems, technologies, materials and planning. Decisions in design establish and/or enhance the sense of community. Ideas of community merge with the desire to reconnect; that reconnection occurs to both the land and to new family/clan structure. The search for what is held in common, for unity, manifests at the family, the village and the existing local community levels. The concept and act of weaving has influenced much of the work as well. It speaks towards the tradition of weaving in Kenya, continental Africa and beyond. It is both a local and universal act. For this work, it has both formal and metaphoric aspects. The village physically and conceptually weaves nature with natural and built systems into village and family structure. There is a weave of spaces, places, people, systems and programmatic components.

Perhaps all of the above coalesce into culture and place; real meaning and significance come into play. For example, Nyumbani means "home" in Swahili. But, to an East African from Kenya, there is a deeper, more profound sense of Nyumbani; it is the place and people from which you came, and to which you return. For example, if you have moved to the city, you may, perhaps yearly, return. It is where you are rooted, where your family and clan are, where your ancestors are, and where you will likely spend your afterlife as well. Nyumbani is home. It is this sense that we were trying to achieve in the studio, and to articulate through the design work. Trying to articulate aspects such as this was not only for purposes of educational achievement but was for the project itself, and for all of the people engaged in the creation and subsequent life of the village.

Through the discussions, design process and creation of work, we were able to confirm earlier ideas and intentions held by the other lead partners when Art Center joined the project. As well, the work produced by the students, or its implications, at times contradicts, shifts, expands, or deepens earlier thoughts and positions. The following closing paragraphs will illustrate a few instances where the work in the design studio at Art Center, through a variety of influence and processes, came to question or expand the initial thinking of the various lead partners. Perhaps it is here that the work is truly invaluable, and that design and design process contributes an added value to the formation of a project. Without a pass through the designers' eyes, minds and hands, the very conceptions and intentions of the project could be misinformed and misstated. Site selection, program, policies could have been ill-prepared; and the project could have been handed to the "designers" with inherent disadvantages. This is not meant to say that designers are better able to conceive and articulate these things, but rather to suggest that designers be amongst the collaborating parties at such, and all, phases. A few small examples follow.

A fundamental approach of the village planning and design acknowledges the immediacy of the needs in response to the AIDS pandemic that has left so many orphans and elderly vulnerable. However, contained within the work of the students is the view towards the future as well. While attending to the necessities of the short-term, the village must also look at long-term developments in Kenya and beyond. The design of the village must inherently account for growth and change. Further, one may reasonably assume that HIV/AIDS will eventually become a livable disease, if not eradicated. Therefore, we are looking at the evolutionary aspects of the village and towards future generations as well. Ultimately we are designing a village that responds to immediate necessities and situations, while also considering the future possibilities and the general nature of village design.

Another example of a shift in thinking can be examined with the ideas, issues and approaches surrounding community, family definition and structure, and housing. In early discussions and documents of lead partners, it was basically assumed that elders, orphans and staff would constitute the village population, and that there would be basically one unit type. This unit followed the basic arrangement and concept currently in place at Nyumbani Orphanage of an adult or two living with six to eight children. Further compounding this, at the larger scale and for many reasons, there was also much concern that Nyumbani Village not be, or be viewed as, an independent, isolated enclave; it needed to link to and engage local community.

During discussions, research and design work in the studio at Art Center much of this fused and became clearer through the process and production of design. The thinking and work became more complex and nuanced. Our position, articulated through design at various scales and typologies, has shifted to a change in the initial village population and unit types. We are proposing that the village include traditional, intact families from the local area initially. This direct inclusion of local community helps avoid the appearance or actuality of Nyumbani Village being an isolated enclave. It also brings a richness and normalcy through diversity, and points towards another potential normative quality of the village. Including intact local families also helps to de-stigmatize the village and situation. And at the scale of housing, this results in a richer diversity in types and unit arrangement. The design work that we are currently placing on the table for discussion, and hopefully inspiration, contains around five unit types. These have built in flexibility to provide for even greater variation, especially over time.

The variety in unit types also came about due to discussions and research concerning Kenyan culture, and its possible manifestation in physical form and arrangement. In this and many things, Njubi Nesbitt, a Global Fellow at UCLA's International Studies department, particularly helped us. He is an anthropologist with particular focus on Africa, and he is from Kenya. For example, at the age of 15, young men in Kenya typically leave home for school or work, and they typically live with similar aged young men until marriage. This specific culture situation prompted another living condition for the village, and another unit type. Njubi's collaboration, and the combination of many other voices, was invaluable in the process and production of the design studio.

This body of work could not have been achieved without the support, actions and encouragement of the many people who shared their expertise and perspectives with the studio. We deeply thank all participants and have felt honored to be engaged in such a rich, meaningful and significant project.[2]

Complex Collaborations and Combinations

All of the above applies and merges into a unified strategy with relatively clear educational tactics. It is all actually one thing, one attitude and approach. Perhaps the "for-profit" and "non-profit" entities may sometimes wear different clothing, but they are ultimately not too different at all. Design is relatively consistent; and design excellence, innovation, leadership and entrepreneurship apply evenly. The design processes and the production of significant and meaningful work, in a highly collaborative, complex and diverse educational environment, is the goal – along, of course, with excellence in overall education and learning. In many ways, it is this complex and collaborative world that confronts our students upon graduation; and it is the environment that they should be at least somewhat prepared to not only enter, but to thrive and excel. Design does not exist in isolation. Why should students, disciplines, departments, colleges or universities be insular? We should allow ourselves the opportunities that arise from being affected by the broader world, and in return by affecting it.[3]

Notes and Credits

1 Students: Julian Honig, David Kim, Ielleen Kwak, Paul Mikulencak, Ray Ng, and Sujeet Paul. Faculty and Department Chairs: Fred Fehlau, Paula Goodman, Dan Hoy, Alan Kupchick, Ken Okuyama, Mikio Osaki, David Stollery, and Blair Taylor. Student works are proprietary and are not actual products of Infiniti. Permission to use Infiniti logo given by Nissan; Infiniti is the luxury brand of Nissan. For additional information contact Lisa Mayeda in Corporate Relations at Art Center College of Design.

2 Students: Delna Balsara, Nikolai Cornell, Guilhem DeCastelbajac, Humberto Flores, Patrick Kiruki, Brody Larson, Nathan Lewis, Shawn Randall, Thasdao Donna Salazar, Susheela Sankaram, Caitlin Smith, Sonia Spragg, and Jonathan Nazareth Zabala. Faculty: Annie Chu and Peter Di Sabatino. Photography: Steve Heller, Art Center College of Design. Student works, and all photography, are proprietary and are not actual products of Nyumbani Village or any other referenced institution or source. For additional information contact Peter Di Sabatino at Art Center College of Design.

3 All photographs below taken by Everard Williams, faculty of photography at Art Center College of Design, during excursion to Kenya in August, 2002, and are proprietary. For additional information contact Everard Williams or Peter Di Sabatino at Art Center College of Design.

A Proposal for a Cross-Disciplinary Design Pedagogy: Generative Full-Scale Investigations

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Within architectural education, ideas are developed through representative media such as scaled models or drawings; unmediated full-scale investigations are rare. When full-scale investigations occur, their potential for informing cross-disciplinary pedagogy is not obvious. Here, we identify and discuss in detail four distinct approaches to full-scale investigations in architectural education, focusing on work which we believe best promises to inform cross-disciplinary pedagogy, work which we classify as generative full-scale investigations. We propose that generative full-scale investigations retain promise for cross-disciplinary pedagogy precisely because they are non-deterministic, non-specific to a particular discipline, open-ended, and speculative.

Keywords: *architecture, cross-disciplinary, experiment, full-scale, pedagogy*

1 Introduction

Architecture is unique among the design disciplines: its products are very large and are not subject to mass-production. Ideas in architectural design are regularly developed through representative media such as scaled models or drawings; unmediated full-scale investigations are rare. Although full-scale investigations are more typical in other design disciplines such as fashion design, product design, graphic design or textile design, they tend strongly to be discipline-specific (e. g. fashion designers work with fabric at full-scale, product designers work with full-scale prototypes); common cross-disciplinary full-scale design pedagogy is not obvious.

Here, we identify and discuss in detail four distinct approaches to full-scale investigations in architectural education: experimental, inhabitable, prototypical, and generative. In particular, we discuss generative full-scale investigations through exercises, curriculum and student work from the architectural design studios which we teach at the University of Minnesota.

Ultimately, we argue not only that generative full-scale investigations are the most promising within architectural education, but more importantly, that they have the potential to cross disciplines as a pedagogy.

2 Background

Our interest in architectural education is a consequence of our work at the University of Minnesota's Department of Architecture (Minneapolis, Minnesota, USA), where we instruct undergraduate architectural design studio courses. The undergraduate curriculum at Minnesota is discipline-centered rather than practice-centered, as a consequence of which our department places greater focus on the development of broad-based liberal-arts thinking and making than on practical or professional concerns of building construction, ideas which we believe are best addressed through professional (i. e. graduate) study, offered at Minnesota through the graduate-level Master of Architecture professional degree program.

The broad focus of Minnesota's undergraduate program enables us as educators to engage the discipline of architecture through a rich variety of media and experiences. This paper draws on several of our personal interests and experiences gained through our participation as educators at Minnesota. Specifically, we discuss not only our own work at Minnesota and abroad, but also that of educators (such as the late Samuel Mockbee) whose work, we believe, is relevant to cross-disciplinary pedagogy.

3 Experimental Full-Scale Investigations

In the discipline of architecture, as is generally true of the plastic arts, a comprehensive understanding of material is essential to success: architectural work is bounded by, and possibilities for innovation are guided by, material properties.

As architectural educators, we are convinced that our students must engage material at full scale to build the understanding and conviction necessary for successful operation within the discipline. We believe that the study of architecture cannot be limited to representational study (i. e. "paper architecture"); at some level, successful study must engage direct, full-scale investigations of the physical components of the work.

In general, full-scale investigations into the nature of material begin with experiment. Hypotheses are explicitly or implicitly made, experiments are designed, results are observed and original hypotheses modified and reconsidered as needed.

We define experimental full-scale investigations into the nature of material to consist of clearly stated and testable hypotheses concerning material, assembly, or system performance (e. g. under simulated or actual weather conditions). Assemblies and systems are critically important within the discipline of architecture because of the multi-component nature of architectural work: buildings must simultaneously respond to a multitude of forces and agendas. In large part, it is this disciplinary focus on assemblies and systems that differentiates architecture from plastic arts such as sculpture.

We accept that the testing essential to experiment may occur within more or less rigorously defined and controlled conditions; the clean conditions of the scientific laboratory need not be replicated in the field in order for an experiment to have some educational value. Even an informal, empirical test of a material or an assembly can suggest a profitable direction for additional investigation.[1] Clearly, however, if experimental full-scale investigations are structured and executed with sufficient care and attention to method, they can provide reliable data which may be used to inform and drive higher-level decisions. We might ask, for instance, does this material, or this process, employed in this climate, at this cost, balance against a certain amount of energy savings? Does the outcome justify the input?

A typical example of this kind of investigation occurs as a component of the Eco-House project at Carleton College in rural Northfield, Minnesota. The Eco-House is a project actively developed since 2002 by Carleton faculty Richard Strong and Gary Wagenbach, whose goal is to design and construct an energy-efficient, cost-effective, small-environmental-footprint structure for student housing. The Eco-House project consists of seminars, field trips, demonstrations, and (of critical interest to this paper) experimental laboratory work.

In 2002 and 2003, under the direction of Strong and Wagenbach, students worked in a semi-controlled environment (a campus warehouse) to construct representative and comparative sample assemblies of exterior building wall enclosures using conventional construction, straw bales, rammed earth, and cordwood. The students observed and measured the assemblies over a period of time, e.g. by recording humidity and temperature differentials inside and outside of the enclosures, in order to draw conclusions about relative system performance. Additionally, and critical to the larger goals of the Eco-House project, the students measured the embodied energy of the assemblies in an attempt to incorporate the cost effects of processing, labor, and transport into an overall project cost.

In general, the laboratory component of the Eco-House project questions whether input in the form of effort and processing (i. e. embodied energy) justifies output as measured by system performance. Determining explicit answers to these questions is critical to the overall success of the project, which will necessarily result in a built, inhabitable structure: the student housing.

Any experiment, if we wish it to be forceful, convincing, and of lasting value – as we believe the work at Carleton College to be – must be approached skeptically: as educators, we must ask hard questions at every moment and seek alternate explanations at every shift in conditions. Particularly if we are testing systems or assemblies (not simply the performance of a specific, isolated material), we must diligently inquire into the role of discrete components and combinations of components; we must be prepared to isolate contributory effects from one another and to trace them to their respective sources. Additionally, for a program of experiments to be reliable, we must empower and enable our students to execute experiments with care, rigor, and patience. As educators, we must refuse to be satisfied by easy or quick results; if not replicable under similar conditions, the results of any experiment are of limited value.

Most importantly for long-term success, we must as educators be prepared for our experimental work to evolve continuously over time, to guard against the questions inherent in our investigations from becoming stale and uninteresting. We believe that successful experiments, carried out over time, must occasionally produce contradictory or conflicting results to provide educational value.

Even more critically, and with particular relevance to cross-disciplinary potential, we believe that the conditions of educational experiments must be deliberately and regularly shifted so as to increase the likelihood of contradictory or conflicting results. Occasional accident, surprise, and unpredictability are essential to the long-term vigor of an experimental program, and are, we believe, at the core of the cross-disciplinary potential of this kind of investigation. And while we believe that an experimental methodology is clearly valuable and important as a pedagogy within many disciplines, we are not fully convinced that its inherent rigor and scientific approach is particularly promising within disciplines and forms of art (e. g. performance art, aleatory music composition[2]) which depend on open-endedness rather than sequential rigor.

4 Prototypical Full-Scale Investigations

Experiments repeated too often and too predictably become stale and eventually cease to be experimental at all. Demonstrations which were once carried forward with healthy, inquiring skepticism instead become guided by dogma. Experiment gradually becomes something more like demonstration or prototype.

Having observed and participated in demonstration workshops which exemplify this quality, we have come to define prototypical full-scale investigations as those which – subject to well-defined initial conditions, processes, and outcomes – are dedicated to the instruction of particular construction techniques.

Precisely because of their limited-scope definition, prototypical full-scale investigations are of limited promise in architectural education: they serve a didactic, demonstrative purpose, often enabled by strong, almost choreographed conditions; having engaged in the demonstration, students move on, possibly possessed of a greater inclination to employ the newly learned technique in their own

projects, but significantly without the heightened sense of skepticism and inquiry they might have had in an investigation more deliberately experimental and open-minded.

An example of a prototypical full-scale investigation is the rammed-earth construction study workshop at the Building Center Earth Unit in Auroville, India, in which we and our students from the University of Minnesota participated in January 2004. Our participation in this program was one component of a three-week academic study tour of India which we structured to investigate implications of globalization within the built environment.

The Earth Unit is a unit of the Auroville Building Center which conducts research and development on the use of stabilized (compressed or rammed) earth as a building material. The workshop in which we and our students participated is typical of the workshops offered at Auroville to international participants.

At the Auroville workshop, paid laborers guided us through an explicitly defined sequential process of construction to create a sample segment of a rammed-earth wall. The process began with hand-mixing powdered cement, sand, and water in a fixed proportion; the minimally moist mixture was poured into a rectangular form and compressed by repeated hand-applied blows with a stout tool. After the wall was completed to a fixed height, the form was removed and the wall cured in the sun.

Following completion of the workshop, we and our students departed the construction site and the laborers readied the ground, and possibly demolished the wall, so they could repeat the demonstration with the next group of students or visiting international professionals.

Although the workshop was of clear and important instructional value, it was in no sense experimental, though we are convinced that experiment continues to guide and invigorate the program of which the workshop is a component.

To the degree that our group's participation in the workshop generated healthy skepticism, the questions that emerged were almost exclusively about the conditions rather than the content of the workshop. For example, the students were intensely interested in whether the wall they had constructed would remain in place as a free-standing construction, become incorporated into a larger structure, or be demolished. The students were also curious about the role of the paid laborers: are the laborers best understood as employees, educators, craftsmen? How does the motivation of the laborers to participate in the workshop differ from the motivation of the workshop organizers? And while the students posed reasonably good questions about the technical nature of the work (for example, concerning the proper cement-to-sand ratio and correct moisture content, or methods for achieving the proper degree of compression, etc.), these questions did not serve to develop the exercise or increase a sense of wonder: they were asked, and straightforwardly answered.

In this sense, the work at Auroville was marginally more valuable to the students than an expertly produced demonstration film or interactive website would have been. The added value in the exercise exists solely in participation, and this value is questionable given that the participation is heavily choreographed. But even given this criticism, we believe that the demonstrative value of the workshop is important and valuable particularly as it relates to sustainable design trends in the discipline of architecture.

Our concern here is limited to the cross-disciplinary potential of instructional methods, and we believe that the methods inherent in the Auroville workshop, while valuable for architects, are generally unpromising for other disciplines.

5 Inhabitable Full-Scale Investigations

As experimental or prototypical full-scale investigations grow in size and extent, they need not limit themselves to the demonstration of a particular technology. If they are created at a sufficiently large size, the results of such investigations may become potentially or actually inhabitable.

A large enough group of students under the guidance of talented directors, given the right set of circumstances and sufficient time in which to work, can successfully engage in full-scale investigations of the practice of architecture in a community, resulting in the design and construction of buildings and homes for the people who live and work there.

The Rural Studio at Auburn University, led by the late Samuel Mockbee from 1993 until his death in 2001 (and now co-led by Auburn faculty Bruce Lindsey and Andrew Freear), is typical of this kind of investigation. In the Rural Studio as conceived by Mockbee and his fellow professor D. K. Ruth, second-year Auburn students travel to Hale County, Alabama, to reside for a fixed time – an academic semester – during which they work with local residents as clients to design and construct private homes. A separate program, open to fifth-year thesis students, focuses on the design and construction of community buildings.

Projects within Mockbee's studio would develop from initial meetings between Mockbee, potential clients, and students to determine functional and budgetary constraints. The initial students and following groups would work to design and construct houses using local, often experimental, materials and techniques. This practice is still carried on under the direction of Lindsey and Freear, and to date, the studio has constructed eight private homes and several community buildings, including multi-unit housing, chapels, pavilions, and a farmer's market.

The obvious and important educational value of inhabitable full-scale investigations such as the Rural Studio emerges because students achieve direct exposure to multiple aspects of practice. Additionally, as convincingly demonstrated in Mockbee's studio, the results of the work are a distinctly positive influence within the community, as formerly ill-housed people find housing, and the large community strengthens its sense of identity through shared experience.

Nevertheless, due to logistical constraints – something large-scale and inhabitable must be built within a fixed timeframe – such work remains guided by credulity rather than skepticism, and although the dogma may be eminently defensible and socially responsible (i. e. ecologically sensitive design, re-use of materials, direct responsiveness to existing unjust housing conditions, etc.), it remains dogma: students, clients, and faculty implicitly subscribe to it as a precondition to participation. The work is propelled both by a strong belief – almost a faith – that it results in good for the community, and since Mockbee's death, by the participants' reverence and respect for a talented and visionary leader.

To Mockbee's lasting credit, the Rural Studio is invigorated by the belief that mistakes are of profound educational value. Of his students, Mockbee once said, "I've learned to trust their resourcefulness, to let them push directions I probably wouldn't follow." Without the willingness to learn from mistakes, the value of inhabitable full-scale investigations such as the Rural Studio would completely evaporate into construction training workshops, which would scarcely do justice to Mockbee's vision of participation and active citizenship.

We believe that the instructional methods and pedagogies inherent in inhabitable full-scale investigations have reasonably good potential to translate across disciplinary boundaries. The Rural Studio illustrates the point: a component of the studio is dedicated to outreach, explicitly marketed towards disciplines other than architecture. The outreach component of the Rural Studio seeks to apply the hands-on, context-based pedagogy of the architectural design studio, with its strong and intimate connection between project conception and execution, toward a broader and explicitly multidisciplinary education engaging rural Alabama.[3] Fundamentally, the Studio as a whole, including its multidisciplinary outreach component, remains committed to good citizenship as enabled and expressed through context-informed built solutions.

We are convinced that the work of the Rural Studio is critically important to the discipline of architecture, and we applaud its organizers' efforts to broaden its pedagogical base and effectively engage "other" disciplines. But the work remains centered on built architecture, and consequently these "other" disciplines remain secondary.

6 Generative Full-Scale Investigations

Some full-scale investigations are neither inhabitable, nor prototypical, nor experimental in the sense of testing a particular hypothesis, although they have incredible value as a source of ideas and inspiration. We define such investigations, for this reason, as generative full-scale investigations.[4]

The fundamentally simplest generative full-scale investigations engage simple materials such as sand, paper, or dry-stacked masonry units. When we define a typical generative full-scale investigation for our students, we provide a description of the subject materials, and a set of simple questions, concepts, or issues, and explicitly stated conditions, such as limitations on space, material quantity, or time.

The first semester of the undergraduate architectural design studio program at the University of Minnesota begins with a generative full-scale investigation into the material properties of sand: the Sand Box exercise.

In this exercise, each student constructs a box and fills it with sand. In three distinct phases, each consisting of a minimum of ten distinctly documented "iterations" or attempts, we ask the students to manipulate and explore the sand in the box, to test its material properties, and specifically to recognize and define regions, separations, overlaps, and conceptual strengths and weaknesses within a specific iteration or configuration of sand. The questions surrounding this investigation are deliberately open-ended and not specifically testable or verifiable.

The stated conditions of the exercise consist of the size of the box (no variation is permitted), constraints upon time (regular deadlines corresponding to the three phases of investigation), and limitations upon action (e. g. no chemical changes to the material are permitted). Strict documentation is essential because of the temporal instability of the material: once an iteration is destroyed, its value to an overall process vanishes, unless it is accurately recorded (i. e. to a sufficient degree that it could be accurately reconstructed later).

In direct contradiction to the premise of experimental full-scale investigations, generative full-scale investigations such as the Sand Box exercise propose no explicit hypotheses whatsoever; there exists no stated goal, predetermined procedure, or desired outcome. Emphatically, there exists in the Sand Box exercise no direct means of testing whether a given investigation is "successful" because no criteria for judging success are ever stated at the outset of the work. As with experimental work, the conditions of generative work are tightly defined primarily as a means of focusing attention; but in contrast to experimental work, the conditions in generative work are not defined as a means of prequalifying the meaning of success.

How, then, is success judged at all? If not by a student's successful demonstration of a principle or technique; if not by the demonstrated validation of a hypothesis; if not by the achievement of some social or communal good, then by what? What constitutes our criteria for evaluation?

Simply, we attempt to recognize those students who are consistently able to discern value in their own work and to productively act upon that value. This recognition requires us to speculate about each student's observation and decision-making processes as evidenced by the hard-copy documentation of their multiple iterative processes. The documentation is revealed to be a critical component of evaluation: only through our examination of the documentation can we hope to understand the subtle shifts in configuration which compose a student's iterative process.

We believe that the best and most promising students are those whose generative processes (in the sand Box exercise in particular) consist of a cycle of seeing, thinking, acting, and judging. First, can students describe to themselves what they see in a particular iteration or set of iterations? Second, can they define for themselves whether they are seeing structures the way they are thinking? Third, can students act upon an existing configuration to strengthen a promising and defined perception? Most critically to success, can students judge whether a particular action has resulted in a positive change regarding the structuring of thought and perception?

Generative full-scale investigations, as considered within the discipline of architecture, are unique in that their connection to the products of architecture as it is professionally practised is profoundly tenuous and shaky. Playing in sand does not substitute for explicit instruction into component systems, nor for rigorous experiment. However, the connection of generative full-scale investigations to promising processes of architectural design is deep and abiding. The cycle of seeing-thinking-acting-judging recurs at every level of architectural design from the most base and fundamental to the most sublime and complex. This observation is as true of the products of our work as it is of our design processes.

7 Conclusion

From observing the successes of generative full-scale investigations in the undergraduate architectural design studio at the University of Minnesota, we believe that these investigations have promise that potentially reaches beyond our already quite broadly based discipline, for three specific reasons.

First, among the four types of full-scale investigations we observe, generative investigations are easy to translate across disciplinary boundaries because they are not specific to a given discipline. We have observed here that the connection between generative full-scale investigations and the professional practice of architecture is tenuous and shaky. More generally, we realize that generative investigations are of value within our discipline because they form a core or foundation for additional study. The investigations deal with patterns and structures of thought, not necessarily of building or architecture; as such, their value clearly has wider cross-disciplinary implications.

Second, because generative investigations are by definition nondeterministic and open-ended, they cannot easily be forced to conform to a particular agenda (e. g. architectural education to the exclusion of wider ideas). In generative investigations, there exists no defined set of criteria for judgment of success or clearly stated, testable hypotheses. There is no stated goal that forces the investigation in pursuit of a narrowly defined topic or theme.

Third, and most significantly for cross-disciplinary potential, generative investigations are speculative by nature: that is to say, they are fertile ground for defining questions about design processes. Generative full-scale investigations introduce a fundamental cycle of seeing-thinking-acting-judging, which is essential to the success of designers (and arguably, to artists and engineers).

In summary, we believe that by engaging students in a haptic experience not directly related to a specific construction technology, generative full-scale investigations foster thinking, ideation, and creation which transcend practicality and which consequently have far greater implications than demonstrative or laboratory work. Direct, unmediated experience with material – experience that is not obviously connected to the discipline of study – gives rise to open-ended learning where importance derives from the asking of questions rather than finding the answers.

We conclude that generative full-scale investigations have great cross-disciplinary potential as a means of introducing design processes precisely because they are nondeterministic, non-specific to a particular discipline, open-ended, and speculative.

Notes

1 Robert Mark, in his book Experiments in Gothic Structure, writes of Gothic architects that it is "conceivable, if unlikely, that scaled models, assembled stone by stone, were used to test for the overall stability of new [i.e. historical] architectural forms. Yet even this type of model could not have adequately predicted the structural behavior of a full-scale building under the action of all natural forces." – Mark, p. ix.

2 Douglas Hofstadter writes of aleatory compositions: "John Cage's 'Imaginary Landscape no. 4' ... is a classic of aleatoric, or chance, music – music whose structure is chosen by various random processes, rather than by an attempt to convey a personal emotion. In this case, twenty-four performers attach themselves to the twenty-four knobs on twelve radios. For the duration of the piece they twiddle their knobs in aleatoric ways so that each radio randomly gets louder and softer, switching stations all the while."

3 See Dean, 2002; also see www.ruralstudio.com.

4 In our paper subtitled The Potential Of The Unquantifiable, we discuss two specific examples of generative full-scale investigations in detail.

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InnovationSpace: Redefining Innovation and New Product Development

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Along with most other professions, the design profession is now facing significant challenges in a new global marketplace. In this global marketplace, "conventional" design is fast becoming just another commodity; the competitive edge goes to those who can be truly innovative. Design firms are increasingly turning to interdisciplinary teams — often made up of designers, engineers, business professionals, and others — to develop innovative design solutions. Design educators are beginning to embrace an interdisciplinary approach as well, developing programmes in which students from design, engineering, and business work together on real-world projects.

InnovationSpace is an entrepreneurial joint venture between the College of Architecture and Environmental Design, Ira A. Fulton School of Engineering, and W.P. Carey School of Business at Arizona State University. The InnovationSpace initiative is based upon three principles: (1) the Integrated Innovation model, (2) a truly transdisciplinary approach, and (3) a comprehensive approach to intellectual property. The Integrated Innovation process redefines innovation by incorporating the elements of environmental and societal "good." The transdisciplinary approach involves breaking down the boundaries between design, engineering, and business, as well as between academic research and community interests. InnovationSpace "deliverables" include design concepts, business plan, and communication strategy - forming a truly comprehensive package.

Through its unique approach, the InnovationSpace programme prepares students for the "messy" design problems they are likely to face after graduation, thus giving them an advantage in the increasingly competitive global economy. Furthermore, the Integrated Innovation model developed at InnovationSpace is being used to redefine innovation — and in doing so, helping to redefine Design itself.

Keywords: *transdisciplinarity, interdisciplinarity, innovation, product design*

1 Background: The state of Design

These are exciting times for the design professions. Within the past year or so, "design" has been the cover story for such mainstream publications as *Newsweek*, *Fast Company*, and *BusinessWeek*,[1] making design virtually a household name. These articles do more than proclaim "The Power of Design,"[2] however; they also help to explain the design process to a wider audience. And increasingly, the design process is a collaborative one. The recent success of design — as revealed in these articles — often lies is an interdisciplinary approach. And more often than not, the disciplines involved include (at least) design, engineering, and business.

Like engineering and business, design is now facing significant challenges in a new global marketplace. According to a recent issue of *BusinessWeek*, "in 2003 U.S. inventors secured 88,000 U.S. patents. The U.S. spent 2.7% of GDP on R&D and graduated 400,000 scientists and engineers" (Roberts, Sandler, & Kovac, 2004). But global competition is heating up, as illustrated in Table 1.

Table 1. "The World's Rising Innovation Hot Spots" (from Roberts et al., 2004)

Engineering	U. S. Patents		Science & R&D Spending	
	1993	2003	(as % GDP)	Graduates*
India	30	354	1.0	316,000
China	60	366	1.2	337,000
Russia	62	268	1.2	216,000
Israel	306	1,188	4.7	14,000
Singapore	39	438	2.2	5,600
Taiwan	62	5,300	2.3	49,000
S. Korea	764	3,952	2.9	97,000

* Total annual new bachelor's degrees of higher

In addition to the direct competition from overseas firms, an increasing number of U.S. firms are cutting back their domestic workforce, and sending jobs overseas. A recent study by Forrester Research Inc. reported that the rate of offshoring is increasing at a greater rate than previously thought. According to the report, "by the end of next year, U.S. firms will offshore more than 800,000 service jobs, 40 percent more than the firm estimated previously. Forrester's overall estimate remains the same: The firm predicts that about 3.3 million jobs will go overseas by 2015" (Shinal, 2004). There was a time not long ago when it was the manufacturing jobs that were moving overseas. Product design, engineering, and marketing were done domestically, with the final phase — production —

going to the lowest bidder overseas. No more. Today, all of it — including the much celebrated "design research" — can be done abroad. And done well. Table 2 illustrates the numbers of jobs — from a host of professional fields — expected to leave the U.S. over the next ten years.

Table 2. Expected offshoring of U.S. jobs (adapted from Shinal, 2004)

	2004	2005	2006	2007	2008	2010	2015
Management	15,000	34,000	42,000	48,000	67,000	106,000	259,000
Business	55,000	91,000	105,000	120,000	136,000	176,000	356,000
Computer	143,000	181,000	203,000	228,000	247,000	322,000	542,000
Architecture	27,000	46,000	54,000	61,000	70,000	93,000	191,000
Life sciences	2,000	4,000	5,500	6,500	9,000	16,000	39,000
Legal	12,000	20,000	23,000	26,000	29,000	39,000	79,000
Art, design	4,500	8,000	9,000	10,000	11,000	15,000	30,000
Sales	22,000	38,000	47,000	55,000	67,000	97,000	218,000
Office	256,000	410,000	475,000	541,000	616,000	815,000	1,600,000
TOTAL	**536,500**	**832,000**	**963,500**	**1,095,500**	**1,252,000**	**1,679,000**	**3,314,000**

In today's global marketplace, "conventional" design is fast becoming just another commodity; the competitive edge goes to those who can be truly innovative. And innovation, too, is "an increasingly global game" (Roberts et al., 2004). Large corporations have long employed R&D labs all over the world, but more recently, another trend had emerged: "global innovation networks" (Roberts et al., 2004). According to a story in BusinessWeek, these networks "often consist of in-house engineers, contract designers and manufacturers, university scientists, and dozens of technology suppliers big and small—all pulled together ad-hoc for a particular product" (Roberts et al., 2004). Clearly, the days of the "lone genius" are behind us.[3] Today's — and more important, tomorrow's — innovative product designs will be the result of the concerted efforts of teams of people representing a wide range of disciplines.

2 Collaboration in Design

Although collaboration across disciplines is a hot topic these days, it's not a new topic. Indeed, "polymath scholars in ancient Greece, the Middle Ages and the Renaissance all made a huge mark in the advancement of knowledge" (Silverstein, 2004). But despite the fact that "much of the current thinking and research dealing with innovation and new product development holds that a multidisciplinary approach should be used when developing new products," (Veryzer, 2003) design educators have been slow to become Renaissance men and Renaissance women. Times are changing, however.

Design programs — both the "art school" versions, as well as those set in large universities — are beginning to see the benefits of collaborating across disciplines. If not for pedagogical reasons, they're doing it for financial reasons. An article in the *Chronicle of Higher Education* reported in 2002 that "after years in which federal research funds focused largely on discipline-specific projects, government agencies are increasingly encouraging collaboration, and appear to be providing a growing amount of money for interdisciplinary research" (Brainard, 2002). And according to a recent Los Angeles Times story, "federal funding for interdisciplinary research and development at U.S. universities climbed to $675 million in 2002, more than double the $330 million in 1997" (Silverstein, 2004). What's more, "the National Institutes of Health, the biggest federal patron of academic research, a year ago announced a 'roadmap' for the future that stressed interdisciplinary initiatives. It budgeted $2.1 billion over five years for the effort" (Silverstein, 2004).

In the foreword to *Creating Breakthrough Products*, *BusinessWeek* editor Bruce Nussbaum writes, "Really good design operations integrate the engineering of functions and features as well as the marketing goals of brand identity and brand extension. Teaming product industrial designers with engineers and marketing people is often the key to quick success" (Cagan & Vogel, 2002). And

"really good" design programs are taking note. In response to the current thinking — and new research funding — several design programs now offer collaborative courses: Carnegie Mellon University's "Integrated Product Development" graduate course; Massachusetts Institute of Technology's "Center for Innovation in Product Development;" Rensselaer Polytechnic Institute's "Managing New Product Development" course, and University of Cincinnati's "Ecollaborative," to name but a few. And, coming soon, Stanford's much-publicized "D.School." *InnovationSpace*, at Arizona State University, is also a collaborative effort, but one with several distinct features — and advantages.

3 The InnovationSpace Initiative

InnovationSpace is an entrepreneurial joint venture between the College of Architecture and Environmental Design, Ira A. Fulton School of Engineering, and W.P. Carey School of Business at Arizona State University. Now in its fifth year, InnovationSpace is made up of students and faculty from both the industrial and graphic design programs, as well as from the business and engineering programs.

InnovationSpace is the creation of Associate Professor Paul Rothstein. Originally offered as a "special topics" course within the School of Design, InnovationSpace is now a regular offering in the ASU course catalog. And, unlike many similar programs, InnovationSpace is offered to undergraduate students.4 Students are selected in equal numbers from each of the four participating programs, based strictly on an application process. For design students, InnovationSpace takes the place of their Senior Design Studio requirement; for business students — all of whom are selected from the Honors program — InnovationSpace is used as their Honors project; for engineering students, InnovationSpace is used as their Senior Capstone project. In each case, the InnovationSpace Studio represents a significant commitment of time and resources on the part of ambitious, specially selected students.

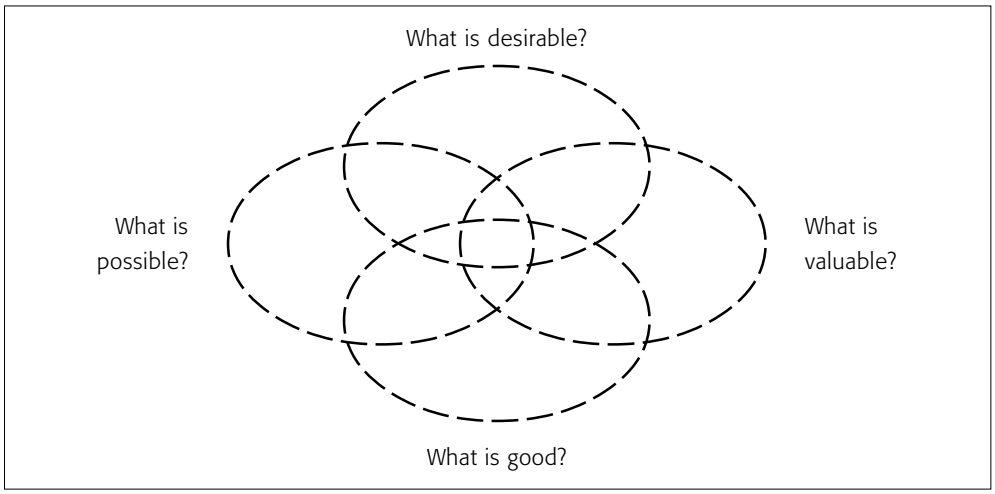
The InnovationSpace initiative is based upon three principles: (1) the Integrated Innovation model, (2) a truly transdisciplinary approach, and (3) a comprehensive approach to intellectual property. Each principle is explained in some detail below.

Integrated Innovation

Before claiming to redefine innovation, it is important to first provide a definition — at least one — of what innovation currently means. And there's no lack of definitions and descriptions from which to choose. Van der Kooy studied no less than *seventy-six* definitions of innovation, concluding that "many investigators fail to provide an explicit definition of the term" (as cited in Oh, 2004). However, Holt provides one definition that may prove particularly useful. According to Holt, innovation is "a process which covers the use of knowledge or relevant information for creation and introduction of something that is new and useful" (as cited in Oh, 2004). For Holt, then, innovation requires both creation *and* introduction; the result must be both new *and* useful. This sort of definition — one in which the term is defined by the assembly of its constituent parts — is not unlike the definition of *Integrated Innovation*.

In *Creating Breakthrough Products*, Cagan and Vogel (2002) describe their own process of innovation, called "integrated New Product Design (iNPD)." As with Holt's definition, innovation for Cagan and Vogel is the result of combining a few critical constituent parts: technology, style, and value. The model Cagan and Vogel propose for iNDP is similar to the model developed by professor Rothstein called *Integrated Innovation*. Like Cagan and Vogel's model, Integrated Innovation represents a process for exploring, defining, and evaluating new product design concepts. It also, however, incorporates an ambitious goal: namely, to develop design concepts that achieve success in the marketplace while also improving society and the environment. This requirement deepens and expands the challenge for all product developers by reframing the ultimate goal of innovation and the final criteria by which innovation is measured. In short, according to Integrated Innovation, design concepts are not innovative unless society and the environment are improved. The Integrated Innovation process involves exploring and resolving four key questions, as illustrated in Figure 1.

Figure 1. The *Integrated Innovation* model



- *What is desirable*? An exploration of the needs and wants of potential users, often using ethnographic research methods.
- *What is good*? An exploration of relevant social, political, and environmental issues and trends related to our design concepts and market research.
- *What is possible*? An exploration of various technologies and their applications, as well as various new design concepts.
- *What is valuable*? An exploration of the market potential of our concepts, researching existing products and locating "gaps" that might be exploited.

The sequence in which these questions are explored is critical. The Integrated Innovation approach involves identifying the demand-side of the problem first by understanding what consumers *want*, and then what society *needs*.[5] Once the demand is clearly articulated, the process explores how technology (What is possible?) and business (What is valuable?) can be shaped to meet the stated demand. In effect, Integrated Innovation implies that design, engineering, and business are drawn (only) to design problems that comprise the demands imposed by consumers and the broader society.

To illustrate how the Integrated Innovation model works, a few examples might be useful. The long-anticipated electric car is still not in driveways and garages. Why is that? Within the Integrated Innovation model, electric cars are "good," since they are much easier on the environment. And they would seem to have value in the market too, so long as pricing was competitive, they were as reliable as their gasoline counterparts, and so forth. Some — those that didn't look like "real" cars — were not terribly desirable, although that hurdle was overcome when companies converted existing gasoline models (which were successful in the marketplace) to electric versions. But, despite years of research and development, electric cars are — in many ways — still not *possible*. Battery life is too low, the batteries are too large and heavy, and the infrastructure is virtually non-existent. According to the Integrated Innovation model, the electric car might be seen as a failure.

From the "failure" of the electric car, however, comes a hint of the possibilities of Integrated Innovation: the Toyota Prius. By using a gasoline/electric hybrid engine, Toyota was able to overcome the final hurdle — they made a version of the electric car *possible*. And if there were any questions about issues of *value* and *desirability*, the long waiting lists[6] for the new Prius ought to put them to rest. The solution is not perfect, of course; the manufacturing process is still harmful to the environment, there is no system in place to recycle the Prius, and so forth. Framed within Integrated Innovation, the Prius is only marginally innovative. Nevertheless, it is a step in the right direction — and a very important step too. Through (relatively) small, incremental steps, the Prius demonstrates what is possible through Integrated Innovation.

By contrast, there are numerous products one can point to that are possible, valuable, and desirable, but are not good. Indeed, any number of award-winning product designs fall into this category. The

goal at InnovationSpace is to change this — *to change the process by which new products are conceived, designed, and brought to market*. It is an ambitious goal, to be sure, but also one filled with incredible opportunities. As the authors of *Green Gold* state in their introduction:

> Propelled by a series of interlocking environmental imperatives, the world is rapidly moving into a new technological era, a second Industrial Revolution every bit as important and long lasting as that of two centuries ago. Call their imperatives environmental protection, energy conservation, consumer demand, or something else entirely, they are very real — and, more importantly, they are changing the way business is being done throughout the world, yielding a profusion of new products that are better at what they do precisely because they are, for lack of a better term, cleaner. (Moore & Miller, 1994, p. 1)

At the core of the InnovationSpace initiative is a belief that a focus on these "cleaner" products is not only the right thing to do, but also one that will prove to be lucrative. What's more, as Arizona State University is beginning to focus its attention — and considerable resources — on environmental and sustainability issues, the work at InnovationSpace fits into the bigger university picture. This, of course, not only attracts research funding, but also encourages collaboration with other disciplines across campus.

A transdisciplinary approach

From the beginning, InnovationSpace has been based on a truly transdisciplinary approach. Obviously, faculty, students, business partners, and clients all bring their own skill sets, perceptions, and biases to InnovationSpace projects. What follows, as in any successful interdisciplinary research environment, is that "concepts, methodologies, or epistemologies are explicitly exchanged and integrated, resulting in mutual enrichment" (Flinterman, Taclemariam-Mesbah, Broerse, & Bunders, 2001). Many academic programs recognize the value of multidisciplinary approaches, but few are truly transdisciplinary.

A transdisciplinary approach is one "in which boundaries between knowledge and perspectives from different scientific disciplines as well as nonscientific sources are integrated" (Flinterman et al., 2001). In other words, transdisciplinary research is a form of interdisciplinary research — one in which "boundaries" are integrated to the greatest practical extent. However, another critical distinction is worth noting as well: in transdisciplinary research, "different scientific disciplines" are integrated with non-scientific disciplines (e.g., graphic design, industrial design, etc.).

But transdisciplinarity is more than just another form of interdisciplinarity. A summary from the 2000 *International Transdisciplinary Conference* in Zurich describes transdisciplinarity as "a new form of learning and problem solving" (Klein, Grossenbacher-Mansuy, Häberli, Bill, Scholz, & Welti, 2000). According to the authors, transdisciplinary research:

> Involv[es] cooperation among different parts of society and academia in order to meet complex challenges of society. Transdisciplinary research starts from tangible, real-world problems. Solutions are devised in collaboration with multiple stakeholders. A practice-oriented approach, transdisciplinarity is not confined to a closed circle of scientific experts, professional journals and academic departments where knowledge is produced. Ideally, everyone who has something to say about a particular problem and is willing to participate can play a role. Through mutual learning, the knowledge of all participants in enhanced, including local knowledge, scientific knowledge, and the knowledges of and single partner. In the process, the bias of each perspective will also be minimized. (Klein et al., 2000, p. 7)

Again, there is a concern for both scientific and non-scientific perspectives, and the element of "mutual learning." At InnovationSpace every effort is made to bring various perspectives into the studio, in the form of students, faculty, guest speakers, project partners, and community leaders. And the two-semester studio experience is designed to facilitate "mutual learning" — not only student-to-student, but among all participants in all projects. Situated within a large research university,

InnovationSpace is able to bring a wide range of perspectives to each project. This, then, is one of the great strengths of InnovationSpace, one reflected in a recent article by Jeffrey Brainard. As Brainard explains, "universities, especially those such as Arizona State, which have few individual disciplines at the top of the research food chain, see the interdisciplinary route as a way to diversify and distinguish themselves" (Brainard, 2002). However, while "the interdisciplinary route" may be the way to distinguish oneself, the transdisciplinary approach of InnovationSpace promises the added benefit of a rise to the top of the "research food chain" as well.

Intellectual property

InnovationSpace projects are far more than academic exercises; they are aimed squarely at the marketplace, where they can make a difference. For each project, students develop a comprehensive package, which includes design concepts, business plan, and communication strategy. Toward that end, the InnovationSpace faculty, students, and project partners work closely with Arizona Technology Enterprises (AzTE), a technology transfer division of Arizona State University. Through the AzTE partnership, commercialization may take several forms. Those involved with a particular project may act as inventors, for example, using AzTE to bring the results to market. Or, partnerships can be formed up front with sponsors, who in turn have first right of refusal for the resulting concepts. Regardless of the particulars, students have more to gain than course credits and studio experience: they also have a financial stake in the outcome of their work.

Current status

The four faculty members involved with InnovationSpace are: Associate Professor Paul Rothstein (industrial design), Associate Professor Mookesh Patel (graphic design), Professor Mark Henderson (industrial engineering), and Professor James C. Hershauer (business). The current two-semester curriculum was developed jointly. All faculty and students meet twice a week, with one additional discipline-specific meeting every Friday. During these Friday meetings, faculty members meet with the students in their discipline to discuss issues and keep the projects on track.

This year there are 24 students working in six transdisciplinary teams, and two projects. The first project, supported by an Arizona business group, is focused on new product design opportunities to address the aging population. The second project, supported by an Arizona State University computer science research laboratory, focuses on developing an invention that enables people who are blind to access text.

4 Implications of InnovationSpace

Predicting the long-tem impact of a new program within an academic environment is always risky — even more so when the program is still evolving. Still, some preliminary findings are worthy of note. Over the past five years InnovationSpace has been used as both training ground and research lab. Early on, when the program was called DesignSpace,[7] several students were interviewed over the course of their semester-long project. The results of these interviews suggested that students "entered the course with certain attitudes, values, and behaviors that can be attributed to differences in the educational culture of their respective disciplines" (Rothstein, 2002). Not surprisingly, these "attitudes, values, and behaviors" shaped the way students from each discipline managed the ever-evolving Integrated Innovation process.[8] The (intentional) ambiguity of the projects was especially challenging for many students. Accustomed to more linear projects and course work, these students were suddenly faced with the sort of loosely defined design problem that has become common in the "real world."

The interviews also suggested that many students were forced to "reconsider their assumptions about teams and teamwork" (Rothstein, 2002). Many students reported frustration with team projects in general, and interdisciplinary teams in particular. In general, the students had underestimated the amount of time and energy required for managing the team — a considerable commitment over and

above the actual "work." Nevertheless, this "creative abrasion" (Hirshberg, 1998) resulted in an improved quality of team output — as determined by both faculty and students.

Leadership skills were also improved. Here again, assumptions held early on were often challenged over the course of the projects. Students who felt they were effective team leaders early on felt less confident by the end of the course, while students who began the course with what they felt were weak leadership skills finished the course with greater confidence in their leadership skills.

Students had mixed feelings about their own creativity, and the extent to which their design/business solutions were creative. In some cases, students felt somewhat inhibited by the process (and the interdisciplinary teams), but nevertheless felt that their solutions were more creative than what they had produced in other "conventional" courses. Others reported that it was the process itself that had inspired their creativity. Students also reconsidered their ideas about the origins and sources of creativity. Initially, many believed that creativity was the rare, innate talent of a gifted few. Over the course of the project, however, they came to see that creativity — as a skill — can be developed. They also began to see that the process itself can help to nurture creative thoughts and creative concepts.

Now that the program has expanded to include students and faculty from engineering, and projects have been extended to two semesters, the challenges are sure to increase as well. Nevertheless, the benefits are sure to increase too. The InnovationSpace program prepares students for the "messy" design problems they are likely to face after graduation, thus giving them an advantage in the increasingly competitive global economy. What's more, the approach — an admittedly entrepreneurial one — leads to what has been called an "action orientation," (Welsh & Murray, 2003) a quality sure to appeal to savvy employers.

For the twenty-first century workforce, teamwork is the name of the game — for design, engineering, business, and others. And according to IDEO general manager Tom Kelley, teamwork is the key to success as well. In *The Art of Innovation*, Kelley explains, "Teams are at the heart of the IDEO method. It's no accident. We believe it's how innovation and much of business takes place in the world. Quite simply, great projects are the result of great teams" (Kelley & Littman, 2001). But IDEO is recognized as a world leader — and award-winner — for its methods as well as its results. How are other companies approaching collaborative projects?

Not so well, according to a 1993 article for the *Journal of Product Innovation Management*. In the article, business professor Anne Donnellon reported, "anecdotal evidence is beginning to suggest that companies, teams and individuals are finding the transition to teams very slow and very painful" (Donnellon, 1993). A more recent study reports that industrial designers often take a backseat to engineering and marketing early on in the development of "discontinuous"[9] new products. In this study, associate professor Robert Veryzer (2003) found that:

> Very limited attention is paid to industrial design issues during the early phases of the discontinuous new product development process. Design for user-product interaction is overshadowed by the need to prove the feasibility of an emerging new technology for a particular product application. Attention to (industrial) design issues tended to occur toward the latter stages of the process, particularly after the project had been transferred to a business unit. The sequencing of ID involvement was ascribed in large part to the high level of uncertainty inherent in the development of discontinuous products. (Veryzer, 2003, p. 58)

With its emphasis on transdisciplinarity, InnovationSpace is sure to make a difference in the professional world. Students are better prepared for the sort of messy problems they'll face as professionals, and they'll also be able to collaborate more effectively than those trained in traditional studio environments. If the professional world is "finding the transition to teams very slow and very painful," then there is an opportunity for those who have done it already. InnovationSpace students (as well as faculty, project partners, etc.) will be prepared not so much to fit into the world as it is today — *but to change it*.

The design profession is undergoing substantial changes — exciting times, indeed. As Bruce Nussbaum wrote recently in *BusinessWeek*, these are fundamental changes: "The design profession shifted its core competencies from drawing to thinking, from styling to innovating, from shaping things to visualizing new business paradigms" (Nussbaum, 2004). How innovation is defined is changing too. Through its Integrated Innovation model, InnovationSpace is redefining innovation — and in doing so, helping to redefine Design itself.

Notes

1 Newsweek October 27, 2003; Fast Company June 2004; BusinessWeek May 17, 2004.

2 Taken from the title of Bruce Nussbaum's May 17, 2004 cover story in BusinessWeek.

3 If indeed the "lone genius" ever did exist. Thomas Edison – the mythical lone genius – has been described by long-time assistant Francis Jehl as "in reality a collective noun [that] means the work of many men" (as cited in Kelley & Littman, 2001).

4 A graduate student offering, in which graduate students will work with undergraduates, will be offered beginning in the fall of 2005.

5 Linking these two is critical and is, in fact, a somewhat radical way to define **demand**.

6 As of early December 2004, the Prius is reported to have a six- to eight-month waiting list (Noe, 2004).

7 At which time, the program was comprised of students and faculty from industrial design, graphic design, and business (but not engineering).

8 Which, at the time of the interviews, was in its early stages. By comparison, the Integrated Innovation model being used today is more challenging – and promises to lead to additional, or different, "management" issues.

9 According to Veryzer, "radical or 'discontinuous' products involve capabilities that do not exist in current products and cannot be achieved through mere extension of an existing technology. These products (for example, MRIs, PCs) involve the development or application of significant new technologies" (p. 51).

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The Nature of the Knowledge Constructed through Collaborative Designing – A Case Study

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The author is a postgraduate student in the Faculty of Art and Design, Department of Textile and Clothing Design, in the University of Lapland. She has recently started working on her doctoral thesis on the knowledge in the design activity. Lately she has also been working as a junior research assistant for the research projects of the department. The paper relates to one of the faculty's research projects called CoDes. Currently the author is working as a researcher in the Emergence of Luxury – research project which is funded by the Academy of Finland through the Industrial Design research programme.

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The study presented at the paper addresses the activity of designing. The salient focus is on the nature of the knowledge constructed through designing. The study can be located into the research on designing and the philosophy of design. The view of the design discipline as a field of research in the paper represents the conception of design as the subject of scientific research.

The primary view of the paper is on the description and conceptualization of the knowledge constructed through a collaborative design case. The nature of the knowledge is analysed through the philosophical and contextual aspects. The data for the case in focus here was collected through audio and video recordings of a concept design process. Additional research material also included questionnaires and visual material produced by the designers during the design process.

The themes highlighted and analysed from the empirical data produced eventually a preliminary depiction of the types of knowledge constructed through the activity of designing. The view has been limited to the elements appearing from the theoretical background and from the recordings of the communication and actions of the design team. The contents of the individual minds are left unexamined.

The study relates to the ongoing CoDes – Facilitating Social Creativity through Collaborative Designing – research project in the Department of Textile and Clothing Design, in the Faculty of Art and Design, University of Lapland, Rovaniemi, Finland. The CoDes research project is funded by the Academy of Finland through the Life as Learning research programme.

Keywords: *design research, constructing knowledge, collaborative designing, audiovisual data, qualitative analysis*

1 Introduction

Mapping the field

Some of the biggest challenges in developing design education seem to be utilisation of the research knowledge on one hand, and on the other, making the information from research public and available to a wider audience. Information derived from project related research in professional practice seems to be proprietary and does not often reach the audience outside the client-provider relationship. Unfortunately most of the academic design research suffers from the same symptoms. (Roth 1999, 18)

A way of sharing the research knowledge among students of design education is found in project-oriented work in research projects in design. In our department the multiple on-going research projects have created unique opportunities for learning through designing and at the same time bridging the gap between research and education of the design students as well as the ostensible gap between design and research in many ways. Research projects concentrating on the collection and utilisation of the user knowledge create opportunities for student design projects and direct utilisation of the research knowledge. At the same time the students' design projects create circumstances for studying authentic design processes from different perspectives.

The paper presents a study of the knowledge constructed through designing in a concept design process included in a research project of our department. The background knowledge for the design process was collected and analyzed by the research project. The design team utilised the analyzed data of the users and the context in order to create a concept of intelligent work clothing. The design process provided an opportunity to study an authentic design process of a team of four designers. This paper concentrates on exploring the nature of the knowledge constructed through the design process.

My role in the case has been both as a designer and a researcher. I have been one of the members of the design team while also collecting research data of the design process. This twofold status has proven to be productive from the point of view of my study of design. The framework enabled personal insights into the process, which would not have been possible as an outsider.

The study presented in this paper relates to a research project called Facilitating Social Creativity through Collaborative Designing [CoDes]. The CoDes research project analyzes the challenges of learning through designing in various design contexts. A special focus of the CoDes project is to address the challenges of collaborative and participatory designing in education and workplace contexts and examine the new possibilities provided by virtual design studios to cross boundaries between educational institutions, between education and enterprises, and facilitate horizontal learning of designers in multi-professional teams.

The results of the CoDes research project will be utilized for developing pedagogical models for virtual design studios and collaborative designing and teaching. The project produces more detailed knowledge about the design process and the role and development of visual representations in collaborative design processes. The project aims at developing more sophisticated practices of collaborative designing and helps to cross boundaries between environments of formal design education and working-life.

A short description of the case

The example of a design process in this study is a concept design process of intelligent work clothing. The design process represented collaborative designing. The team of designers consisted of four undergraduate design students in the final stage of their studies for master's degree. All of the group members also had experience in actual assignments in different fields of design.

The team included two students of clothing design and two students of industrial design. The team was also regularly in contact with consultants of physiology, material technology and electronics from collaborating universities. A few representatives of the target group also participated in the three-month long process. All the communication between the designers, consultants and the target group representatives was conducted through the Internet in a virtual learning environment.

The design team had their meetings face to face in our department. The key data of my study was collected in these meetings with audio and video recordings. Additional research material also included questionnaires and visual material produced by the designers during the design process. The solitary working of the designers outside the meetings was not recorded into the data of the study. Consequently my study concentrated on the communication and actions of the design team and the contents of the individual minds were left unexamined.

The design process was divided into three phases over a three month long period in the spring 2004. After the first two phases the design team presented some of their ideas and sketches to the target group representatives through the network environment. The target group participators commented and discussed the material giving feedback to the design team.

The final concept was developed during the last phase of the process. The final results of the process were not aimed directly at industrial productization but at researching the usability and the acceptability of the concept before further development. The team took the assignment as an authentic design task even though the commercial utilisation and development was not guaranteed in the

time of the design process. From the point of view of industrial product development the process differs most in the part of the publicly available outcome after the research on the concept will be concluded.

The background and the aims of the study

The term design covers a broad field of activities from the systematic processes of engineering to the artistic processes of industrial arts. There are elements of design that are common to all or most of the fields of design but still we cannot assume that the term would denote equal meanings to all designers (Franz 2000, 70). Lawson has described designing as a prescriptive rather than descriptive job. "Unlike scientists who describe how the world is, designers suggest how it might be" (Lawson 2001, 113). Lawson emblematically states that even though he cannot offer a satisfactory definition of design he has no difficulty in recognising it when encountering it (Lawson 2001, 305).

The underlying axiom of the study was the conception that there are forms of knowledge and ways of knowing special to the designer (Cross 2000, 97). The study began from the will to discern the speciality of this knowledge. In the study these "designerly ways of knowing" (Cross 1982) were taken as a subject of scientific research. The preliminary questions were particularly interested in the content and the philosophical aspects of this knowledge. One of the first issues was also the methodological approach that could be applied in research related to the activity of designing.

The salient focus of the study has been outlining the nature of the knowledge constructed through designing, by description and conceptualisation. The study has been an attempt to primarily analyze the key elements defining the essence and the content of the knowledge. The empirical approach was founded on the constructivist view of knowing as an active event.

2 Methodological approach

Methods of data collection

According to Cross, design knowledge has three sources: people, processes and products (Cross 1999, 5). This study combines people and processes as the sources of data. The examination viewpoint of the products was irrelevant in the context in question because the case exemplified the early stage of the product design process where the results can be best described as a product concept rather than the product itself.

The data-driven study applied various methods of data collection and analysing. Even though the methods cannot be directly labelled with any existing terminology, all the methods applied here can be best described as qualitative research methods. The primary data for the case in focus here was collected through audio and video recordings during a concept design process. The data collection was adapted according to the design meetings. The presented case was recorded from the start to the end as a part of the design team's collaborative work.

The team always met in the same work premises. The audiovisual recordings of the activity were videotaped with a stationary video camera and a stereo microphone. The aim was to produce continuous recordings. The recording was paused only during the breaks in the activity. The recording was always activated by a member of the team when all the participants were present. The camera was set on the widest possible angle in order to capture as much of the activity as possible.

Table 1
The amount of the audiovisual data sectioned by the phases of the design and analysis processes

The phase of the design process:	The amount of the audiovisual data:	The amount of data for the deeper analysis:
1st month	22 h 12 min	4 h 07 min
2nd month	12 h 12 min	1 h 34 min
3rd month	13 h 15 min	2 h 10 min
Total:	47 h 39 min	7 h 51 min

The data included considerable amount of conversation and exceptionally few hours of mere sketching or other silent activities. Partially this was related to the fact that the visually productive activities naturally took place while working alone and the computer. The common meetings were focused on the collaborative development of the ideas, which necessarily involves verbal communication.

Methods of analysis

The videotaped records give an insurmountable way of collecting data especially when studying aspects of activity, movement or behaviour. The difficulties with the data emerge usually in the analysis phase. One of the biggest challenges is often the amount of data. Because of the continuous recording the raw data included some unrelated material from the point of view of the study. Therefore the analysis of the data began with reviewing and categorising it roughly in order to mark out the relevant sections of the recordings.

The usage of the video material directly in the analysis without verbal transcription is often an unusual decision in research. In the case the decision was grounded on the will to preserve the nature of the data with its multiple non-verbal aspects.

The analysis of the video material in the case was based on a relatively common qualitative approach where the data was first reviewed as a whole, then split into minor themes and eventually coded into various main and subcategories. The analysis followed largely the basic model for analysis by Collier & Collier with the exception of the elimination of the statistical analysis of the data (Collier & Collier 1999, 178-179). The statistical analysis was replaced with a qualitative approach based on the qualitative content analysis.

In the first phases of the analysis the focus was especially on the type of the activity and on verbal communication. The types of activity and interaction as well as the content of the communication were documented on a specially formulated form for further examination. The data in the phases of the deeper analysis consisted especially of situations where the team reflected their working, explicitly referred to knowledge in some way and the situations that could not be easily "labelled" or coded in a simple and descriptive way.

The additional research material of questionnaires for the designers and visual material produced by the team during the process were used for revising, questioning and finally supporting the conclusions drawn from the primary data.

3 Results

Knowledge for design and knowledge from designing

The analysis of the data produced a central classification between 1) the existing knowledge that was only discussed in the meetings and 2) the knowledge that was constructed through designing. For example, in the particular case the background knowledge of the users was already collected, analyzed and available at the beginning of the design process and could be categorized in this case rather as knowledge for design than knowledge from designing. Nevertheless the knowledge of the users and of the context of use was one of the most mentioned topics in the communication of the designers. The important background knowledge was referred often in the conversation of the

designers and it was obvious that it was utilised in designing in many ways. The analysis of the content of the knowledge constructed through designing generated the conception that the background knowledge was often used as a basis to build new knowledge on.

The commonly shared view on the background knowledge was that it guided the course of the process but could not be given a dominant role in the development of the resolutions of the concept. This view was grounded on the designers' experience that the users seem to search solutions for existing needs and problems but the designers should be able to also picture the situation in the future.

What sort of knowledge was constructed through designing?

The contentual aspects of the knowledge constructed through designing in the particular case were very context specific and somewhat impending. The significant grounds for classification of the knowledge seemed to arise from the analysis of the epistemological examination of the data.

Although the analysis started with the focus on the verbal expression it soon became evident that the knowledge constructed through designing cannot always be verbally conveyed. The concept of tacit knowledge paved the way for the examination of the ways of knowing that are not explicitly mentioned in the communication of the team in the data.

The conception of the existence of a certain kind of a tacit knowledge is often elicited in the fields of art and design without further analyzing the expression. One of the origins of the concept is in the philosophy of Michael Polanyi. Polanyi used the concept of tacit knowledge to describe a type of knowledge that is attained without words and explications. According to Polanyi the tacit knowledge is the foundation for all kinds of knowing. Knowledge can be referred as tacit when one knows something without being able to tell how. (Polanyi 1983) In the fields of arts, craft and design the concept is often understood as a form of non-verbal knowledge, which relates directly to the know-how of the artist or the designer. (Koskennurmi-Sivonen 1998)

The tacit aspect of knowledge is a problematic subject of study because of the very nature. The verbal approaching of the subject leaves a part of it inevitably unattained. The non-verbal cannot comprehensively be described in words. However, the tacit knowledge is not necessarily impossible to articulate in words. The knowledge may remain tacit for the simple reason of the lack of motive to express it verbally. Koskennurmi-Sivonen has pointed out that the verbalisation of the tacit knowledge need not to be expected always from the designer himself. The task of verbalisation may be that of the researcher of the subject. (Koskennurmi-Sivonen 1997, 221.)

In the data the tacit knowledge was often explicitly expressed later, but the origins of the verbal expression could be traced into silent activities in the deeper analysis. Often the verbalisation process was collaborative even though the nature of the tacit knowledge in the data could be best described as personal, subjective and intuitive.

The opposite of the tacit knowledge is called explicit knowledge here. In its best it was very found to be analytic and conceptual and always verbal. This is the kind of knowledge that best matches the traditional definition of knowledge.

The definition between verbal and tacit knowledge was not the only aspect specifying the nature of the knowledge in the data. The second axis dividing the knowledge pertains to the nature of the knowledge in relation to its factuality. The nature of the knowledge could be divided with a line between the factual knowledge and the imaginary knowledge.

The factual knowledge based on reality, facts and information related in the data especially to the decision making and problem solving activities. This type of knowledge appeared very specific, precise, definite and even exclusionary. The imaginary knowledge targeting to the future was expressed particularly in the visualising of the possibilities and alternatives. Both of these counterpoints could be recognised both in non-verbal and verbally expressed dimension.

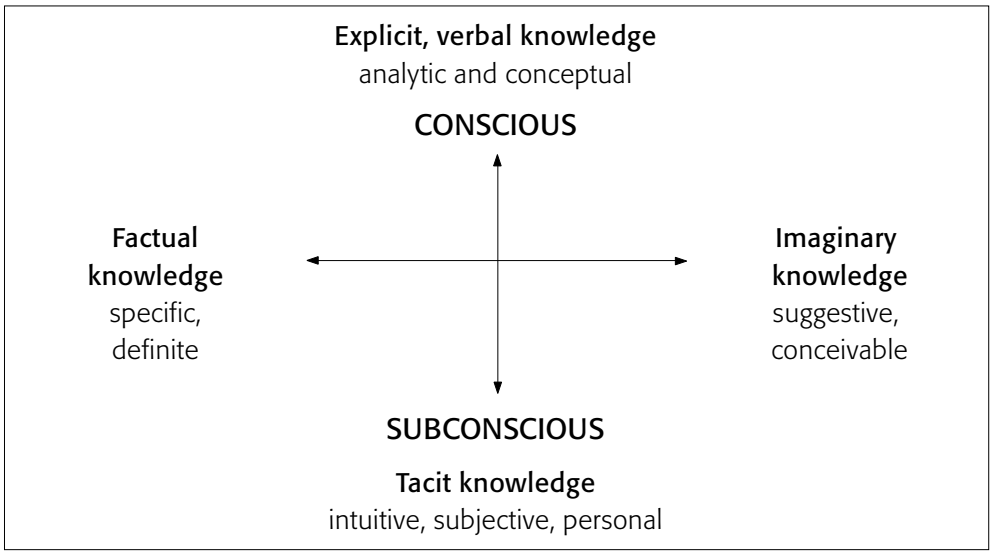

Figure 1: The key axes conceptualizing the nature of the knowledge constructed through designing

4 Discussion

The study was an experimental attempt which aimed at both testing the methodological approach with the audiovisual data and mapping the subject matter initially for further examination with supplemental data. The conceptualisation of the subject is not intended to be final and extensive.

The concept design refers to various fields of activities that cannot be considered as an inseparable whole. The activity of designing referred in this particular case represents specifically the fields of industrial and clothing design. Even if the case represents a mode of operation that could be familiar within different fields of design, it must be taken for consideration that different domains of design may approach the activity and also the knowledge related to it from different perspectives. The origins of the knowledge cannot be separated from the surroundings, circumstances, people, time and place that contribute to the construction of the knowledge.

The difficulties in research on designing are well condensed in Lawson's statement that even after some thirty years of working on design research he knows much more from practising the process, rather than studying it (Lawson 2001, 308). I would like to add that the special troubles in the research on designing result from the seamless combination of verbal and non-verbal expression in designing.

The knowledge constructed through designing is not always directly related to designing. But as a designer I do not see a way of naming the domains of knowledge that could not be relevant in the process of designing.

5 Conclusions

The viewpoint of the study represents designing as constant working with knowledge in different dimensions. The study of the interaction among the designers revealed a continuous process of sharing, receiving and constructing knowledge.

Despite that the process was organised in different ways, the ideas and insights were unexpected, unpredictable and even surprising. The knowledge constructed through designing is fragmentary and does not answer to any particular questions as a whole. The knowledge produced through designing should not be paralleled with scientific inquiry for instance. Instead, it is apparent that designing as an activity is a way of producing various kinds of learning.

The designer's knowledge and the ways of constructing it are of special interest for the purposes of understanding the learning process relating to design and developing design education. The study

has given a narrow view of the subject through a single case. Due to the framework of the study the results are only suggestive and strictly contextual. Still the case points out various interesting lines for future studies.

Finally, while examining the subject from the point of view of the knowledge, it must be remembered that the activity of designing also reaches past the limits of knowing in many ways.

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Technological Influences on Product Design

What Does the Future of Product Design Education Hold?

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The focus of her work has been in the emerging hybrid practice at the intersection of industrial and interaction design–or the mediation between people, stuff, and technology. She is interested in design as a way of thinking and has a great interest in all design disciplines. She has focused on building a multidisciplinary approach to design with work experience in industrial design, interaction design, engineering, and business at Ford Motor Company, amazon.com, Armstrong Industries, and the Massachusetts Institute of Technology.

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"What does the future hold for design and design education?" and "What are computing technologies' influences and impacts on the field of product design?" are two questions whose intersection will be explored in this paper. This proposal aims to explore new directions in design education through addressing the conference topics of design education research, and the future of design/design education.

This proposal is focused on the impact that computing technologies have had on the field of product design. Since their conception, computing technologies have had influence on both product design processes and on products themselves. This paper focuses on the later influence - how computing technologies influence the nature of product and, as a result, what product design as a discipline might look like in the future.

The emergence of computing technologies are causing the lines between product and graphic design to blur and blend, and have created a new kind of design (interaction design) that is forming at the intersection of artefacts and information. This paper will explore issues related to this confluence within the context of product design education.

Goals for this paper are to think about what the future of design education holds, and move towards clarity on how to integrate the influences of computing technologies into design curricula. Topics of discussion include:

(1) Examples of innovative products/projects that showcase how computing technologies are influencing the field of product design and explicate this blurring and blending of design lines.

(2) If the lines between disciplines are becoming blurred… What do we do about this convergence?

Keywords: *interaction design, computing technologies, industrial design, ubiquitous computing*

1 Introduction

> "The boundaries between hardware and software, device and interaction, 2-d/3-d/4-d have blurred considerably and will only continue to blur and blend. The new product development model is one of collaborative design, with individuals representing various fields of knowledge working together..."[1]

This paper focuses on the challenges related to the influences of technology on the field of design due to recent advances in (and the proliferation of) computing technologies. The computer as a general-purpose electronic object has been around since the ENIAC's debut in 1946, and 1984 brought the computer into mainstream consciousness through Apple's introduction of its Macintosh. Computers and computing technologies are changing the world through the ways we live, work, and play, and their influence is apparent in their effects on the fields of graphic and product design. Computing technologies have created a new kind of design that is forming at the intersection of artifacts (3D) and information (2D). Currently this area of study is known as Interaction Design, and is defined as the interface between man and machine or the integration of computers with the objects in our world.

"Twenty years ago computers were expensive tools for professionals or games machines for enthusiasts. Today they appear in all aspects of our daily life, from mobile phones to microwave ovens, from exercise bikes to sewing machines."[2] Most succinctly, interaction design is defined as "what humans do with computer based systems and what those systems do in return."[3] It is a complex discipline that requires a multidisciplinary skill set — its practitioners require knowledge of graphic design, industrial design, information science, psychology, and computer science, to name a few. This paper explores issues related to this confluence, and focuses on the influence of computing technologies on the nature of 'product'[4] , and how the lines between graphic and product are beginning to blur.

2 A Visual Survey of Interaction Design: A Graphic + Product Synthesis

A shift is occurring from mechanical based products to interactive ones as computers become imbedded in many of the objects that surround us, including products such as cell phones, digital music players, ATM machines, digital cameras, and computers. "There are already twelve computer chips for every man, woman and child on the planet"[5] , and this will only continue to increase. As computing technologies become more ubiquitous, they are influencing and changing the nature of the product. Products are no longer discrete physical entities unto themselves, but the influences of systems, services, behaviors and experiences become important components of their existence and must be considered. Products today cannot be viewed as isolated physical entities, but as objects with connected capabilities that enable and expand their outreach.

iPod

Apple's introduction of the iPod is a good example of a product that is not a product in its own right. The success of Apple's iPod lies in the integration of its corresponding software and services in order to make this object and design a successful one. This success is due to the equally important interrelationships of each component in the iPod system: the *physical form* of the object (iPod physicality), the *user interface* including the structure of the information and how it is accessed (iPod interface), the relationship to the computer *software* (iTunes), the ability to download and upload music in *how the songs are transferred* from computer object to MP3 player (iMac), and most recently the ability to purchase songs through their *online music store* (iStore). It is the combination of all these components that creates the product system and ultimately the success of the iPod as a product. A New York Times Magazine article discusses the iPod's success as being difficult to assess: it's hard "to nail down whether they key is what's inside it, the external appearance or the way these work together. One approach is to peel your way through the thing, layer by layer."[6, 7]

Cell Phone

Although the iPod may be the best example of *successful* graphic-product integration, there are an increasing number of objects that require this synthesis. ATM machines, automated checkout machines, VCRs, DVDs, kiosks, answering machines, exercise bikes, gas pumps, and cell phones are all examples of products that require a good graphic-product synthesis. A cell phone is an object that is becoming increasingly important, omnipresent, and complex. Most cell phones come with 100+ page user guides that assist in familiarizing a user with their phone. The graphic-product integration is important, because navigation through the menus is a combination of physical and graphical controls.

Ambient Orb

An interesting new object that changes traditional notions of industrial design is a new concept developed by Ambient Devices (of Cambridge, Massachusetts) for the physical display of digital information. One of their designed objects, *Ambient Orb*, connects the virtual world to the physical one through the display of computer-generated information in a physical form — the Orb changes color in response to stock market changes. "The Orb's power lies in how it can reflect the ease with which humans process basic visual information—giving physical form to information."[8] Its application

is not confined to the type of information it responds to – people have programmed the Orb to respond to a variety of tasks: "Tracking job openings in Atlanta, measuring the flow of visitors to a Boston-based interactive design agency's website, gauging energy use in a New York City apartment, tracking eBay auctions, notifying someone when a particular person is online or a certain number of e-mails have filled their inbox."[9] Although not necessarily a proponent or opponent of these devices, the omnipresence of networked physical objects is on the rise.

This object is unique in that it is in the first generation of form-based objects to display information. There is no true graphic display in a traditional Graphic Design sense of display but it is information display nonetheless. What is not known in this case (without owning or interacting with one of these objects) is the interaction with its user. Although the physical interface to the device is seemingly simple and easy to understand (you look at the object and associate color with information), what is not explained in text is how one interacts with this object. Do you simply plug it in? Does it connect to a network? Does it connect to your computer? How does the object receive the information? How do you set the parameters for the information display? A seemingly simple object – may or may not have an intuitive interface. Additionally, this is also an interesting object in that it changes the design question/problem from "How do you display information graphically?" to "How can you display/ convey graphic information?"

3 Investigations: Industrial vs. Interaction Design

On November 19th 2003, the www.interactiondesigners.com listserv generated a lengthy discussion surrounding the impacts of computing technologies on the nature of product, as many design professionals debated the difference between 'interaction design' and 'digital industrial design'. The discussion was sparked by the announcement that the industrial design and graphic design professional worldwide organizations, ICSID and ICOGRADA (respectively), were merging and the interaction designers wondered where their position among these relationships fell. A question was posed to the listserv that inquired what interaction designs relationship was with industrial design, and why they were not included as a distinct discipline in this worldwide merger. A statement was posed by Molly Steenson, an Interaction Ivrea Professor, which generated a great amount of debate:

> "Bill Moggridge at last weeks' Ivrea symposium indicated that interaction design is a sort of digital industrial design."[10]

The discussion escalated from this inquiry into the differences between Interaction Design, Industrial Design and Graphic Design. What is the relationship between these disciplines? How are the relationships changing? What similarities and differences do they share?

Although Interaction Design has roots in many disciplines — graphic design, product design, architecture, art, ergonomics, computer science, cognitive psychology, sociology, cultural anthropology, media arts, mechanical engineering, electrical engineering, software engineering, hardware engineering, marketing, business, manufacturing — this discussion is focused on its relationship with industrial (or product) design, graphic design, and human computer interaction (HCI). In order to begin the discussion it might be helpful to begin by defining the respective disciplines as they relate to interaction design, and discuss some similarities and differences among them.

Industrial Design: Contributions to Interaction Design Through Physical Form

The term "Industrial Design" was coined in the early 20th century in order to describe the creative role that was performed during the process of developing industrial, or mass-produced, objects. Industrial designers are people who perform a creative problem solving process in order to develop the products we use everyday. "They determine the way a product looks, feels and how well it functions."[11] Industrial Design's professional organization in the United States, IDSA, defines Industrial Design to be: "The professional service of creating and developing concepts and specifications that optimize the function, value and appearance of products and systems for the mutual benefit of both user and manufacturer.

The industrial designer's unique contribution places emphasis on those aspects of the product or system that relate most directly to human characteristics, needs and interests. This contribution requires specialized understanding of visual, tactile, safety and convenience criteria, with concern for the user. Education and experience in anticipating psychological, physiological and sociological factors that influence and are perceived by the user are essential industrial design resources."[12, 13]

The strongest link between Industrial (Product) Design and Interaction Design is simply in how we interact with objects in the world. The form of an object influences a user by providing clues as to how it operates, which is summarized in Donald Norman's succinct statement: "Information is in the world."[14] He postulates that the information a person uses to operate an object is a combination of the object's inherent *physicality*, and one's (interaction) experiences with other objects in the world. This relates to the fundamental principle upon which industrial design operates — "form follows function." This well-known *mantra* of industrial design existed long before computing technologies. The primary relationship between a human and an object prior to interfaces was through physical form — a toaster, toilet, shower, chair, book, automobile, and wood planer all contain clues as to their operation. An industrial designer's job is to provide these clues. These ideas are explained by Donald Norman in his book "The Design of Everyday Things", where he focuses on the frustrations of our interactions with everyday things and provides numerous examples of poorly designed everyday interactions including experiences with doors, stove burners, bicycles, automobiles, slide projectors, and light switches.

Another way that Industrial Design connects to Interaction Design is in the area of *human factors* and *ergonomics*. This area of industrial design analyzes the relationship between a user's body and an object's physical form. It answers questions such as 'How comfortable is that phone to hold?', 'How comfortable is that chair to sit in?' and 'How well does that object fit in your hand?'. Automotive engineers analyze a car's interior in order to make exterior views accessible, seats comfortable, and controls reachable for approximately 95% of users that will encounter them.

Marc Rettig, a well-known interaction designer and recent Carnegie Mellon Interaction Design Visiting Fellow, provides a pre-computing example of desirable interaction design by exemplifying a wood planer for its physical properties. He posits it is an object created with desirable interaction intentions. Most of the *desirable qualities* sought in the creation of this object are the same properties desired in the creation of interactive objects today. These include an object's usefulness, usability, desirability, affordability (to the right people), appropriate complexity, appropriate styling, appropriate transparency in function and use, appropriate adaptability, and "good fit" with people, context, activity, result.[15] It is interesting to note the many similarities between the creation of an object, and the creation of an interaction.

In addition to the more functional aspects of design discussed above, product styling also communicates important information to a products user. Semantics are inherent in both the graphical and physical form of a product, and are extremely important components in an object's creation. This is not separate from a form's function, although not always fully integrated.

Graphic Design's Contributions to Interaction Design Through Informational Form

Just as traditional[16] Product Design contributes in the 3-dimensional realm, traditional Graphic Design contributes in 2-dimensions. As the physical form should make a product usable, desirable, and understandable – so should the graphical form. Essential principles of establishing good 2-dimensional form are found in information design. This includes establishing good informational *hierarchies* and *layering* the information in a way to help create clear content navigational structures. Because interactive products are highly complex, establishing clear and consistent *navigation* is imperative in ensuring usability.

Another contribution is through typography to ensure a product's *legibility*. This is increasingly important as many interactive products get smaller and smaller and people's eyesight remains the same.

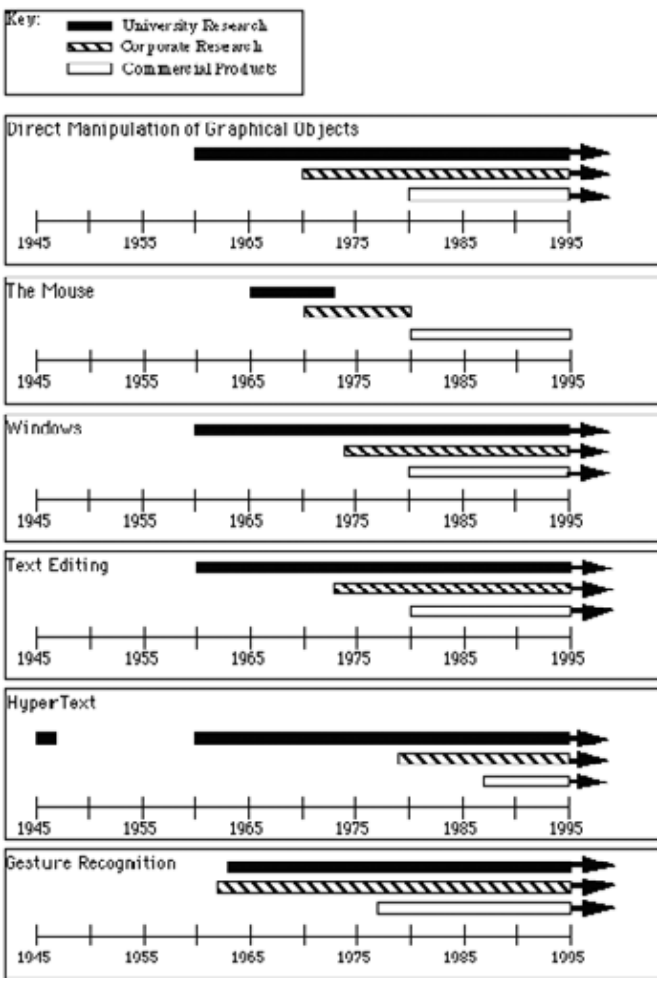
An interactive product design process begins with the product's contained information/content, a desired experience, or access to certain product functionalities. When one visits amazon.com, one wants to find information on a certain book, musician, or video. If one visits eBay, one wants access to information on a particular auction. If one wants to make a phone call, then it is functionality that is desired. Each interactive product design process begins with these features in mind. Content, function, and experience are used to shape and construct categories based on informational similarities and differences. This hierarchy is established through analysis, with an end result of an information structure in the form of information architecture. This information architecture then sets up the product's navigation in order to provide clear, consistent access to the information or function.

An interactive product results in the creation of the graphical user interface, widely known by its acronym GUI. The GUI includes any screen-based access to the information contained within, and is one way that a user interfaces with any information (or functions) wished accessible. Although there are trends toward products containing solely physical navigation and controls (see Ambient Orb discussion later in this paper), most interactive products today contain screen-based interfaces. The navigation through a website, cell phone, digital camera, iPod, computer, microwave oven, and television – are all based on their GUI which is a function of informational hierarchies, layering, navigation, and structure.

Human Computer Interaction (HCI)

Human Computer Interaction, commonly known as HCI, is a discipline first developed in the 1960s as a response to the advent of computing technologies. The following graph shows the development of HCI associated technologies. University research on human-computer interfaces began in the 1960's. The first demonstration that supported direct manipulation of graphical objects using a physical device (predecessor to the mouse) was Ivan Sutherland's MIT PhD Thesis, entitled SketchPad. This thesis, completed in 1963, "contained the seeds of myriad important interface ideas."[18] The next big advancement was the development of the mouse at Stanford Research Laboratory (now SRI) in 1965 as part of the NLS project, and in 1968, Douglas Engelbart and a team of 17 researchers at the Augmentation Research Center at Stanford Research Institute publicly debuted computer control devices. These included the first public demonstration of this computer mouse, along with other interactive control devices including the standard keyboard, a special keyset (similar to the keysets on keyboards today), hypertext, dynamic file linking, and shared screen collaborations over a network involving audio and video.[19] These objects were categorized, and further developed, under this discipline of HCI.

Figure 1: 17



HCI educational programs are often aligned with computer science programs and thus are developed in a more technical environment. Based in computer science, they often focus on what can be done technically with neglect to the 'human side' – the influences of design, psychology, human factors, and ergonomics – of object/system creation.[20]

Continued efforts in developing HCI into the discipline of Interaction Design, as it is known today, occurred in the early 1980's through contributions from many people. Most notable in establishing today's Interaction Design discipline are Bill Moggridge, trained as an industrial designer and co-founder of IDEO; and Bill Verplank, who has affiliations with Xerox Parc, IDEO, and Interval Research Corporation. "In the early 1980's, while working on the GRiD

Compass, Bill M. first recognized the need for the equivalent of industrial design for software interfaces and began using 'Softface' to describe it (being a contraction of software and interface). Being an industrial designer, I think he may have been more concerned with the form of the interface, than with the behavior (at least at the time). It wasn't until the mid-1980's, when Bill M. began working with Bill Verplank, that they began to focus more on the behavior and started calling it Interaction Design."[21] Some people also trace the origin of Interaction Design to 1989, when Gillian Crampton Smith began the Computer Related Design (CRD) masters degree at the Royal College of Art in London, where designers would apply their traditional skills to the development of interactive products and systems.

Interaction Design Today

Interaction Design as a discipline today is still evolving, and as such, it draws from many disciplines, and is being taught in many different ways in many different types of programs. Some of these include programs of Art and Technology, Media Arts and Science, Cognitive Science, Computer Science, Industrial Design, Graphic Design, and Architecture. It is defined most succinctly by Stanford's HCI program to be "what people do with computer-based systems (and objects) and what the systems (and objects) do in return"[22] . It is the kind of design that has emerged as a result of the omnipresence of computing technologies and their integration into/with objects. It is concerned with the *design of both physical and virtual things*, and can include the design of *objects, systems, environments, and services*. Users and their needs are placed at the center of the design process, and the end result is for a *clear, efficient, and simple interaction between the user and the system.* Important things to consider while designing include *form, ergonomics, use, function, experience, system, and behavior*. "Interaction design seeks to establish *a dialogue between products, people and physical, cultural and historical contexts*; to anticipate how *the use of products will affect comprehension*; and to *determine a form that is appropriate to its behavior and use*."[23] Skills and disciplinary contributions necessary for this field include knowledge from graphic design, industrial design, architecture, art, ergonomics, computer science, cognitive psychology, sociology, cultural anthropology, media arts, mechanical engineering, electrical engineering, software engineering, hardware engineering, marketing, business, and manufacturing.[24]

Interaction design combines elements of 2-dimensional display, 3-dimensional form, and 4-dimensional time in order to create design solutions. As opposed to graphic and product design, it operates within the virtual realm, is behavior focused, and explores some new aspects of design including the design of services, experiences, and behaviors. It is concerned with relationships between elements — between objects, between screens, between humans, between humans and objects — introducing elements of navigation and hierarchies over time.

Interaction Design in Education

Interaction Design in education is at the beginning stages of development, and in this infancy different aspects are being taught in many different programs and schools. In the United States, perhaps the most notable program is the Media Lab at the Massachusetts Institute of Technology, which was established in 1985 to address the convergence of computing, publishing, and broadcast as it related to the communications industry. The growing focus of the Media Lab today is on how electronic information overlaps with the physical world, or the integration of atoms (the physical world) with bits (the virtual world). The Media Lab was established as a research center that operates at the boundary between academia and industry, and operates without regard to traditional divisions among disciplines. The lab hosts over 30 research groups, 5 research consortia, 5 special interest groups, and a handful of institute-wide programs. Of these research organizations, there are a growing number that are of interest to product and graphic designers. Among these are Hiroshi Ishii's Tangible Media Group and John Maeda's Simplicity Initiative. The mission of Ishii's group is "to design seamless interfaces among humans, digital information, and the physical environment"[25] . His group is focused on projects that address the interlinking of physical forms with digital information.

A recent article in the New York Times discusses John Maeda's Simplicity initiative, a new initiative designed to address the increasing complexity of interactive objects and systems. It is created to address humans and our relationship with technological objects and systems. He has assembled a team of fellows who are attempting to define 'simplicity' as it relates to products, as well as integrating 'better' design with 'better' technology to produce 'better' results. Its program vision is stated to be "…redefining our relationship with technology in our daily lives. This goes well beyond removing buttons, slimming down screens, and shrinking interfaces to fit into the palms of our hands. It is a radical reexamination of ways to break free from the intimidating complexity of today's technology and the frustration of information overload."[26]

Not discounting professional and research experience, only one (out of approximately 40 full time) Media Lab Professors hold degrees in design – represented disciplines include visual studies, fine arts, documentary film, media lab arts and sciences, and architecture. [*disclaimer: This information was obtained by looking at Media Lab faculty websites and not through firsthand experience. It is not known if, and in what capacity, designers may consult on a variety of projects*.]

The Berkeley Institute of Design (BID) is a newly formed teaching and research entity hosted at the University of California at Berkeley with a mission to foster "…a new and deeply interdisciplinary approach to design for the 21st century: The design and realization of rich, interactive environments which are shaped by the human activities they support. Here "environments" include architectural spaces, products, web sites, and other artifacts that support complex human activity."[27] The BID was formed in 2001 as an offshoot of the Human-Centered Computing (HCC) group at Berkeley. The HCC was formed in 1998 "…as a weekly meeting of faculty with interests in information technology and its impacts. … The goal was to explore how social and behavioral sciences could inform the design of better information systems."[28] This institute comprises faculty and students from Computer Science, Mechanical Engineering, Art Practice, Education, Film Studies, Architecture, Business, and Industrial Engineering. Of the twelve permanent faculty, there is currently no involvement from a full time graphic or product designer. [*disclaimer: This information was obtained by looking at the BID website and not through firsthand experience – it is not known if, and in what capacity, designers may consult on a variety of projects.]*

Stanford's Human Computer Interaction program captures its philosophical focus through emphasis on interaction design. "By highlighting interaction as the object of design (rather than "interface" or "software" or "product"), we emphasize the interplay of what people do with computer-based systems and what the systems do in return."[29] HCI is a topic that is taught and studied in a variety of departments at Stanford and exists as a consortium that services various departments which have HCI concentrations. Concentration degrees are offered through, and faculty come from, departments of Computer Science, Symbolic Systems, Communications, Product Design, Industrial Engineering and Engineering Management, Mechanical Engineering, Education, Music, Psychology, and Medical Informatics. In addition, Stanford has an Interactivity Lab that is dedicated to HCI work, and whose goal is to "develop new devices, techniques, and theories that support the design of fluent interaction in a ubiquitous computing environment."[30]

The most notable worldwide initiative to address Interaction Design, and the integration of the physical and digital world, is the Interaction Design Institute Ivrea. The institute opened its doors in October 2001, and combines an Italian masters graduate program with a research institute sponsored by Telecom Italia and Olivetti. It is the only institute in the world developed and based solely around the discipline of interaction design, with its mission to develop "our capacity to innovate new products and services. These services help us interact with each other in new ways-through communications, network and information technology."[31] A primary aim of the institute is "to find new ways to design in the medium of tele-communications - through future concept projects which demonstrate the role of interaction design in the development of services and the devices that allow us to interact with them."[32] Ivrea has ten 'core educators', who comprise a nice mix of product designers, architects, graphic designers, software/hardware developers, and visual artists.

A University of California Irvine initiative is proposed to develop a new interdisciplinary school of design that emphasizes the conceptual and theoretical foundations of design. Interaction Design is included among the disciplines, along with Product Design, Spatial Design, and Design Studies. It proposes the study of "principles, techniques, tools, and processes for designing (1) interactions and (2) entities with which and through which people interact." (UC Irvine Proposal, p 19) It goes beyond traditional HCI program approaches to include influences from human factors, ergonomics, communication, cognitive science, software engineering, cultural issues, and others.

Industrial and Graphic Design programs are beginning to offer courses that direct attention towards this intersection of industrial, graphic and interaction design. The Rhode Island School of Design recently began offering both industrial and graphic design studios with focus on interface design. RISD's Graphic Design studios include '*Interactive Instructions*' and '*Interactive Information Design*'. Interestingly, '*Interactive Instructions*' focuses on improving the design of information instructions that assist in understanding the large number of interactive devices and instruments. (Perhaps if the instruments were designed more cohesively, this would not be required or desired.) RISD's Industrial Design HCI studios have a focus on the technological, social, cognitive, perceptual, cultural, and social influences on designed objects.

Another notable Industrial Design occurrence happened in the fall of 2003, when Syracuse's 'Industrial Design' program changed their name to 'Industrial and Interaction Design'.

4. Conclusion

What relationship do industrial, graphic and interaction design have with one another and what responsibilities do we, as educators, have to acknowledge and train our designers in any overlap? In examining the designed objects of today, it is clear that there is a shift from isolated products to ones that necessitate the designing of systems, services, experiences, and behaviors. Although a solution is unclear, and the disciplinary boundaries are blurring – what is clear, is that there are problems that need solutions. Since design is a *problem solving* discipline, focusing on the problems that technology poses as opposed to disciplinary boundaries might be a good approach.

Design Methodologies

Since design is unique in its thinking, an approach for design synthesis occurs in identifying methodologies used in the discrete disciplines, and employing their practice across curricula in some fashion. Interaction design utilizes industrial design methods such as rapid prototyping, user testing, user focus, functional analyses, and semantic analyses. In an Ivrea symposium, Bill M. discusses the concepts of *user focus* and *iterative prototyping* as two processes industrial and interaction design share. A user-focused process is simply one that is developed around a user's needs. Iterative prototyping speaks to the potentially never-ending process of continually refining designs through physical prototypes in order to achieve the best results. He states, "Try, try, and try again."[33] And in an essay entitled "Form is Function", Bosse Westerlund discusses the appropriation of industrial design methods for interaction design purposes. He identifies *functional and semantic analyses* as two useful methods for interaction designers to employ.

Systemic Thinking

As we enter into this new kind of design, it is critical to understand beyond the physical and informational characteristics of a product in order to understand the *system*: how it works, who is involved, and what are the influences on that system. As technologies become more integrated into our world, design elements become intangible and there is increasing importance in having methodological tools for representing and evaluating the systemic elements of design. The elements of the system *could* include the problem, the technologies, the relationships, the people, the social influences, and more. We must understand the links, and be able to evaluate their influences on each another in some way.

Collaborative Efforts are Needed

It seems as if interdisciplinary approaches are necessary and beneficial, and the more informed we are with respect to different aspects of different disciplines, the better. For the well-known product designers, Charles and Ray Eames, 'there was no difference between design disciplines. There was only the importance of applying good skills and thinking to a shared understanding of a common problem.'

"This broader scope for design has, in turn, forged new connections among disciplines that previously developed in isolation, created new languages that cross older disciplinary boundaries and transform the infrastructure of design, and realized an array of objects and fields of study that we could only dream about in the past."[34]

How do we break down the different concepts, skills, and methodologies in a cohesive way in order to structure and build curricular formats around any necessary change? Although mostly left with questions about what all this means for designers of tomorrow, incorporating this knowledge into our curricula is necessary, because computing technologies are changing products and attention is needed to designing with their impacts in mind. The major disadvantage of incorporating this type of information into design curricula is that this means more skills and concepts to teach in the same amount of time within the same number of credits. Where and how do we teach new skills and ideas? Is it possible to add this knowledge to an undergraduate design program without compromising quality of education and still teach the necessary skills for becoming a product designer today? If all skills cannot be taught, where do we draw the line – which skills do we teach and which skills do we neglect?

Computing technologies' influences on design have created many new interesting opportunities and challenges for the field of product design, and due to the nature of technology this is a discussion that will not go away. Determining the best way to integrate this is a difficult challenge for all design disciplines today in order to create a practice of interaction design that is a singular discipline informed by many. Although this relationship is complex, there are consequences for designers of the future. It is imperative to identify new skills, methods, and tools necessary to train the designers of tomorrow for these challenges.

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This paper was originally written for the American Institute of Graphic Designers Education Conference in October 2004. Currently, a modified version is published on their website, http://www.aiga.org.

Integrating the Education of Design and Management

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Design is a multifaceted discipline. It can be used in a variety of contexts and for a variety of purposes. The processes, the methodologies and the tools that designers use, and are trained to use, can be effective not only in generating artefacts (be they buildings, products or experiences), but can also be highly useful in designing services, systems and strategies. Management thrives on strategies and systems. Yet it is a rare case where both these disciplines may have worked in tandem.

Many management gurus lay emphasis on using tools like Lateral Thinking, Holistic Approaches, Innovation, Quality etc. Designers use them all the time. Yet, these two streams don't seem to confluence. Isn't it time that the two looked at each other seriously and each granted other the recognition that it rightly deserves? Design education, if it must keep abreast, needs to look at systems and the management of the same. It will not do to exist as a microcosm. Also, young designers hit a glass ceiling in the corporate world, governed by management principles, even though quite capable of going beyond the existing parameters of the supposed skill-sets of a design professional.

Design involves a lot of Strategizing and Innovation! Aren't these also the mantras of sound management competencies? Managers can reach the execution stage, in tangibles as well as abstracts and that is a skill that the designers would do well to learn, so that they too can reach completion and not get waylaid by just thoughts. It would do well to have integrated courses for the professionals of the two streams, so that both learn from each other and the end product is a well-rounded, integrated individual capable of scaling hitherto unscaled heights.

The paper deals with the issues of segmentization of the professions of Design and Management, when the two need to be integrated to be meaningful in the coming decades and economic scenarios all over the world.

Keywords: *design & management, integrated education, evolving methodologies, strategy & innovation, qualitative leadership*

Introduction

When I was a much younger girl…

…I joined a course in Design. And I looked at the world with new eyes. I thought it was a fantastic education, an invigorating profession. I still do. In fact, I maintain that perhaps all our youngsters should have a mandatory design education, post school, before they decide upon their eventual professions.

Why? You may ask. Design Education is where art, science, math, history and philosophy all meet. That is why it is integral to who we are, and what we are. It defines our contexts for us. Also the unbelievable exposure to 3-dimensional experiences in design education opens up the mind from its hitherto 2-dimensional training. One can start thinking in a non-linear way, which brings in a

whole new perception about the complexities and inter-connectedness of our existence. Some also call it the Chaos Theory and Complexity. We weren't taught it as any theory or philosophy, but we learnt it nonetheless. Because, when we design, we need to keep everything, a huge lot of everything, in mind.

I loved it. It was about learning, experiencing, discovering and experimenting with everything that went on around us. And so we ventured forth into the world, the young designers, with our ideals and ideas. To make this world, this life, aesthetic and meaningful.

Then I grew up…

…and I discovered that, well, the world did not quite want what I wanted to give it. I may have felt that the world needed it, but the world did not. Was I wrong in thinking that I had anything to give at all? Perhaps.

Perhaps the world knew what it wanted. My job, I realized, was to provide what was demanded. Nothing more, nothing less. I was given a few parameters and I could work within them to my heart's content. Some call it a Brief. I was given enough say in whatever I did as long as I stayed within my parameters. Anything outside of it was not my domain and I was supposed to have very little knowledge of it.

Sure, I agree. I am not super-human. But, hey, please remember that I think laterally. I was taught to do so. In fact, it was insisted that I do so. The world continued on its momentum, my little squeaks of protests drowned in the din of bigger, more important sounds.

Thus continued the story till one day, I noticed that there was some rumble. People were talking about innovation, optimization, appropriateness and 'thinking out of the box'. Also; complexities, connections and contexts. Finally the world was talking our language, or so I thought. So did others of my kind. We moved in eagerly, ready to share with everyone our knowledge and our expertise. In some places we were welcome, and became part of the whole but, in many cases, we couldn't be heard because we were not supposed to have had the requisite training or the domain knowledge!

Now I have children of my own…

…I tell them, don't give up. If Mohammed will not come to the mountain, the mountain shall go to Mohammed. All our lives, we have concentrated on the Qualitative. Maybe we need to stress equally on the Quantitative as well. I tell them to learn the language that is understood by the world. After all if one can't make oneself understood, what is the point of shouting oneself hoarse?

Listening to me, some try. But most of them can't go beyond a point, simply because the extent of their knowledge is not formally acknowledged. Perhaps, there is truth in the matter. What we know is not enough. We have had a good grounding but the structure has to be built yet. So some more education is needed.

Similarly, those who already know what we apparently don't, need to familiarize themselves with what we do and they don't. That, believe me, needs a serious amount of conversion.

This is what this paper is about.

1 Design & Management

What is design?

It is an intention, an anticipated outcome. An end is always expected and the process, which leads to that end, is Design. The process comprises innovation, optimization and appropriateness.

Innovation is the introduction of something new. Origin is the Latin *innovare*: to renew, alter. In design, it is about improving an existing product/situation/experience. One may ask, is it development then? Or is it about creating something new? Actually it is a bit of both. The scale of the 'development' and the 'idea' qualifies them as innovation.

Optimization is to make best use of a situation or a resource. Origin is the Latin *optimum*: best thing. In design, it is the way in which all the factors, internal and external to the design process, are juxtaposed in a mutually beneficial way. It is about resources, technologies and the intangibles coming together to form an optimum whole.

Appropriateness is that which is suitable for a person, place or condition. Origin is the Latin *appropriare*: for oneself. In design, all end results have to be appropriate for their environments. The environment may be physical, cultural, emotional or psychological. Perhaps, even the metaphysical.

Added to these are the *three Cs* of complexities, connections and context, making the entire design process a network of constant back and forth movement. Excruciating, but eventually exhilarating.

What is management?

Derived from the Italian *maneggiare* from *mano* hand, and from Latin *manus*, Management would mean the systematic coordination and application of thought, strategy, skills, and resources to systems and structures to deliver certain predetermined outcomes in the most optimal way.

The optimal, in turn, would basically imply getting maximal output from minimal input in terms of resources, costs, and services. This would, therefore, necessitate continuous optimization of available resources and systems, innovation and appropriateness.

The inherent similarities in desiring an outcome, both in design and in management, are evident.

Enough thought would evidently be given to innovation, optimization and appropriateness in Management too. The tools for dealing with these parameters may be different. The points of stress may be different too but it is not likely that these parameters are not dealt with at all.

However, looking at the methodology of management, it is obvious that the stress is much more on the quantitative than the qualitative. The quantitative applies much more to typical businesses and industry but management, (if it is good management, either at the conceptual-strategic or the practical-applicative levels) should be as concerned with the qualitative as, perhaps, design. The converse probably holds true for design.

The processes in management are geared towards the empirical and the end is well defined. The emphasis is on attaining those ends, primarily by analyzing the available resources and exercising immense logic and rigour in optimizing those. The process is tailored to suit the desired results. While in design, the end is a concept, which gets fleshed up during the design process to reach its eventual form. Thus, the process itself is a generator of the results. Therefore, while the tangibles hold sway in a management process, the intangibles have a lot to contribute in a design process. Here again, any good leader-manager should know that the crux of effective management is to deal with the intangibles!

Herein lies the difference between the two. Such differences exist more in the popular conception primarily because of a limited, or incorrect, understanding of management. Unfortunately, the more pragmatic subject of managing businesses has hijacked management as a science or an art, or even philosophy, which is only one aspect of management!

There are also other differences, like the reaction to 'change'. While the design community, for most part, believes that change is the only constant, many management professionals feel that it leads to unnecessary risks, and it is better to stick to the tested and tried methods. They may have enough justifications for the same but at some point it does lead to being conservative. It is true only in rare cases now. Any business that wants to survive and succeed in the contemporary business environment

will have to be change-oriented; there's no choice here! While the rest of the world is embracing these changes, we, in India, are unfortunately still holding on to the rather archaic principles.

These differences are also the prime cause of incompleteness of the two streams, which is what hinders them. Because, as we philosophically know, nothing is complete without its antithesis. Classically, 'The whole is greater than the sum of its parts.'

To make up for these lacunae, it would make sense to integrate the two streams. Traditionally industry is always a little resistant to change. So what better place to initiate this change and integrate the two streams than the academia!

2 Integrated Education

If we look closely at the curriculum of any leading B-School, we find it primarily divided into five broad categories — Business Policy, Economics & Finance, Management, Marketing and Systems – all fairly evolved, complex fields in their own rights. Theoretically, they would also be capable of involving a lot of qualitative parameters and notions. Yet, when it comes to practice, there is very little of that in the way these courses are taught. It may be due to the restraint of time and resources, or due to a drag effect from the industrial age. The age of the machine stressed on efficiency and this efficiency was determined by having the minimum possible indefinable.

Now we are in the midst of a knowledge economy. Given the highly differentiated economic scenario of today, the qualitative parameters will play an increasingly important role in determining the future market leaders, and therefore need to be incorporated actively in the education process.

Similarly, if we look at the education of design today, we will find emphasis on the experiential, process-based learning; integrating, synthesizing and creating. Little time is spent on logic and analysis. While in the management education, the qualitative parameters are the silent, dormant features, in design education that is the fate of the quantitative parameters. Yet, there is much that is happening in management thinking today that subsumes some of design concepts and principles. Again, we in India need to recognize and adopt this change.

At some level, both the streams do touch upon the extremes but in a very subconscious way. The need is to do the same in a very conscious and determined methodology. As I stress again and again, the process has already made a beginning in the West, but here in India, the divergence is still very apparent.

I stick my neck out when I say that the resistance has been more from the field of management, nationally and internationally, and would love to be proven wrong. It may be equally true that the resistance, or part of it, comes from design professionals who refuse to dilute their purist "qualitative/ intangibles" approach to accommodate the "quantitative/tangibles" demands of management!

3 Evolving Methodologies

To integrate these fields of Management and Design, a workable methodology needs to be put in place. This, of course, is the most challenging and most exciting part of this endeavour. It needs coming together of the leading institutes, academicians and professionals from design as well as management to work out a curriculum where the best and the most relevant of the two streams are integrated. The resultant should be a holistic, robust curriculum, which gives us the leaders of tomorrow.

The challenge also lies in tackling how the work going on in the academia rarely filters down into the real world. We know that a lot of work is going on in optimization and sustainability, but very little of it is being used in business or industry. We have to do away with this filter between the academia and the real world. So whatever methodology is evolved, it should be practical and applicative. For example, how is optimization and innovation to be taken to the market? Let us understand that the

function of management is not to optimize and innovate, but to create conducive conditions and systems so that these can be done unimpeded. That is where corporate strategy comes in. And strategy is something that is as qualitative as it is quantitative.

The integration of management and design shall then, perhaps, happen in the spheres of strategy and innovation, both being the life force of their respective fields.

4 Strategy and Innovation

Strategy is a plan, a means of attaining a particular direction or a goal. Origin is the Greek *strategia*: generalship. Strategizing involves taking up a general direction to work towards, and the necessary actions needed to move in that direction. In that it is common to both design as well as management. Both processes have an aim and both devise their strategies to work towards it. Strategy can never be absolute in practice. It is absolute only in the realm of the theoretical. The moment it enters the real world, there are innumerable factors playing upon it. So strategy is forever changing and emerging renewed out of that change, and when it accomplishes what it set out to, it is a *realized strategy*.

This, again, holds true for design as well as management. Having such a strong common denominator, it stands to reason that this is where design and management can come together and augment each other.

Innovation is another facet where design and management can be in tandem. Traditionally, not a strong criterion in management processes, innovation is fast emerging as a key component of competitive strategy. Its importance in this 'age of ideas' is unquestionable. What should be of importance vis-à-vis this paper, however, is — can methodologies for innovation in the design process be used in formulating innovative strategies as well?

The idea is not just to make innovative products, and by products I mean artefacts, systems and experiences as well. This would anyway happen in the current economic environment because it is a need driven by the markets. And we all know, designers, managers, everyone, that when the market demands, it makes sure that we deliver.

The interesting and rather pertinent issue now would be to pre-empt the future and recognize *innovative management* as a strategy, to think in newer, more radical terms so as to be able address the dilemmas that we face now, be they economic, environmental or social.

The effort should be in integrating the qualitatives of design with the quantitatives of management and helping shape an individual who can have a comprehensive worldview. A little like the Renaissance's classic complete man.

This is where we come into perhaps the most important domain of all, gauging by the ramifications that it can have on the future of not just the professions of design and management, but on the very existence of man himself.

5 Qualitative Leadership

Not only is this the most important of all the domains covered till now, it is also the most difficult. Now we are not just talking about the integration of two professions, their processes, but of an integrated leadership. Of providing such a grounding to an individual that he is able to see beyond the here and now, beyond his immediate profits or personal gratification, towards a future that is beneficial to all. A leadership, which is not merely based on the quantifiable, but also the on the abstract. Which finds its roots not just in knowledge, but wisdom. A leader, who does not only have a policy, but has a vision as well.

These terms may sound clichéd, but I use them for want of other, identifiable ones. Some may argue that isn't that what our leadership courses are providing, but I feel that the whole effort is fragmented and misses out on some important points.

This is not to advocate the cause of design or design education or importance of design, but merely to reiterate that the whole experiential nature of the design process, and the non-linearity of it, is an important stepping stone towards realizing oneself. It helps us break pre-conceived notions and structures, come in touch with the intuitive and hone the senses — all pre-requisites to wisdom. What we need are well-rounded, complete individuals who can understand the depth of strategy, innovation and optimization.

As academicians, professionals and teachers, we can only provide the right climate, the right environment. The rest ought to follow.

The education of design and management should be integrated so that the real-life division between the two, as professions and practices, is healed. As we debate the education of design, it is imperative that we look at the integrated whole, at all the factors that are at play, instead of existing in our microcosms, however utopian they may be.

Making Design Education Relevant In Singapore: Emphasizing Collaboration

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As national commitment to promote design gathers momentum, design education in Singapore has been evolving to support this sea change. This paper shares how the School of Design at Temasek Polytechnic, a well-established design institution in Singapore, has adopted a holistic approach in developing and promoting design enterprise and innovation through a three-tier collaborative learning approach:

- Collaboration between the school and the industry,
- Collaboration between staff and students and
- Collaboration between students of different design disciplines.

This paper elaborates upon details of this three-tier collaboration as an example of a new model of structuring design education at schoolwide level. It also illustrates how this change has created opportunities for exchange of ideas and learning to take place outside the traditional classroom setting.

Keywords: *design education, industry, collaborative learning*

Introduction

In recent years, the Singapore government has made a concerted effort to position Singapore as a leading centre for design creativity in Asia. For example, the Design Singapore Council was established in 2003 by the Ministry of Information, Communications and the Arts (MICA) to spearhead the Design Singapore Initiative. Among other things, this initiative includes a range of Art programs, Design Awards, international design forums, the long awaited establishment of a dedicated Arts Center, the Esplanade, etc. In Sept 2004, Singapore also took part in the prestigious Venice Architectural Biennale, a bi-annual event that showcases best work of international architects, for the first time. This is definitely an indicator of how encouragement in design is allowing Singaporeans to make headway in the international design arena.

As a key contributor to the design education arena, Temasek School of Design has tried to support this strong emphasis on design and collaboration. The core for the organization of these collaborations is the Center for Design Innovation (CDI). CDI was set up in 1997 because it became apparent that design education cannot be complete without constant student and staff exposure to the design industry. If design education is to support the larger national design agenda, design education cannot be seen as divorced from commercial demands and challenges. Sadly, this is often the case. For example, while working on industry assignments, students may not have the benefit of discussing their concepts or design process with design educators. Similarly, in the past, there was no structure to allow design educators to point out to students how classroom concepts can be applied to "life" projects. To address this, CDI encourages staff and students to embark on "life" projects together and use CDI projects as teaching platforms to highlight design theories and techniques that have been taught in classrooms. In the following sections, I will further discuss how the establishment and structure of CDI has tried to make design education more relevant in the Singapore context by emphasizing collaborations on three different fronts:

1 Collaboration between school and industry

CDI encourages industry collaboration and projects that encompass various design disciplines such as industrial design, interactive media design, visual communication design, interior design and apparel design. The design brief can be initiated by both the industry or the Design School itself and can vary in emphasis from commercial to academic and theoretical.

CDI acts as a service provider to the companies that do not have in-house designers to help with design and production. Depending on the needs of the company, CDI may provide design advice or design packages. Through such collaboration, both parties get to understand and learn from the design process together. Students are exposed to the industry's work logic that is not only profit driven, time-sensitive and strongly economic in nature, but also demanding in terms of innovative design. Through collaboration, industry also comes to understand the importance of research and analysis, student learning, exploration of ideas etc.

Though achieving commercial and academic goals simultaneously is often a tightrope walk, synergy between the design school and the industry can be achieved through project management skills. When this synergy is achieved, the result is good designs that both industry and the design school are proud of.

2 Collaboration between staff and students

Collaboration between design school staff and students on authentic design projects (commissioned by industry) reinforces design skills covered during design course modules and allows professional design faculty to "guide" and facilitate students while working on live design projects. Team learning, peer learning, and problem-based learning form an integral part of the experience.

Although most projects are done outside the curriculum, and students and staff have to meet for discussions outside classroom hours, there has been a general high level of commitment from both staff and students. One reason could be that during such interactions, staff members work as professional peers with students and students are "elevated" to become colleagues. This requires students to perform professionally and practise alongside their lecturers. CDI's experience has been that this is a liberating experience for students because once expectations are clearly spelt out, students take ownership of their role and this leads to positive intrinsic motivation. As the predominant mode employed is team learning and in many cases brainstorming of ideas between staff and students, the "fun" element is usually evident. This has been most positive because when "fun" and "light-heartedness" comes in, the result is the unleashing of creative ideas and imagination.

In CDI's framework, small design teams with faculty and students usually in the ratio of 1:4 enable faculty to spend quality time with students. This encourages knowledge transfer and two-way communication between staff and students.

Students come into the CDI collaborative framework at three different levels. The main curriculum of our Design school is divided such that students in the first level receive basic design instruction; the second intermediate and third level students are gauged as having acquired most of the skills necessary to practise as designers. Depending on the job scope and deliverables of the project, students from the appropriate level are selected on the basis of their portfolio.

Collaboration between the faculty and the students is the key to the success of CDI's projects. The dynamics involved and the amount of interaction cannot be easily quantified but the final output of the design product and the supporting processes that takes place speaks volumes for the learning that takes place for.

Collaboration between students from design sub-disciplines

As some projects are multi-disciplinary, students from various design sub-disciplines have a unique opportunity to work together. This often promotes innovative ideas as paradigms are challenged and later reconstructed. Unlike the classroom experience, students working on CDI projects are given a

perspective of parallel design disciplines that support their own design process and this contributes to the development of a richer overall creative design process. Students also learn how to be tolerant and appreciative of the different skills necessary for a multi-disciplinary project to succeed.

For example, in one project, a new character has to be created, and the students from the animation studio classes were selected to participate. However, as the end result for the project is to create products relating to the character, product design students were included as well. This led to a creation of a team comprising two animation students and two product design students. The process enabled them to work alongside each other, a scenario not possible earlier because of the separation of design disciplines. They brainstormed, sketched ideas, met clients and worked towards completing a common goal together.

During such cross-disciplinary collaborations, the students felt that working with other students broadened their perspective of the design world. Though students were from different fields of design, they could share and discuss different approaches to problem solving. The CDI approach, they felt, was a great exchange of different points of view resulting from their different backgrounds and experiences.

As a lecturer, I can see great potential in such cross-disciplinary learning. Such learning can change the paradigms of what can and cannot be done and students become more open to new ideas. It is only a matter of natural course that designers move beyond their own design "pigeon-hole" and understand other fields of design. It is a wonderful opportunity for young designers to obtain such exposure as it gives them a holistic view of what design is all about and how it embraces our daily lives in a myriad of areas. For example, a product designer can begin to see the importance of fashion design and how fabric can be applied in many areas including his own discipline, instead of just thinking about working with the common plastics. Similarly, a website designer can begin to see the importance of the design of logo, motion typography and even the design of a keyboard once he understands graphic design and product design better, and how they all relates to his work.

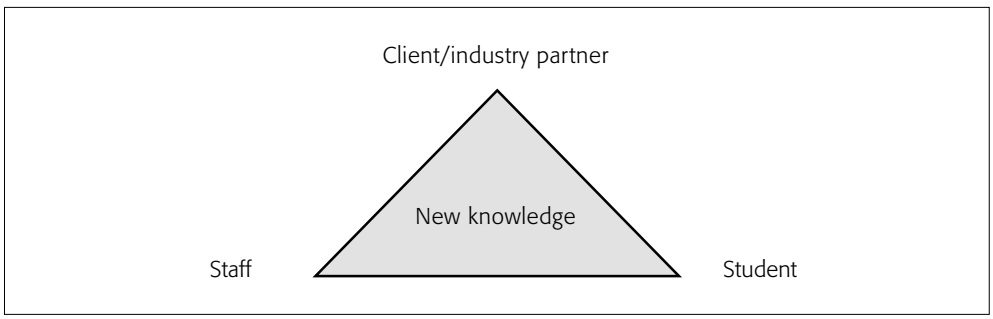
On a personal note, in CDI, as a product design lecturer, I have had the opportunity to work with graphic design students on a graphic design project. This has increased my own knowledge base as well and has allowed another combination in which learning can take place.

Collaborative Learning

Collaborative Learning method is evident in the process that CDI uses to train young designers. According to Gokhale (1995),[1] collaborative learning fosters the development of critical thinking through discussion, clarification of ideas and evaluation of others' ideas.

As an instructional method, collaborative learning allows a group of students working together to achieve an academic goal, complete a task or, in the specific case of design education, to create a product. It is a good way to engage students in a very active manner, promoting active learning instead of passive learning. Members of the group are structured to be responsible for one another's learning as well as their own; they need to learn how to think creatively, solve problems and make decisions as a team. This shared learning also allows them opportunities to engage in discussion, accept constructive criticisms from fellow team members and thus become critical thinkers (Totten, Sillls, Digby & Russ, 1991).

Figure A



Students are capable of performing at higher intellectual levels when asked to work in collaborative situations than when asked to work individually (Vygotsky, 1978). This is because group diversity in terms of knowledge and experience contributes positively to the learning process as well. This is an approach that underlies CDI's multi-disciplinary approach to problem solving and collaboration with the industry. CDI's project teams usually comprise both staff and students and this fosters opportunities for cooperative learning. Cooperative learning methods are powerful because they have been seen to improve problem solving strategies as students are confronted with different interpretations of the given situation which they have to make sense of (Bruner, 1985). This is seen in the critiques and the brainstorming sessions that are held between staff and students and also with clients. This triangular support system makes it possible for all members involved to absorb knowledge, assimilate them, and hone their personal critical thinking skills, leading to the creation of knowledge. (See Figure A)

Conclusion

Singapore, as a nation, is going through fast changing times. Design is seen as one of the many ways of creating new intellectual property and creating a new knowledge economy. Innovativeness, enterprising spirit and creativity are much sought after characteristics in our education at a national level. CDI, a part of Temasek Design School, plays an integral role in supporting design education in the changing socio-economic context of our nation. Although I believed the model of CDI is not unique by itself and other design schools have their own models of collaboration with industry, this paper shares the collaboration philosophy that is the foundation of CDI in Singapore. (See Figure B) It has also tried to illustrate how design education has been broadened and deepened alongside with industry so as to ensure that design remains current and relevant in Singapore.

It is my hope that this paper will stimulate discussion and comparisons with other similar collaborative models so as to create a better learning environment for design students across the world. After all, more progressive teaching and collaborative models would go a long way in developing quality holistic designers for the future.

Staff, students and client in discussion

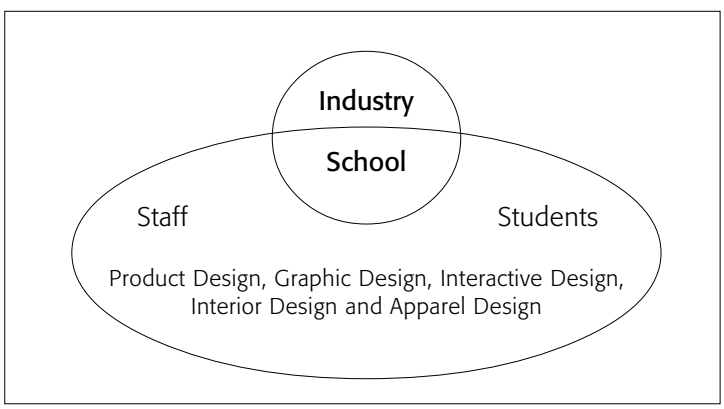


Figure B

Notes

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Global Classroom (Multi-cultural Design Education and Technology)

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Cindy Gould is an Assistant Professor of Art and Design at Iowa State University, Ames, Iowa, USA. She teaches courses in CORE / Foundations of Design, Color Theory, Surface Design, Fiber Forms, Senior Seminar, Independent Studies and guides Graduate Thesis Research projects. She received her MFA from The School of Art and Art History, The University of Iowa. She is Fellow of the ISU Center for Excellence in the Arts and Humanities and a Wakonse Teaching Fellow and has research several grants.

Professor Gould has presented her research at the ARS Textrina International Textile Conference in Leeds, UK, International Colour Congress 2002, Iowa State University, and at FATE conferences in Boston and Sarasota. She co-curated "Banners 2000", at ISU and "Temple and Village: Patterns and Prints of India", exhibited at 24 venues in the USA. Most recently, she curated the international invitational exhibit "Aspects of India" and organized a three day symposium "Interpreting India: Multiple Views, Multiple Voices", hosted by the Octagon Center for the Arts, Ames, Iowa, USA.

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Nita Thakore is a contemporary textile artist from Vadodara, Gujarat, India. She is a Senior Lecturer at the National Institute of Design in Ahmedabad, Gujarat, where she teaches Textile and Fashion Design. She received her BA and MA in painting in Vadodara, India and a Post Diploma in Textile Art from Goldsmith's College of Art at the University of London, U.K. Nita Thakore was the recipient of a Fulbright Fellowship to the Rhode Island School of Design (RISD) from January – June 2000. She received a Fulbright Fellowship Travel Award to participate in the "Aspects of India" exhibit and related symposium and was actively engaged in activities at ISU during August / September 2004.

Nita Thakore's own creative textile artworks have been exhibited widely throughout India, Europe and the USA and are in such prestigious collections as the British Museum in London, The Times of India, New Delhi, and Cymroza Art Gallery, Mumbai, India. Awards include a Charles Wallace Festival of India Grant and a Government of India Senior Fellowship in visual Art. In 2002 she was invited to curate the India portion of the 8th European du Patchwork Exhibition, showcasing 200 avant-garde textile artworks by 35 Indian artists and designers.

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Education, the world over, shares universal concerns. While political boundaries have historically limited access to information and communication, changes are rapidly occurring in both cultural and educational spheres. These significant changes are paving the way for a world of increased mutual respect and a sharing of humanistic ideals.

Technological advancements provide enhanced global educational opportunities via long distance teaching and learning. Design educators the world over can formulate, share and refine standards for effective delivery of classroom pedagogy, including curricular content, teaching strategies and methods, as well as critical analysis, outcomes assessment, multi-cultural interpretation and universal design standards. These technological and educational advancements enhance student learning and outcomes and better prepare students for success in their chosen area of study and subsequent success in their professional careers. The previously limiting aspects of geographic location and educational isolation can now be overcome with technology, providing expanded and enhanced educational opportunities of a global nature.

The co-authors, design educators from two different countries, the USA and India, jointly developed the "Global Classroom" project, an on-line educational model. It was implemented by involving a class of Iowa State University undergraduate students taking a course on "Surface Design." The project curriculum was designed and documented through multiple phases. The involved students and instructors critiqued assignment outcomes while the two instructors assessed the "Global Classroom" model project. It is a model which could be implemented anywhere in the world, where instructors and students are present in one physical place, yet are able to interact electronically (virtually) with students and instructors in other parts of the world.

Keywords: *global classroom, multi-cultural design education, technology, on-line education*

1 Introduction

During August and September of 2004, co-authors Cindy Gould and Nita Thakore had the opportunity to work together professionally. Cindy Gould, Assistant Professor of Art and Design at Iowa State University, located in Ames, Iowa, USA, had organized the international invitational exhibition "Aspects of India" and a three day companion symposium "Interpreting India: Multiple Views, Multiple Voices." Professor Gould had invited Nita Thakore, Senior Faculty member with the Department of Apparel and Textile Design at the National Institute of Design in Ahmedabad, Gujarat, India, to participate in the exhibit and symposium.

A Fulbright Travel Award allowed Ms. Thakore to be in residency with the ISU Department of Art and Design for the months of August and September. During those two months, she gave numerous presentations to students in multiple departments across the university, as well as various student organizations. In addition, she was actively involved as a resident artist / designer with students enrolled in the *Art IS: 346: Surface Design* course taught by Professor Gould during the fall semester.

It was during this intense and exciting time that these two design educators saw a wonderful opportunity to expand on the classroom interaction between the ISU students and Ms. Thakore. The educational interaction and creative collaboration between her and the students was dynamic, rewarding and significant on many levels. However, her residency at ISU had a looming and definite calendar end, thereby ending her actual, "real" (physical) presence in the classroom.

The two instructors decided that this significant teaching / learning interaction could and should continue. As a result, they conceived of the "Global Classroom" project, using Internet technology to develop an on-line educational model. This paper is based on the case study of that project.

2 Project Description

Ms. Thakore and Ms. Gould teach textile design courses at their respective institutions. This case study was based on an assignment developed and implemented in Professor Gould's Art IS 346: Surface Design course at ISU. This course is an elective course for students and is generally taken by upper-level students from the departments of Art and Design and Textile and Clothing. Students are introduced to a range of mechanical and liquid resists, dyes and discharge processes that are then used to create successful surface designs on a wide range of fabrics.

Typically, additional surface embellishment and stitchery techniques are not included as part of the course curriculum. However, Ms. Gould wanted her students to fully benefit from the opportunity provided by the Fulbright residency for them to work one-on-one with Ms. Thakore, a world-renowned textile artist and designer. Therefore, the course syllabi and curriculum was modified to include her areas of expertise.

The students were challenged to create a unique and successful 2-D or 3-D fiber art piece which included mechanical resist, dye and discharge processes, as well as three or more of the surface design and stitchery techniques taught to them by Ms. Thakore during her residency.

Students were required to do preliminary design research, including: 1) researching the work of contemporary textile designers from the U.S.A. and India; 2) studying color schemes and personal color preferences; 3) creating and refining compositional ideas; 4) experimenting with a wide range of resist processes, dyes and discharge processes, along with over-dyeing until desired results were obtained and could be replicated; 5) learning ten different stitchery and surface embellishment techniques; and 6) experimenting with a wide range of design possibilities and solutions provided by all of this preliminary research and design development.

Students were required to create a research / resource notebook of the entire design project from start to finish and were to include all of their preliminary samples and experiments. This design resource notebook was turned in with the finished project and was assessed for its thoroughness.

(In addition, students were required to do some on-line background research on the National Institute of Design in Ahmedabad, on India in general, and on traditional and contemporary design in India.)

3 Implementation

The "Global Classroom" project was implemented as outlined below:

Stage 1:

Ms. Thakore and Ms. Gould discussed their concept for the project with the *Art IS: 346* students. Assignment handouts were distributed to the students and they were encouraged to ask questions. Following this discussion session, students were instructed as to what supplies were needed and what preliminary research was to be accomplished before the next class meeting.

Stage 2:

This stage involved hands-on experiential teaching and learning by the instructors and the students. This type of learning is central to art and design studio courses.

Ms. Thakore spent two class periods demonstrating and teaching various surface embellishment techniques to the students. The ten techniques included *shisha* mirror embroidery (a uniquely Indian technique and one the students particularly enjoyed learning), the use of *Solvy*, a commercial product which allows for mesh-like textural surfaces, and the use of *kantha*-style embroidery stitches which are gathered to make puckered and textured surfaces.

Ms. Gould spent two class periods demonstrating and teaching various surface design techniques using mechanical resist and dyed processes. Included were age-old techniques such as tritik, *bandhani*, and *shibori*, as well as the use of contact paper stencils, clamping and pinning and discharge techniques.

During this stage, students and instructors were continually photo-documenting the studio activities and preliminary research results (outcomes). This documentation was done with conventional print and slide film, and more importantly, with digital cameras. (The world is constantly straddling technologies!)

It was during this stage that Ms. Thakore's Fulbright residency at ISU ended. She returned to India and resumed teaching at NID. Soon after her return home, she met with students in her 5th semester "Media Exploration" class at NID. She shared the "Global Classroom" concept and project with her students. They were enthusiastic about the project and eager to become involved. Subsequently, her students from the "Media Exploration" class at NID and Professor Gould's *Art IS: 346* students at ISU were paired up via the Internet for on-line discussions and e-critiques.

Stage 3:

Once students were paired up with another design student across the globe, they were provided with a preliminary set of questions and general information to share with each other. This preliminary information included place of birth, age, hobbies and interests, courses taken, career goals and so forth. It was important for the students to gain some preliminary insight into the unique individual they would be interacting with on-line. These preliminary emails were important to establishing rapport between the students. Design studios utilize in-progress and final critiques of student work as one method of assessment. Therefore, the instructors saw it as essential that these "virtual" students get to know one another somewhat prior to the critique phase of the "Global Classroom" project.

After the preliminary research and design development stages were complete, the digital images taken at ISU were downloaded and sent as digital attachments to Ms. Thakore and student e-mail partners at NID. An on-line dialogue and e-critique ensued. Following these discussions, the ISU

students continued refinement and further development of their projects, continuing to digitally document all stages of the project. Periodically, these digital images were forwarded for additional on-line critiques and feedback from their peers at NID and from Ms. Thakore. (Students were required to include some documentation of these critique sessions in their research notebooks.)

Stage 4:

The *Art IS: 346 Surface Design* students had several weeks to work on this assignment from initial introduction of key design concepts and techniques to final critique and due date. Students presented their finished fiber art piece during a final critique session, at which time they also shared their experiences and assessment of the on-line global dialogue. Digital photos of the finished projects were sent to Ms. Thakore and her students for final comments.

4 Outcomes

One of the most significant outcomes of this "Global Classroom" project has been the person-to-person, on-line dialogue between students. Students can see a different culture and experience firsthand how technology is growing and enabling this type of global dialogue. The project has provided a forum for design students to engage one another across the globe, discussing a wide range of issues. Topics have ranged from specific design elements and principles as applied to their projects to larger world issues, such as current political events and pop culture. In addition, this project has provided a forum for larger group discussions on a broad range of topics, such as universal design standards, aesthetic differences and similarities among diverse cultures, archetypal symbols and their significance, the impact of technological advances on visual communication and envisioning design education in the future.

Such opportunities enable design instructors across the globe to observe and learn from their peers about innovative teaching strategies, effective and varied methodologies and through active engagement in a global dialogue on design education of the future. As rapidly evolving technology brings the world's cultures closer together and geographical distance becomes increasingly irrelevant, it is critically important that open, inquisitive and mutually respectful discussions among diverse cultures occur. It is imperative that design institutions are integrally involved in such discussions and are at the forefront in designing for a global society.

5 Conclusions

This project was a rewarding and beneficial one on many levels for many individuals, and had positive ramifications for both ISU and NID. On a small scale, the project encountered typical issues and problems, such as inconsistent e-mail communication between students, unequal access to digital media and uneven class scheduling between the two courses and the two institutions. However, these issues are minor challenges to be resolved and refined during the next implementation of the "Global Classroom" project between Ms. Thakore and Ms. Gould, as they pair up two new groups of students.

The "Global Classroom" model is easily transferable to students in other areas of study, as well. Individual instructors could easily substitute their specific curricular goals and strategies for those developed and implemented by the two design instructors discussed in this particular case study.

Indeed, the ramifications of a "Global Classroom" are far-reaching and profound. The concept and its successful implementation are not restricted to any one specific geographical or physical space. Instead, it is largely dependent on creative, inquisitive individuals and educators with access to rapidly evolving technology that can result in unlimited potential for design education.

Design Education & Research

Design is increasingly becoming a collaborative exercise and the virtues of an interdisciplinary and collaborative approach to design education have largely been acknowledged. As discussed in the previous sections, design education has attained new dimensions in the context of the emerging global-local phenomenon. There is an increasing tendency among design schools across the world to promote learning across different disciplines, contexts, and methodologies. Across the world, design curricula in a university system involve a strong interrelation between didactic studies, analysis and research.

Given the pace of change that is taking place in the domain of design education, especially in the realm of the knowledge economy and emerging technologies, research in design education and practice has assumed a new significance. Design research is breaking regional boundaries in search of new sensitivities, alternate methodologies while exploiting collaborative opportunities in an era marked by changing user aspirations, rapid advancements in technology and a growing awareness of the need to recognize local sensitivities in a globalised world.

The papers presented in this section attempt to evaluate the role of design research and its significance in terms of implications for design curricula, design pedagogy, evaluation techniques etc. and the broader domain of design knowledge and practice.

As Hester du Plessis of University of Johannesburg, South Africa, points out in her paper, design research is one of the most difficult fields of research. The process of design involves a number of intangible methods such as intuition, creativity and style sensibility – all methods difficult to define. The use of scientific methods and principles forms an essential part of the logical process of design and adds to the complexity for research in this discipline.

Hilary Carlisle of Edinburgh College of Art, Edinburgh, Scotland believes that practice-based doctoral research can provide models for the integration of practice and theory. Diane Gromala and Sunil Parihar of Georgia Institute of Technology, Atlanta, USA make a strong case for interdisciplinary research that includes designers, and draw our attention to the vast opportunities that exist for designers to provide serious contributions to complex scientific and technological research.

These, and the other papers included in this section, inevitably point to the fact that collaborative research in design is gaining momentum.

The Integration of Design Research with Indigenous Knowledge Systems (IKS) and Science

Hester du Plessis University of Johannesburg, Johannesburg, South Africa

Hester du Plessis is a senior research fellow in the Faculty of Art, Design and Architecture (FADA) at the University of Johannesburg. She is responsible for the development, coordination and supervision of research within the departments of product design. Her field of interest lies in the role of women in design, indigenous knowledge systems (IKS), traditional technological processes as well as science communication. She has been working in collaboration with Gauhar Raza at the National Institute of Science, Technology and Development Studies (NISTADS), CSIR in New Delhi for the past 5 years. Together they are doing comparative cross-cultural research combining IKS and the public attitude towards and understanding of science (PAUS) by looking at the attitude and understanding of science amongst potters in both South Africa and India.

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This paper addresses the complex relation that exists between design education and design research. The need for a more formal and academically orientated design research approach is considered to be quite important in the South African context. The nature of design education has changed considerably over the past five years with the transformation of the education system whereby former Technikons became Universities of Technology and some Technikons were merged with a University. This latter is the case of the Faculty of Art, Design and Architecture (FADA) at the Technikon Witwatersrand (TWR) in Johannesburg that merged with the Randse Afrikaanse Universiteit (RAU) and VISTA University and became the University of Johannesburg on the 1st of January 2005.

This transformation process required a more academic approach from our Faculty and initiated some serious debate amongst design practitioners, design educators and design researchers about the perceived lack of design theory and a well-developed design epistemology. This debate underscores a global need perceived to develop a strong design epistemology for the design discipline. Such a design epistemology should engage in an intellectual dialogue between researchers, practitioners of design, design theorists and society. This presentation argues the following: If we see technology as the application of (design) knowledge towards practical use we need to keep in mind that technology, like science, is also a feature and product of culture and is used in society. Hence the current renewed interest in indigenous knowledge systems (IKS) and indigenous cultures.

This presentation argues that this understanding needs to be mediated by science communicators. Relevant science-related knowledge must become meaningful in the everyday lives and experiences of these different cultural groups. At the same time the level of understanding of the underlying scientific processes applied by the practitioners of traditional technologies must be measured.

Keywords: *research approach, design epistemology, traditional technologies, design theory*

Introduction

> Examining the viability of rural manufacturing, the existing structures of rural manufacturing practices reflect the prevailing conditions under which production takes place and therefore contain features that are fundamentally appropriate to their context. An approach to intervention that capitalizes on existing skills, practices and social relationships, is therefore proposed and it is shown that by working with existing structures and skills rather than undermining them, the sustainability of the enterprises which are developed is greatly enhanced (POSTON, 1994: xi).

A multifaceted relationship exists between the modern designer, tertiary education institutions and society. A constraint in this relationship is that academically trained designers are predominantly concerned with the design of products based on western design criteria and the manufacturing processes of modern industries. These products, designed according to urban needs, are not always applicable or useful to rural communities. This paper pays attention to the current dialogue in

developing countries around the need for new design (research) strategies to be developed that will assist the designer to design socially acceptable and appropriate products for rural and/or poor communities. The current process of social transformation in South Africa is located within this debate. In South Africa there is increased pressure on researchers to position their activities within civil society, to be more socially responsible and for design to reflect our multi-cultural identity. To ensure the appropriate development of product design that targets previously disadvantaged communities becomes a necessity and an obligation to society. Research responsibility should, therefore, not be seen as predominantly *outcomes* orientated but the *impact* of research is as important.

The traditionally designed (craft-made) artefact is part of a complex process that evolved historically and is deeply embedded in the indigenous knowledge systems (IKS) and the scientific knowledge of a community. Both India and South Africa are faced with multinational industrial manufactured products bombarding the market at the cost of indigenous, mostly traditionally designed products being neglected and even disappearing from the market. The interest of this paper lies at the point where industry and tradition meets. I will argue the need for a sound design epistemology and design philosophy to be developed that will assist design researchers and practitioners to integrate these two worlds. This process should and could be driven by designers from within the developing world and by the indigenous academics themselves.

Design in the Modern World

Design is seen as a predominantly industry-orientated activity with its roots deeply embedded in the industrial needs and practices of western society. The function of industrial design is to sustain the industrial western markets. All products used in this modern era are, however, not industry based. *'Many complex, beautiful, functional, civilizing artefacts have been created without anyone consciously designing them. These artefacts are the many craft-made objects, tools and utensils. This craft-made activity refers to the products and processes of what must essentially be a pre-industrial culture'* (CROSS in ROY, 1986; 36).

Design accommodates both. For the researcher design methods become complex when a need develops to accommodate both the needs of high industry and local communities. Victor Margolan (1998) considers the complexity of such design research to be located in the fact that design, until recently was heavily entangled in the consumer culture and that the designer him/herself has only recently been able to disentangle and separate his/her '*own identity from the context in which their work has been traditionally located*" (MARGOLIN in STRANDMAN, 1998:43). One of the biggest concerns he highlights about the efforts during the 1970's till now by UK and USA designers towards defining the design method was the limitation introduced towards a more open discourse. "*Had design methods theorists given greater attention to the plurality of design reflection and discourse instead of trying to define design singularly as a science, the movement would not have become as inflexible as its critics found it to be. It tried to produce a totalizing mode of thought that sought the truest method of understanding design*" (MARGOLIN in STRANDMAN, 1998:47). This extremely inclusive approach towards the study of research became the accepted norm for design practice, the design of products and even the global design discourse.

Today most designers recognize a need for the development of sound design knowledge (epistemology) to ground and extend design research processes and outcomes to civil society. There is, in addition, a growing concern about the responsibility for design researchers to disseminate their work through effective communication and to report to society on the practice of design. Added to this need is the clamour of the developing world for the recognition of their own unique products embedded in their indigenous technologies and knowledge systems. More and more researchers in South Africa are, as a result, discovering the wealth of knowledge that exists within rural communities and are changing their design methods towards an integrated system with society becoming part of the design team.

What Constitutes a Design Epistemology?

By definition epistemology is the study of the theories about the nature and scope of knowledge. Epistemology evaluates presuppositions and bases of knowledge and scrutinizes knowledge claims. For epistemology '*to analyze and evaluate claims of knowledge*' (KAPHAGAWANI in COETZEE, 1998:206) is to look at indigenous knowledge systems embedded in culture. Epistemology is generally seen to be universal and not culturally or race bound. However, knowledge assumptions and the bases of knowledge differ from culture to culture. Knowledge gets formed and informed by the socio-economic world of a society and, in the case of design, by the tools designed and manufactured within the same society. These tools are linked to the cultural needs as well as the scientific knowledge of the society. This position certainly includes developing countries in which rural communities even now fall outside the margin of globalization and modernity. It is to our own detriment, in our effort to create a balance in the formulation of a design epistemology, to neglect the traditional technologies and systems of knowledge in custody of these communities.

A design epistemology is used to engage in intellectual dialogue between researchers, practitioners of design and design theorists. The underlying epistemological assumption in the theory of design that underscore this observation is determined by the structures of culture and is, at its most fundamental, "*a theory of how design functions in society rather than simply a theory of techniques*" (MARGOLIN, 1998). Richard Buchanan describes the complex nature of research in design as being based on: '*The assumption that design has a fixed or determinate subject matter that is given to the designer in the same way that the subject matter of nature is given to the scientist. However, the subject matter of design is not given. It is created through the activities of invention and planning, or through whatever other methodology or procedures a designer finds helpful in characterizing his own work*' (BUCHANAN, 1998:202).

To initiate a debate that fluctuates between industry and traditional practices one needs a design epistemology that strives towards a more socially focused approach. The following themes/topics could be considered:

- What is design knowledge and what constitutes research in design from an intercultural design perspective?
- What are the main characteristics of local and global design epistemologies in relation to cultural and science studies?
- What types of relationships can exist between dominant science theories, IKS and the diversity of local design epistemologies?
- What could be the most enduring relationship between local knowledge and sustainable development?
- How do we address endogenous development in design and how can it contribute to a co-evolution of design epistemologies?
- What steps could be taken to enhance the co-evolution of different ways of knowing in the design discipline itself?

It can, therefore, be proposed that these themes/topics could assist in the development of the theoretical aspects of design research. It could also contribute to the intellectual understanding of design by historically reviewing the interplay between the techniques used during the manufacture of artefacts, their impact on society and their cultural uses. The epistemological knowledge of such products/artefacts usually gives a clue to the needs of the culture using these objects. The cultural involvement of a society in the design and manufacturing process (the technology) of the products/artefacts is generally read as an indication of the level of scientific sophistication of the given community (FOUCAULT, 1972)

Design and Science

Traditionally designed artefacts, used daily in a community, are not just closely involved with the cultural structures of a given community but, because of its related technological processes, linked with science and the communities' level of understanding of science. **Design-based research therefore involves a community centred, systematic understanding of both culturally and science-based design practice and theory**. This is not a straightforward task as such research is complex and '*is best characterized as arising through large-scale, non-linear interaction*' (CILLIERS, 1998:37). The creation of new paradigms of social constructs as a result often accommodates and even necessitates new methods of research.

During the past twenty years the debate around design theory and practice (praxis) increased in intensity, especially in Europe where design as a discipline entered the academic world. Awareness was developed around a perceived need to develop a sound design epistemology to underscore the *practice* aspect of design. Though the origins of this debate can be traced to the Institute for Social Research, also known as the Frankfort School, at the Frankfort University (1923) it is only during the recent past that scholars from the developing countries started to participate in these discussions.

The debate originating from The Frankfort School addressed a concern for what was called the use of '*unbridled technology*' within the western world. They expressed concern for any irresponsible actions and/or "*one-sided doctrines such as Marxism where thought and theory are relatively, though not wholly, independent of social and economic forces*" for the development of a critical theory. Horkheimer (1895 – 1973) who is one of the founder members and directors of the Frankfort School argues that "*since theory and its concepts are a product of social processes, critical theory must trace their origins and must not, like empiricism and positivism, accept them and thereby indirectly endorse the processes themselves*" (HONDERICH1995:290).

One of the current leading second generation members of the Frankfort School is Jurgen Habermas who argues that "*the sciences depend on ideological assumptions and interests, and that enlightment reason has become an instrument of oppression*" (HONDERICH 1995:290).The school underscores the idea that "*science already embodies value-judgement, such as the desirability of the technological domination of nature, which, though in fact questionable, seems so self-evident that they appear not to be value-judgements at all, but simply disinterested devotion to science*" (HONDERICH1995:290).

Design studies and design philosophy should, according to Alain Findeli (FINDELI in STRANDMAN, 1998), bring together epistemological, aesthetical and ethical aspects of design. Vuokko Takala-Schreib, on the other hand, proposes the combination of '*epistemological, ontological and pragmatic aspects, including the aesthetical and ethical aspects*', to be a better method. (TAKALA-SCHREIB in STRANDMAN, 1998:48). He interprets these three aspects as follows:

- The *epistemology of design* comes into play in the design discourse on the issues which are regarded as design knowledge and the notion of 'good design'.
- The *ontology of design* comes into play when the discourse is regarded as an emergence surface for the epistemological objects, for those things, which are regarded as beings and objects of design, distinct from non-recognizable issues and non-objects.
- *Pragmatic aspects of design* come into play when design discourses are regarded as circulating systems of thoughts in the mind of the designer subject in the design process and the problem solving process. This also includes ethical issues. (TAKALA-SCHREIB in STRANDMAN, 1998:49).

Design, Science and Technology

While theoretical design research contributes to the intellectual understanding of design, it, at the same time, introduces a process that historically reviews the interplay between the techniques used

during the manufacture of artefacts, their impact on society and their cultural uses. The epistemological knowledge of artefacts usually reflects the needs of a culture using these objects. As previously stated, there is cultural involvement of a society in the design and manufacturing process (the technology) of the artefact. This was historically read as an indication of the level of scientific sophistication of the given community. It is exactly at this point where design research yet again becomes a very complex issue.

The sciences are in perpetual flux due to social as well as cultural forces acting upon it. Science (that is western science) was popularly seen as being demarcated from local traditions. Science knowledge systems are considered dominant by the West. It is seen in the developing world to balance unevenly between the hard sciences of the West and nascent science research theories and philosophies of science emanating from the developing world (MEDAWAR, 1996; CRUMP, 2001; SARDAR, 2002). The resultant dialogue does filter through to the West. In India individuals like Bose, Rahman and Sen, who all excelled in science, '*contributed to global changes of perceptions as well as changing the focus for researchers towards the problems experienced in communities of the developing world*' (SALAM, 1993:166). Muslim scholars, such as Ibn Shatir, from as far back as the 14th century, are credited with '*aiding the scientific revolution*' (SARDAR, 1998:203). Science, it is therefore argued, should not be seen as a European creation but "*modern science is seen as the heir to all the sciences of all non-European civilizations*" (SARDAR, 1998:202).

A difficult relationship exists between the terms 'science' and 'technology'. "*Until recently it was customary to make a distinction between science as the generation of knowledge primarily for its own sake, and technology as a body of knowledge concerning a practical technique*" (ZIMAN, 1984:115). Historically technology is considered to be part of the 'method of science'. This category of knowledge was regarded as having no scientific importance, lacking real scientific formulae or scientific '*language*' and could not be codified (EZE, 1997). "*Nevertheless, there is an historical tendency for all crafts to become codified as technologies, and for all technologies to give birth to regular sciences intended to bring the craft under predictive control. This tendency is clearly one of the most significant instrumental characteristics of sciences in modern society*" (ZIMAN, 1984:116).

Within this frame of reference, science should be studied as both a knowledge system and a means to deploy epistemological methods and scientific achievements. Epistemology then becomes a changing and variable concept. Science, it can be argued, must become legitimized in the traditional practices and be recognized as '*scientia sacra*', that is, being part of organized knowledge of a particular domain or reality that is inseparable from the immutable nature of the larger cosmos (BRIDGSTOCK & BURCH, 1998). The necessity to support an alternative look at modern science as science based on "*the secularization of scientific theory and in this way, located within a dissimilar cultural context*" (Riana, 1996:30) could be argued. Therefore "*The intelligent use of scientific research work and technology requires that people are science literate. Only a science literate citizen can properly understand basic scientific phenomena, laws and theories, and use the achievements of S&T for their personal development and for development of the society to which they belong*" (www.ustanova-szf.si/public_underst.htm: 12.05.2003). This argument follows the premise from my own research based on the hypothesis that scientific knowledge exist amongst indigenous peoples (artisans in this case) and, as verification, the analysis of the level of scientific knowledge embedded in indigenous practices could support this (Raza & Singh, 1995; Raza & du Plessis, 2002). The scientific knowledge imparted in formal education forms an indicator against which the level of indigenous scientific knowledge can be measured. The '*cultural gap*' that exists between these knowledge systems can also be analyzed (Raza & du Plessis, 2002).

The Design of an Organised Product Design Research Niché Area (RNA) at FADA

South Africa has been restructuring its education system during the past five years. The new ANC government initiated this process in an effort to shake off the restricting, unfair and biased practices

of the previous government and its renowned Bantu Education system in its strive for transformation. The Apartheid system separated and marginalised all previously 'black institutions' (i.e institutions with mainly black students and staff) from mainstream (represented by the predominantly white students and staff) research support such as funding, etc. The current system is focussed on merging institutions to, in the first place, accommodate the lack of management resources and, in the second place, get rid of the perceived under-privileged institutions to create evenly balanced student demography. The Technikon Witwatersrand merged with one of the dominant Afrikaans (white) universities, the Randse Afrikaans University. The shift from operating as a practice based (praxis) educational system at the Technikon with an academic University system proved to be quite complex. As FADA research is still in its infancy stages compared to our new colleagues, a need was perceived to structure and restructure our research.

A decision was taken to organise research within the Faculty of Art, Design and Architecture into a structured RNA. The focus is on interlinked and related fields of research and to engage all the researchers in debate on design epistemology, design practice and technology (this includes modern technology, traditional technologies and the technology transfer process). Requirement for this research is to be community based and to promote sustainable development incentives.

The specific focus of the RNA is threefold:

- The RNA undertakes research into how local cultural values and practices (i.e., indigenous knowledge systems) and indigenous aesthetics inform the design of artifacts and utility objects that find application within targeted communities (product design).
- The RNA undertakes research into the impact of newly introduced, recently emerging and recently designed technologies on community development (technology transfer).
- The RNA uses the research method of participatory action research (PAR) to situate the researchers inside the communities and to incorporate communities into the research process (following the Mode 2 of knowledge production as identified by GIBBONS, 1994)

We decided to approach design as a discipline characterised with: '*areas of knowledge and ways of research methods that are very special to design and it seems sensible that there should be ways of building knowledge that are especially suited to the way design is studied and practised*' (OWEN, 1998). Design research is closely involved with the cultural structures of a given community and, because of its related technological processes, linked with science. On a macro level this design based RNA therefore involves a systematic understanding of design practice, scientific principles applied during design, technological processes involved in manufacturing of products and the impact study of products (artefacts) on communities. Our design research involves both theory and practice based research (praxis research).

Development of Appropriate Technologies

Transfer of design ideas, processes and skills from the developed to the developing countries as well as between developing countries promotes technology transfer. The need to study the indigenous technologies and the necessary technology transfer and innovation that this will result in is, therefore, important and forms part of the research, development and training responsibilities envisaged for this new educational institute, the University of Johannesburg. Within this paradigm, design in South Africa plays an increasingly important role if the manufactured products are to establish a niche for themselves that distinguish them from similar South-East Asian or Latin American products.

While industrial-level manufacturing is a main focus of the government's industrialisation strategy, so too is the indigenous arts and crafts sector, where artefacts are produced within specific historical and cultural contexts. This sector has been targeted for aggressive development in South Africa not only because it is seen to accompany the increase in tourism, but also because it is a seen as a

sector that could play a critical role in poverty relief. In this RNA both these areas are identified as being in need of technological transfer to support and upgrade the manufacturing process. As both sectors form an integral part of the RNA, this need for technology transfer is incorporated into the research structures of the individual projects.

Promoting Sustainable Development

There exists a reciprocal – some might argue dialectical – relationship between technologies and the communities in which they are embedded. The introduction or development of new technologies can have a strong impact on the development patterns of the community using the technology. Cultural and other aspects of those communities can also be expected to influence the development of technology within or for the community. Our RNA explores the nature of this relationship with specific reference to the impact of new technologies on community development patterns, on the one hand, and – vice versa – the impact of community experiences and culture on the design of new technologies applied within that community. The technologies explored will typically, but not exclusively, be '*low-technology*' and '*appropriate*' to the community setting, while the communities targeted for this research will exclusively be '*developing*' communities.

As communities develop within their own specific contexts, different communities may have different standards of living and access to resources, therefore differing markedly in developmental capacity. Taken in context, however, they could still be defined as undergoing '*development*'. Dispersed, low-density, rural communities may differ markedly from high-density, urban ones, but their relative developmental backlog may be similar. This RNA will embrace both types of developing communities.

The Adoption of Participatory Action Research (PAR) as Research Methodology

The role of design as a discipline is especially poorly understood in South Africa. Design plays a crucial role in the production of artefacts and therefore impacts largely on the national and international market. With the mutual link between design (artefacts), technologies and community development that constitutes the focus of this RNA, participatory action research (PAR) becomes the logical choice as its methodological backbone. The methodology of PAR ties together the objectives of this RNA by providing a clear pathway for the research to take place within and for rural communities.

Conclusion

By engaging alternative research paradigms such as feminism and postmodernism in the quest for the development of a design epistemology, a design researcher can dynamically connect with the culture of the society studied. By looking at both theory and practice and the use of culturally specific utility designs from these perspectives new approaches can be created regarding knowledge about the use and practice of product design. During such study it is imperative to honour the inherent IKS used within the society while simultaneously employing a critical evaluation of the level of scientific knowledge inherent in the community as expressed by the design of products and the traditional techniques used. We certainly hope to keep these aspirations alive during the next few crucial years as a new University.

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The Significance of Design Research for the Design Education Curriculum, or "Why the theory bit is important"

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Hilary Carlisle took up the post of fulltime lecturer in Visual &Cultural Studies at Edinburgh College of Art in September 2004 prior to that she held roles as MA Critical Context Programme Coordinator at Central St Martins and Design & Visual Culture tutor at The Nottingham Trent School of Art & Design.

Her MA training in Textile Design at Central St Martins led her to examine the emerging possibilities of digital print alongside a theoretical examination of gender and clothing. In her doctoral research at The Nottingham Trent University she continued both themes, developing prototype software for creating non-repeating patterns on fabric in conjunction with an exploration of gender symbolization in twentieth century surface pattern on clothes. It is her previous education in mathematics and career as a commercial programmer that allows her to combine creativity in textile design with the possibilities of new technology.

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There is a popular myth that the teaching of design history and theory to design students serves little purpose other than to give some academic merit to their education. In this paper the author begins by arguing that the teaching of design history and theory is essential in the creation of a well rounded designer in terms of both the skills and knowledge developed in the process. She stresses that the benefits can only be felt to the maximum potential if the teaching is made relevant to the students and their practice, and hence the level of engagement by the student is high. If the student looks upon this element of their programme as something to be endured, rather than enjoyed, then the benefits available to them will not be achieved.

She continues by highlighting some of the issues that she has encountered in her own teaching experience at both undergraduate and postgraduate levels at two established art and design schools in the UK, and indicate their relevance to wider issues surrounding mass design education.

She believes the role of the practice-based PhD is central in attempting to answer some of these questions. Practice-based doctoral research, or research with a significant practical element, can provide models for the integration of practice and theory, which ultimately helps in conveying the relevance of theory in design education. In the last section of the paper she brings together her thoughts from the previous sections and discusses the role of design research and its significance for design education in terms of the promotion of research, analytical and evaluation skills and broader design knowledge.

Keywords: *design theory, critical context, theory into practice*

1 Introduction

In this paper I wish to explore and develop issues surrounding the teaching of design theory to students of design in higher education in the UK. Though this topic has been reasonably well researched, it is one which still appears to cause debate in many institutions around the country, from coffee machine discussions among lecturers to strategy meetings by the senior management. This is hardly surprising at a time when budget cuts are often juxtaposed with increasing student numbers and widening participation.

This paper should be considered more of a personal manifesto than a rigorous piece of new research. I write in support of providing theoretical grounding for students in practice-based disciplines. The paper is, however, supported by appropriate research on the subject and complemented with the views of a number of practitioners and educators from various UK institutions, who were contacted with regards to the research for this paper.

Before the main themes of the paper are introduced I feel it is necessary to give my definition of Design Theory, as it can be taken to have a wide range of meanings. I will also explain a little of my own background, which I believe is required by the somewhat personal nature of the paper.

For the purposes of this research the definition of Design Theory I shall use is:

a discipline involving examining design in a wider social and cultural context than that of the practice itself. This may involve design and social history; the investigation of theoretical ideas borrowed from other disciplines and applied to design; and the exploration of contemporary cultural and social issues which affect and are affected by design.

This may be regarded as an ideal, and one which most of the Design Theory educators I spoke to broadly agreed, though several took issue with the idea of Design Theory as a discipline, and some stressed that individual institutions may have a particularly historical or theoretical bias.

I came to design education and practice late, having previously pursued a career in commercial computing, preceded by a BSc in Maths and Computing. From an Art and Design Foundation course I jumped straight into an MA in Textile Design at Central St Martins, which at the time required an equal amount of theory and practice. After a year as a freelance textile designer, I embarked upon a PhD at The Nottingham Trent University, the research for which also incorporated theory and practice. About two years after the PhD began, I started teaching undergraduate Fashion and Textile students at Nottingham Trent in the section of their course entitled 'Design and Visual Culture' and slightly later I also began teaching undergraduate Art and Design students at Central St Martins in Cultural Studies. As my PhD reached its conclusion, I took on the role of seminar leader for the MA Critical Context programme at Central St Martins, which later developed into programme coordinator. In 2004, I embarked upon a full-time post as lecturer in Visual & Cultural Studies at Edinburgh College of Art.

All of the teaching on these programmes fits in broadly with the definition of Design Theory given above. The experience I am drawing upon for this paper, then, comes from working as a practitioner, as a student of design theory and an educator of design students. It is my view that Design Theory can be extremely beneficial to practitioners, though I fully acknowledge that many would not share this view. I would also argue, without presuming to understand every practitioner's own method of practice, that many designers intuitively use Design Theory in their visual research, analysis and reflective practice.

This paper has three main sections. I begin by proposing reasons why Design Theory is essential for design students. In the following section I address questions and dilemmas that have arisen during my own teaching experience. The third section examines the role of the practice driven PhD in Design Theory education, before the conclusion in which I suggest some proposals for the future of Design Theory education.

What I do not do in this paper is delve into the background of teaching Design Theory to students of practical design disciplines. Catto[1] provides an excellent summary of the historical developments of the history and theory component in art and design courses, and an amusing, but realistic appraisal of the anxieties and allegations that can develop between the studio staff and "academics" running the history and theory components.

2 Essential reasons for teaching Design Theory to students of design

In this section I will explore different motives for providing Design Theory education, which may be considered by different groups to be important. For example, evidence that practical work is enhanced by partaking in Design Theory classes will be important to studio tutors, whereas the development of transferable skills and quality assurance may be considered more important by employability and managerial staff. Enhanced abilities in critical thinking are, hopefully, seen as desirable by all sections of the Institution.

We might first consider what defines an honours degree programme. According to the Quality Assurance Agency (QAA) in the UK:

> An Honours graduate will have developed an understanding of a complex body of knowledge, some of it at the current boundaries of an academic discipline. Through this, the graduate will have developed analytical techniques and problem-solving skills that can be applied in many types of employment. The graduate will be able to evaluate evidence, arguments and assumptions, to reach sound judgements, and to communicate effectively.[2]

This definition applies to England, Wales and Northern Ireland. The Scottish Credit and Qualification Framework (SCQF) provide more comprehensive lists of level descriptors for every stage of education, though their preliminary definitions fall broadly in line with the one given above[3]. As these definitions show, the ability to think critically, evaluate and communicate effectively are necessary components of any undergraduate honours degree programme. They are also skills which Design Theory seeks to develop, and on which it is generally assessed. From this it can be assumed that the creation of "good" design work alone is not sufficient in the awarding of an honours degree. Teaching and evaluating a student's capacity to engage with Design Theory is one method of providing evidence of suitability for the award of an honours degree.

2.1 Quality Assurance

The mission of the QAA is to 'safeguard the public interest in sound standards of higher education qualifications and to encourage continuous improvement in the management of the quality of higher education'[4]. One of the key ways in which it encourages institutions to maintain and improve quality is by the implementation of transparent learning outcomes against which each component of a course is assessed.

While including a Design Theory component in a course does not in itself provide quality assurance, it is my experience that the teaching, learning and assessment strategies of the Design Theory components of Design courses are often at the forefront on an institution's drive to meet the exacting standards of quality assurance demanded by UK higher education today. To be more specific, learning outcomes tend to be clearly stated and correlated with assessment and feedback procedures to the student. In some areas of studio practice the ability to verbalise reasons for bestowing a particular grade on a piece of work, or even the desire to do so, still seem to be a long way off.

Catto[5] argues that assigning clear learning outcomes, developed by staff who define which elements are most important to their particular component of the course, allows for qualitative comparison of different sections of the course, even across practice and theory. His thesis is that modularisation encourages this practice and that the very process of modularisation 'demands that the practice and philosophy of education itself be demystified.'[6] He also argues that this demystification process 'breaks down old distrust and creates new alliances'[7]. In other words, by putting into words the mechanisms by which tutors assign grades, a level of transparency is reached which can bring clarity and harmony to all concerned.

2.2 Transferable Skills

As was shown above in the QAA's definition of the qualities which an honours graduate should possess, employability and transferable skills are key requirements of higher education programmes. Study skills are often incorporated into the Design Theory element of the curriculum, though obviously skills such as time management, active learning, how to research and using the library are of benefit to the students' entire higher education, and hopefully, life, experience. Sometimes this can be problematic, particularly when theory and practice are taught as entirely distinct units of a course. In this case students may fail to see the connection between the two and neglect to transfer their learning from one area to another. This can not only mean that a student may be unable to practice good time management in studio projects, for example, but also that they are unable to transfer their skills of visual evaluation from the studio crit to a Design Theory submission.

Ball[8] presents an enlightening case study from the University of Brighton, School of Design in which study skills and practical work are integrated into the teaching programme. The students were required to produce a self-evaluation essay of the project. By doing this, she reports, some of the benefits students received were: 'Raised awareness about the transferability of the learning process', 'Confidence in using sources and resources' and 'Increased confidence in presenting themselves and their work (verbal and written)'[9]. It is often the case that studio and theory elements are kept entirely separate and taught by different members of staff. Because of this it is unusual for students to be asked to write an essay in a project that was largely studio-based. Encouraging students to write about their own work, or to write from a personal viewpoint on the work of others, often helps to break down the resistance some design students feel towards the essay writing process. Once a student becomes confident in expressing their views verbally or in writing, it becomes easier for them to assimilate other theoretical or historical positions into their mode of thinking.

2.3 Critical Thinking

As discussed at the beginning of this section, critical thinking is a key element required by the QAA for an honours degree programme. The SCQF level descriptor for an honours degree also states that students should be able to 'Critically review and consolidate knowledge, skills and practices and thinking.'[10] Design theory is largely about questioning: the students are encouraged to question their own response to images, as well as questioning cultural or societal phenomena they see around them. Questioning can have two effects: firstly it can increase knowledge. If, for example, students questioned why the style of minimalism was popular in contemporary society, their search for an answer would necessarily lead them back through time to investigate early 20th century modernism and late 19th century design reform movements, and hence their historical knowledge would necessarily be improved. By encouraging the student to *want* to know more, and to begin questioning everything they see around them, the historical significance of their learning is made relevant to them. Hence, design history can be imparted more cohesively (some may say surreptitiously), rather than being presented as a chronological series of design movements whose importance in the contemporary context is often lost.

The second effect of questioning is that it can improve the ability to make critical judgments: the more questions asked, and answers found, the more reliable the judgement is likely to be. As Ball states 'The ability to make critical judgements about their [students of art, crafts and design] own and others work is fundamental to the student's independence.'[11] Independent thinking is a crucial skill of a designer and important in the development of a successful student. Critical thinking, therefore, necessarily impacts on both the development of the student's own practical work, discussed below, and transferable life skills discussed above.

2.4 Development of Practice

Friedman tells us that 'Design involves solving problems, creating something new, or transforming less desirable situations to preferred situations.'[12] Given this definition, it is clear that design requires the student and practitioner to look outwards into their wider social environment. Designing in a vacuum is designing a closed, entropic, stagnant state bereft of creativity, as a colleague at Central St Martins was keen on reminding students. Outside influences foster creativity. But how can Design Theory help to this? By its very nature it is an outside influence; a potential trigger to help solve the problem, create something new or transform a situation. This may be in the form of a 'Eureka!' moment, or something closer to the analogy of the grain of sand irritating the oyster into producing a pearl.

In an empirical study into the usefulness of prior professional experience in the assimilation of Design Theory, Verma argues that the goal of teaching theory to design students should be:

> …teaching students to think like designers, to make them self-critical by facilitating their understanding of design issues at a deeper cognitive level, and to help them see systematic relationships between different facets of design.[13]

Once again we are seeing the view that students need to see design in a wider context than that of their own discipline in order to be able to understand relationships which will enhance their practice. Thankfully, it is not just lecturers in Design Theory who hold this view. Wallace Murdoch, principal lecturer at the Nottingham Trent School of Art and Design, and for many years programme leader of Textile Design at the school, agrees that:

> It is extremely important that students think outside the narrow confines of subject and discipline and consider the wider social, economic and political agendas which affect the nature of practice in both the arts and design.[14]

Dr Amanda Briggs-Goode, practitioner and senior lecturer, explains that Design Theory helped her as it '…worked as a tool for me to analyse my own practice which really has enabled me to understand what I am doing and how it contributes to the wider culture.'[15] Other lecturers in Design Theory, myself included, reported that students admitted that their practical work had been influenced by the lectures, seminar discussions and texts read within the theory programme[16,17].

3 Issues in Contemporary Practice

Having addressed the questions of why Design Theory should be promoted in the Design Curriculum, I will now look at four issues concerning the practice of teaching Design Theory that have occurred regularly over the time of my teaching practice. I have already outlined why Design Theory should be considered relevant, but I will now address how it can be made to seem more relevant to those who may dispute it. I will then consider issues of assessment, including essay writing and alternative forms of assessment, before going on to look at expanding class sizes, widening participation and the related issue of knowledge deficit.

3.1 Perceived lack of relevance

Design Theory has often been criticised by students and sometimes other members of staff for its perceived lack of relevance to the design curriculum. Several of the lecturing staff acknowledged that problems could arise when 'overly theoretical language' was used in the discussion of issues with students who 'are generally not that happy at having 'to write about stuff''[18]. Writing of her own experience of being taught Design History at undergraduate level, Amanda Briggs-Goode states:

> I received design history, which I did enjoy; it did allow me to contextualise and be able to identify movements and schools. However this design history wasn't then placed within a wider context. So it took me a lot of time to put together the meaning of modernism and how that related to modernist architecture for example.[19]

Perhaps, to some extent the problems of using unfamiliar language, or omitting to give a wider context to the subjects taught is a result of some design theory tutors failing to engage sufficiently with the practical side of the student's education. Another reason may be hereditary: if studio staff themselves had trouble understanding the relevance of the theory element of their education, it is possible that this apathy or even antagonism towards the subject could be inadvertently passed on to their students. If the student's studio mentors appear ambivalent to the theory component of the course, it is possible that this attitude will be adopted by the students.

It is also the case that keeping both the staff and the teaching of theory units separate from the studio can lead to the impression by students that this annexing implies it is a less important component of the course. Honours level students are often surprised to discover that I am not only a theory tutor, but a designer too. While some give me a wary look that would suggest they believe I'm either lying or have some sort of craft hobby that can't really be considered design, the majority respond positively. I am not, of course, suggesting that all theory tutors should have a design background, but more integration between the theory and practice staff and teaching in an institution would surely help both the staff, (on both sides), and the students, to better understand the relevance of both areas of design education.

3.2 Assessment

Using essay writing as the predominant means of assessing students within Design Theory is a practice that is regularly being questioned at the institutes in which I have taught. The motivation for change comes from several different forces. Sometimes studio staff argue that it is inappropriate for practical students to have to write essays, but the two more common reasons come from the theory departments themselves. Firstly, increasing student numbers means that the sheer volume of reading required by the tutors in order to assess students becomes prohibitive. Secondly, theory tutors are constantly looking for innovative assessment techniques, which can both help the student to make links between theory and practice and encourage students from a variety of backgrounds and skills to find methods to succeed.

Before discussing alternative forms of assessment, however, I would like to argue a case for continuing to have some form of written component in the assessment of theory courses. Being able to communicate effectively through written language is a transferable skill that will be useful to students whatever career or lifestyle they pursue. While students may well feel uncomfortable or even intimidated by the thought of essay writing, it is my experience that most find it an immensely satisfying experience when given the right encouragement and support. It often seems to be the case that students arrive in higher education with a preconceived idea of what an essay should be which is derived from experience of a scientific or literary model in their earlier education. In Design education students should be encouraged to write from a personal point of view, albeit an informed one. Consequently, there is a case for providing alternative forms of written assessment, which are not necessarily considered essays, for example visual analyses or research reports. In this way the student can be encouraged to develop their writing skills without feeling the spectre of the essay looming over them.

The verbal presentation is one obvious choice of alternative method that is regularly used, though in my experience at undergraduate level, they are always used as a partial form of assessment, in conjunction with a written piece of work. Like the essay, a verbal presentation can be daunting; however, it is usual that students of Design will regularly have to discuss their own work in studio crits. The experience of this can be drawn upon and discussed in the preparation for their theory presentations. The verbal presentation also has the benefit being at least partially assessed within the presentation session, reducing the burden of marking for the tutor. However, this does call into question issues of monitoring, and research. Evidence of some form should be submitted by the student to combat this.

Asking students to produce a short film is another alternative form of assessment subject to discussion. The benefits of this type of presentation lie in allowing students to use a level of creativity which they normally only associate with their studio practice. They can explore visuals more imaginatively than in an essay, and use spoken or written text to strengthen their work. This format may also free them form the blocks they may feel when requested to submit an essay. However, disadvantages may occur through the lack of parity in technical competence of the students. Tutors may also find that assessing this type of work against learning outcomes is more problematic than other more traditional assessment forms.

MA students at Central St Martins participating in the Critical Context programme were asked to make three-minute films in groups of between three and five. The aim was to address an issue related to one of their lecture topics and make a video that clearly communicated the point they wished to make. They were also asked to find some way of showing evidence of their research within the film. From the feedback, this exercise was generally seen as a positive experience and some students did succeed in fulfilling the brief well. However, differing technical abilities raised some issues. While we only required the students to use the most basic technology, and supplied some technical support, some of the very competent students produced extremely polished animations while others just used basic video skills. When assessing the work, it was sometimes difficult to ignore the beguiling qualities of the presentation and look more deeply at the levels of

research and communication. On reflection, this issue is not confined to video presentations: essays and oral presentations can also be seductive, but perhaps as tutors we are more attuned to this in traditional assessment methods.

In general, alternative forms of assessment are to be welcomed, though learning outcomes and assessment methods need to be well thought out and executed as new methods inevitably mean unforeseen problems will arise. I would also advise a word of caution on throwing the proverbial baby out with the bath water. The ability to communicate through written language is a highly desirable life skill that should not be ignored.

3.3 Expanding class sizes & widening participation

The remit of encouraging students from non-traditional backgrounds to enter higher education is one to be welcomed, though it obviously brings with it its own challenges. As Cottrell states, these students are not lesser versions of the traditional intake, they are simply 'different kinds of learners'[20]. Among the characteristics she identifies as challenging for students from these backgrounds are a 'lack of confidence' and an 'unpreparedness for higher education'[21]. The 'unpreparedness' which Cottrell describes can be aided through the teaching of study skills, which, as discussed above are often incorporated into Design Theory teaching. She stresses that this is not a solution in isolation and requires support and back-up from other initiatives[22]. I would argue that it is also important that study skills are taught in such a way as to make them appear relevant to all areas of the student's study. Also, when one considers that students from non-traditional backgrounds are entering higher education at a time when class sizes are rising, it becomes clear that these issues may grow exponentially if the student sees themselves as a very small cog in a very large machine. Self-esteem and sense of purpose grow through the feeling that one is recognised as an individual.

As MA Critical Context Programme Coordinator at Central St Martins, I ran a twelve-week programme of lectures by outside speakers for 130 students mainly from the Communication Design, Industrial Design and Textile Futures programmes. The speakers were eminent in their fields and spoke on topics such as ethics, narrative, psychoanalysis, taste, and the body. While the seminar staff relished the opportunity of adding to their own knowledge and understanding of contemporary socio-cultural issues, many of the students failed to understand why they were being asked to attend the lectures, which were deliberately outside of their own practice. In our many discussions on the subject of why the programme wasn't perceived as relevant to the students, the studio staff and seminar leaders from the programme identified one possible reason being the large group sizes. Seminars were held before the lectures to encourage open discussion; however by 2003 there were over thirty students in each group, many of them having different cultural backgrounds and first languages. Consequently, the seminar's place as a forum of individual expression and knowledge transfer became very limited.

A pragmatic approach to student learning is required in order to tackle some of these problems. Looking back on the perceived Utopian times of yesteryears when a seminar group was a maximum of ten and students had regular one-to-one contact with their tutor does not in itself help in the proposal of new strategies. I believe that the key to providing mass higher education is to make the student feel that they are recognised individuals with relevant viewpoints and life experiences. At first sight, this might seem contrary to the reality of teaching more students with fewer resources, but I do believe it is possible through various negotiations. Firstly, lectures can be delivered to high numbers of students without the increase in numbers resulting in a drop in the quality of the information imparted. The seminar group sizes, however, must remain at a level where personal contact is possible; otherwise they simply become another, smaller version of the lecture, or a discussion forum for a select group of confident and verbally-able students, with a group of less confident students forming an audience in the background. One reservation I have with this approach is that it often means tutors have to repeat the same seminar four or five times in the same day, which can not only be frustrating for the seminar leader, but may also result in the quality of the seminar being reduced as the day progresses. Finally, the traditional means of keeping in touch with

students on a personal level has been the one-to-one tutorial, but I would argue that in most cases the student can benefit more from a small group tutorial of between three and five students. The student's peer group can give confidence and feedback to the student that the tutor alone may not be able to do.

3.4 Knowledge deficit

One of the most difficult and increasingly common problems experienced at post-graduate level is that of being confronted by students whose background has not provided them with theoretical knowledge or developed their analytical skills. In the relatively short time period of the masters programme, and within the confines of the limited time given over to the theory component of most courses, the Design Theory tutor somehow needs to impart enough information, or help the student to very quickly develop the research skills, necessary to successfully complete that element of the programme.

Different approaches can be used in tackling this problem at different levels. Firstly, one could argue, it could be addressed by removing a theoretical or written component from the course. However, in relation to Master's level graduates the QAA states that:

> Students will have shown originality in the application of knowledge, and they will understand how the boundaries of knowledge are advanced through research. They will be able to deal with complex issues both systematically and creatively, and they will show originality in tackling and solving problems.[23]

While one of the SCQF's indicators for Master's level states that students should 'critically review, consolidate and extend knowledge, skills practices and thinking in a subject/discipline.'[24] It is difficult to know how either of these statements can be met if the lack of theoretical knowledge or research skills is not addressed in the programme.

Secondly, it could be addressed at the interview/intake stage, where students without the necessary skills would be rejected from partaking in the course. This approach has, of course, many problems attached to it. In particular it raises the questions of how this could be justified in the current ethos of widening participation, how student targets would be met if it were applied rigorously, and in association with that, it raises the issue of how the student's ability could be measured.

Thirdly, it could be addressed at programme level either by providing optional remedial courses in Design Theory, or by increasing the weighting of the Design Theory element to provide more comprehensive coverage. Once again, these solutions give their own problems: they would both be a drain on the already shrinking resources held by UK programmes by requiring extra teaching provision, and the latter option would also necessitate decreasing the amount of time assigned to studio work, which would not generally be a favourable option for practice-based courses.

The fourth solution involves incorporating the theory and practice elements of the Masters programme, so that in the early stages the student is presented with a series of research models and methods involving theory into practice, which can help the student to develop skills of critical and independent thinking. The student can then utilise these skills to enable them to find or adapt a specific model in the later stages of the course when they are being encouraged to develop and articulate their own individual research project. While they may not be able to gain a well-rounded knowledge of all aspects of history and theory concerning their practice, they will hopefully have the confidence and skill to take on a particular aspect and investigate it rigorously.

4 Design Research and its Implications for Design Theory Education

There is a long-standing concern over what constitutes a PhD in the area of design, particularly when the research contains an element of practice. Some have argued that practice is research, but Durling provides a convincing argument against this stating that 'Research and practice coexist as

different categories of creative endeavour, and should not be confused as being identical categories.'[25] For the purposes of this paper it is worth considering how these terms and argument relate back to Design Theory education at undergraduate and taught post-graduate level.

We could consider that 'research' in doctoral study is in some way equivalent to 'Design Theory' in undergraduate teaching; Design Theory should encompass the teaching of research, analysis and communication skills. By doing so, the argument for maintaining and developing Design Theory programmes is therefore strengthened: not only are students receiving all the benefits described above, but they are also being trained towards doctoral study. However by considering practice to be categorically different to research, there is a danger that the benefits of Design Theory are negated. By implication, one could argue, if practice is categorically different to research, then it doesn't involve research. Durling's argument in some ways refutes this by acknowledging the main difference between research and practice is their different goals, neither one being necessarily more rigorous than the other[26]. What we may derive from this discussion, is that practice may well have an element of research, and research may have an element of practice, but only the latter should be considered appropriate for doctoral study.

Doctoral research in design is a relatively new and as such is bound to cause controversy and confusion over its purpose and merits. However, one thing which appears obvious from my experience of teaching in higher education is that there is as yet very little scope for integrating the doctoral research of the staff into the undergraduate teaching programmes. Studio staff who undertake practice-led PhDs are ideally situated to help break down the barriers between the teaching of practice and theory as they will have a clear idea of the benefits that research brought to their creative design work. Similarly, theory tutors with experience of a wide range of practical and theory based research can help to bridge the gap to studio practice, reflexivity and research. Indeed as more tutors undertake doctoral study, the significance of the boundaries between theory and practice become lessened, and the integration (rather than assimilation) of the theory component into the main practice component of the course could become an exciting and welcome challenge.

5 Conclusion

As this paper comprises a diverse, though linked, set of thoughts, summaries and conclusions have been proffered along the way. However, I will take this opportunity to re-emphasise the main aims of this paper and reflect on its success in achieving them.

Overall, the main aim of this paper is to highlight issues of teaching Design Theory to Design students in contemporary higher education. I began by stressing the importance of Design Theory, and demonstrated through the use of QAA and SCQF level indicators how useful it could be in helping students attain the appropriate level for their degree. I also argued that as a designer, research skills are an important aid for generating and maintaining creativity; a designer needs to understand the world around them.

I continued by addressing issues that I have encountered in my own teaching practice and gave possible, if partial, solutions to some of them. These issues are all heavily linked, and if there is one solution to all of them, then I feel it is by a) arming students with the necessary skills for study in higher education and b) by making each student feel like they are being listened to and that they have important contributions to make. While neither of these things are ground-breaking revelations, I feel they are sometimes overlooked in the push towards mass higher education.

In the last section of the paper I related the teaching of design theory with the relatively new area of doctoral study in design, and suggested that in order to move forward in both areas, closer ties are required.

All of the areas touched on in this paper have been discussed to some extent in previous research, and similarly all the areas would benefit from more in-depth study of the issues within and across higher education institutes of design in the future. However, I hope this paper will serve to bring together ideas that have previously only been tackled separately and provide a starting point for further debate on the issues raised.

Notes

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Collaborative Agents of Design: the Need for Interdisciplinary Research and Training in Design Education

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What do designers need to change in order to sustain their contributions to collaborations in ongoing, nationally or internationally funded, scientific research environments? Though opportunities in interdisciplinary research work are vast and are being pursued by a few traditionally trained designers, the nature of the complex scientific and technological challenges that we face in turn creates a need to ensure that designers can provide serious contributions on broader, sustained scales.

Although designers have, in many respects, always worked with others in numerous disciplines, their on-going and systematic inclusion in collaborative, interdisciplinary research teams appears to be more prevalent; particularly as Ph.D. programmes in Design emerge worldwide. Nevertheless, traditional and persistent barriers to interdisciplinary research remain. Why then should designers consider collaborative research?

It is observed that emerging technologies have had such wide-ranging effects that they have, in effect, produced a new paradigm on many levels, from knowledge production to globalization and new economic structures, to name a few. New corollaries of the Design field, like Human-Computer Interaction (HCI) and New Media, have begun to force us to redefine our goals and practices, as the term "designer" has been appropriated and redefined in these contexts. Funding structures are undergoing a change in educational institutions, while the computer industry and technology sectors consistently target hiring those designers who understand computation in great depth. Perhaps the most important reason designers should implicate themselves in interdisciplinary research is that it enables us to become a part of shaping emerging technologies, rather than waiting to respond to its after-effects, as enumerated above. All of these forces necessitate a response by design education, in keeping with its historical tradition of adaptation.

Keywords: *collaboration, interdisciplinary research, new media, design*

1 Cross-fertilization

Both authors have had the opportunity to be collaborative agents alongside HCI experts, computer programmers, physicians, biomedical engineers and physicists, and cultural theorists in the Humanities in the U.K., Canada, France, Switzerland, Japan, and New Zealand. One measure of the success of these collaborations is the level of acceptance and recognition of their design contributions, indicated

in terms of renewed grant funding and the publication of research papers within these communities. Long term results include the development of new, interdisciplinary curricula.

By focusing on two case studies of collaborative projects we have each participated in, we wish to outline the differences and strongly similar experiences from two perspectives: an American faculty member and an Indian graduate student (Indian Institute of Technology alumni) who daily discuss this issue and who daily collaborate with others outside of the field of design. Through the case studies, we outline these two converging perspectives, and refer to similar experiences by designers, in order to extrapolate. The result of this extrapolation is a positing of what we consider to be the demand for and opportunities offered by interdisciplinary collaboration, particularly with respect to its implications for design education in Indian and American contexts.

2 Incubation

2.1 Case Study: Nanolithography

In our first case study, Sunil Parihar was invited to join a research team as an interface designer, just after completing undergraduate studies at the Indian Institute of Technology (IIT), Guwahati. The project was a collaboration between two laboratories in Switzerland, titled "Data Coding Tools for Color-coded Vector Nanolithography." Although this experience followed three prior internships that served as preparation for working in collaborative teams, the subject matter of nanolithography, needless to say, was alien.

Nanolithography is the art of etching, writing, or printing at the microscopic level, where the dimensions of characters are on the order of the nanometers (units of 10-9 meter). This includes various method of modifying semiconductor chips at the atomic level for the purpose of fabricating integrated circuits (ICs). Instruments used in nanolithography include the scanning probe microscope (SPM) and atomic force microscope (AFM).

Either the SPM or AFM can be used to etch, write, or print on a surface in single-atom dimensions. The goal of the project was to develop flexible, portable software that enables physicists to share nanolithography patterns, no matter which device they use.

The collaborative group consisted of nuclear physicists, computer scientists, engineers and interface designers.[1] Although this represents a diversity of disciplines, in terms of education, the greatest difference is between the interface designers, whose education includes cultural, symbolic, aesthetic and other subjective areas; and the scientists, whose training and methods of judging the validity of any idea is ultimately based on repeatable, measurable results. The collaborators were in direct contact with each other, often informally. Formally, a common meeting was held the first week of each month.

This project involved a great deal of multidisciplinary input and interactions on multiple levels, from its inception to completion. The whole process was like a big incubator—a think tank machine where ideas compete for survival and complete their individual cycles to give birth to the new ones. This process itself elucidated the roles and responsibilities of a designer in interdisciplinary platforms. For instance, any task requiring website, graphic or visual design was given to us and our performance in these areas was never questioned. However, the scientist's assumptions of our skills as interface designers was restricted to website design. This was just one of the biases we had to set right, as it was assumed that designers were non-programmers. Thus, it took some time to prove our abilities in programming languages. Once that was accomplished, we were able to contribute more substantively to the project.

Factors that lead to successful collaborations that should be taken into account are individual ability, intellect, and social skills, though this is often difficult to assess. However, the *readiness to work in a collaborative setting on the part of all participants* seemed to be the key factor that most affected the outcomes of the project. This, combined with a *designer's responsibility to educate their collaborators about design processes, and a readiness to provide demonstrations of knowledge,*

problem-solving abilities, and proposed solutions — that is, an ability to achieve symbiotic trust — were essential to the realization of this project as well.

The major challenge was how to identify the nanolithography input files and the software encoding scheme. The physicists were skeptical of any non-typical solution, such as brainstorming — a typical designer's process — in general. A further challenging role of a designer in a collaborative, traditionally scientifically-oriented environment is to make this brainstorming process or *thought flow* accessible. Once achieved, a coherent level of mutual trust is realized, which in turn leads to higher comfort levels and successful project outcomes.

We looked at the problem of finding a way to identify nanolithography file types with a designer's eye. As part of the team, we designed the software to read and interpret a nanolithography pattern stored in a Windows Metafile (.wmf, a standard graphic format) and next to draw it on a substrate using an SPM tip. Nanolithography parameters like height, velocity, and feedback force were coded in the color of the WMF onto the RGB channels of the image. This established a distinct relation between a graphical feature (color) and the nanolithography scheme employed (voltage, height, etc.). The concept enabled preparation of complex patterns using any standard graphic software, and aided an intuitive recognition of the mode and parameters set for a pattern. After studying the type of image formats viable for our task and actively discussing the problem with expert users such as Dr. Janusz Lekki (a nuclear physicist from Warsaw University, Poland, and an expert in the field), and experimentation, we chose .wmf files for our job because of its portability and universality. *A simple demonstration did the job for us in winning the physicist's trust*. The idea of using color was a very effective design solution and became a backbone of this software. The fact we could see and comprehend such a solution was, in our opinion, the result of our group's openness, along with the interface designers' ability to articulate their process, provide examples, and conduct usability tests — all while relying on their solid backgrounds in undergraduate science courses.

2.2 Case Study: Immersive Virtual Reality

Although nearly twenty years separate the authors in terms of experience, their collaborative experiences with scientists strongly resonate. The authors' second case study then shall focus on the differences observed during a collaborative project conducted by Professor Diane Gromala. Her experience in this realm began as an undergraduate at the University of Michigan, continued at Apple Computers in the mid- to late 1980s (primarily in the development of HyperCard) and in Virtual Reality in the early 1990s at the University of Washington's Human Interface Technology Lab (HITLab), and the Banff Centre for the Arts, in Canada. At Banff, the collaboration, usually headed by scientists (since they can more easily secure and sustain research funding), was inverted — the Canadian government regarded the first projects in immersive virtual reality to be a form of research and development (R&D), and so funded projects that included a number of computer scientists, but that were headed by artists. During this time, designer Diane Gromala and choreographer Yacov Sharir supervised computer scientists for over two years. During that time, however, they revised the status of the computer scientists from a supportive to a more fully collaborative status, since the creation of new knowledge in the overlapping realms of Art and Computer Science appeared more fruitful. Indeed, the group devised the then-novel method of "paging" that enabled virtual worlds (3D models, sound files, and texture maps) to open and close. This in turn allowed for much more visually robust worlds, animation, and interaction than was otherwise available. Their results were routinely published, exhibited, and performed worldwide, in both disciplines. Although collaborations between designers and computer scientists usually benefit designers more than computer scientists, at least in academic realms, in this case, several of the computer scientists went on to productively work with artists over the subsequent decade.[2]

Because of this prior experience, Professor Gromala was able to initiate, on equal footing, an immersive VR project with computer scientists Dr. Larry Hodges and Dr. Chris Shaw at Georgia Tech in 2000. The *Meditation Chamber* was an immersive virtual environment that, combined with a biofeedback

device, provided users with real-time feedback as user's physiological states approach what is generally regarded to be indicative of meditative states. Tested on 504 users at SIGGRAPH 2001's Emerging Technologies, the project proved highly successful for users who had never meditated. The scientific data was published in CHI2002's Physiological Workshop. The project was also useful for non-scientific purposes in the realms of Design, Art, and the Humanities, in terms of exhibits and publications relating to visual rhetoric, representation and phenomenology. The project also served as a precursor for subsequent VR projects in pain distraction for children who are undergoing treatment for chemotherapy.[3]

Although the designer in this project was a co-Principal Investigator (PI), the observations made by Sunil Parihar in the first case study still held true for the graduate students involved in the *Meditation Chamber*. The PI's of the *Meditation Chamber*, in a fairly rare instance, had all collaborated with others for quite some time, and were well-versed in the disciplinary differences at play. This, however, was not true for graduate students. Thus, in order to create a community that understood differences in knowledge bases and expectations of each discipline, the group met weekly and discussed these issues immediately and often in order to work more smoothly. As observed by Parihar, *conference, paper, and exhibit deadlines actually had much more to do with clarifying positions, the development of common trust and goals, and the evolution of the project than any other single factor*.

In addition, it is noteworthy that the standard practices of citation in Computer Science went far, though unnoticeably so, in cementing the trust that was built by the PIs. This was important because one of the impediments of the design practice to the collaboration — a reliance on individual skill in the best sense, with the historical remnants of a cult of singular genius in the worst sense — was ameliorated by the understanding that everyone's authorship was recognized. Or, in other words, practices in Computer Science reinforced the knowledge that the project was very publicly recognized as a team effort.

Perhaps the most important outcomes of the *Meditation Chamber* were the subsequent projects it spawned, grants (including a U.S. National Science Foundation Grant), and the development of an interdisciplinary curriculum between undergraduate designers and computer scientists at Georgia Tech. The project itself was not the primary cause of the development of the curriculum, but was evidence that such an innovation was necessary.

3 Gestation

We are approaching an era where designers will be expected to have a more diversified role, though this claim seems to be repeated from decade to decade. While designers are expected to be generalists to some degree, a balance has always had to be struck between simultaneously being a generalist and an expert. In other words, a balance must be struck between educational breadth and depth. What is different in our times is the degree to which designers will be expected to have computational expertise and an ability to collaborate in a long-term manner with others outside of their discipline. In addition, as design continues to become a more legitimate area of research enquiry in academia — beyond mere professional practice or craft — the paths it follows tends to be scientific (as in HCI), Humanistic (semiotics, Cultural Studies), emerging Artistic research, or some uneasy combination. Bearing this in mind, the question we must then attend to is this: what groundwork is necessary for the education of this next generation of designers? While we are not suggesting that all designers should collaborate with scientists, in emerging realms of technological development, we do believe it is particularly relevant.

As mentioned, interdisciplinary collaboration is never an easy enterprise, and remains in cultural and institutional contexts that pose innumerable obstacles. The impediments to interdisciplinary research include well-documented resistance in attitudes, differing research and communication methods, the length and depth of training, the difficulty in developing new career-paths outside of traditional structures, impediments to securing research funding for collaborative research, the lack

of support for interdisciplinary departments in academe (despite rhetoric to the contrary), and the lack of clear publication and dissemination routes for interdisciplinary research results. Institutional differences, and value systems at the private, state, federal and international levels only seem to compound these obstacles, as does the dominant definition of design as simply a professional practice. Although these are seemingly intractable problems, the sweeping changes wrought by technology nevertheless make such efforts necessary, if not urgent, particularly if designers want to become part of shaping the way technology is developed and deployed.

Designers are increasingly implicating themselves at this stage of research, as evinced by the steadily rising number of publications in CHI, ISWC, and numerous other Computer Science conferences. They are also appearing in other fields, such as biotechnology and bioinformatics, among others. Further, as designers participate, through collaborative teams, in scientific realms, they also bring back to the design realm these experiences and new forms of expertise. What is crucial here is what has always been a problematic issue for design: the ability to properly define their discipline and to articulate their specific expertise in ways that other scholars can readily comprehend.

4 Beyond the Shell

In order to begin to answer our question regarding how design education would need to change in order to better prepare students for long term collaboration, the following areas are discussed: institutional variables, disciplinary bounds, and pedagogy and curriculum. This is by no means an exhaustive account, as we have restricted our focus to existing and emerging strategies and approaches that appear to have already realizable directions.

4.1 Institutional Variables

Currently, the education of designers takes place in generally three major arenas: the small, private or autonomous school; the large public university; and the medium-sized technical institute. Private or autonomous schools include the National Institute of Design in India (NID); the Rhode Island School of Design and the Cranbrook Academy of Art in the United States; IVREA in Italy; and the Royal College of Art in England to name just a few. Large public universities that include Design departments, such as the University of Michigan and the University of California Los Angeles, are more common in the United States. Medium-sized, technical institutes, both public and private, that have design departments are the Indian Institute of Technology (IIT) and Carnegie Mellon (CMU). Similar institutes that include design, although not in traditional ways, are the Massachusetts Institute of Technology (MIT Media Lab) and Georgia Tech.

First, the affordances of each type of institution should be recognized and exploited. For example, it is generally much more straightforward to obtain and sustain labs in technical institutes than in large universities, while, on the other hand, large universities offer many more options in terms of specific educational and research options in the Sciences, Arts, and Humanities. Second, while it is generally and ironically apparently easier to create sweeping change, such as the development of an interdisciplinary department rather than the addition of a new area in an existing realm (as is the case in the U.S.), it is often difficult to maintain the rigor that existing disciplines offer. For example, it is easy to see the uneven results of what passes for design in New Media programs that have been erupting in departments as diverse as Library Sciences, Information Technologies, and the Humanities. Finally, the mission and funding structures of MIT's Media Lab or an IIT are substantively different than those that are operational in Art Schools or large universities. Thus, the strategies employed in each type of institution, in order to be realized, must respond to the directives and structures of that institution. These can be accomplished directly, or, more usually, indirectly, through the development of alternate structures that nevertheless have a chance of thriving in the specific environment. In some cases, sweeping changes can occur with great effort. In our experience and observation, however, they more generally occur on smaller, more local scales that then grow — in seemingly great spurts — as successful outcomes are built up over time.

Finally, the specific context of the educational institution in its global context should be taken into account. Certain institutions have directives to build international relationships, while others do not. Nonetheless individuals accomplish goals outside of institutional boundaries. Sugiura Kohei, for example, in building an Asian grammar of design, has, as a result, been building an Asian network of designers in numerous ways over the years.

4.2 Beyond Disciplinary Bounds

In terms of education, building opportunities for students can be realized through internships, work-study and research programs on the undergraduate and graduate levels. One step toward the realization of this goal, for instance, has been the initiatives taken by Prof. Sudhakar Nadkarni. His efforts to take Indian design to a global scale by instigating continuous traffic between various design disciplines, along with the exchange of students among research labs and universities are vital for the next generation of designers on the Indian-subcontinent. Likewise, several other designers who head educational programs in Australia and New Zealand, the United States, Canada, and Europe do likewise, and insist that their students participate in the same conferences and journals that HCI or other experts do. Recent graduates of design programs, such as Stijn Ossevoort are employed at prominent research labs, such as the Wearable Computing Lab at ETH, Zurich. He is only one example of a growing number of designers.

An important aspect of any interdisciplinary research collaboration is in dissemination, particularly in writing papers. It is our observation that during such collaborations, the areas of conflict and the agreement come into focus. This quickly leads to a wider goal of understanding the research phenomenon through differing lenses or knowledge bases, and often connects the loose or dislocated sense of thinking and acceptance. The importance of such publications to research of course, goes without saying, for it is still the primary method that new knowledge is communicated and legitimized.

4.3 Pedagogy & Curriculum

At the undergraduate level, a strong skill set in aesthetics, problem-solving, and programming, along with a Humanities or Liberal Arts basis (cultural analysis) should be developed. Although the design student does generally not have expertise developed to a significant degree until the end of this time, we believe it is important to provide access to and support for those who are predisposed, to or support for research opportunities, particularly in collaborative groups. There is persuasive evidence that cooperative teams achieve at higher levels of thought and retain information longer than students who work quietly as individuals. This is because the shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers. As noted earlier, the more experience designers have in collaborative groups, particularly with others outside of their field, the greater successes they accomplish subsequently.

At the graduate level, the core curriculum should comprise two or three classes as a maximum, and should provide grounding in research methodologies so that students become conversant with the differing knowledge bases of the Sciences and Humanities. Although it would be difficult to accommodate any graduate student who did not have an undergraduate degree in design, some institutions have addressed this by adding a remedial year to the length of graduate study. Much of the curriculum, however, should be open to self-directed paths so that students can develop expertise in an area of their own choosing. This is especially important in a quickly changing realm of technology. Students should identify their current areas of expertise and the direction they wish to pursue as early as possible, such as HCI, ubiquitous or pervasive computing, biotechnology, or Cultural Theory. Inclusion in on-going research projects, many of which are funded by national or international agencies or private research concerns, such as Xerox PARC, are essential at this point. In some countries, it should be noted, graduate students are expected to be much more autonomous and self-directed than in others. Thus, a balance should be sought between the cultural norms of the prevailing institution, and developing global norms in research.

Although it is widely regarded as a terminal degree, a Master's of Fine Arts (M.F.A.) is still, sad to say, treated as a lesser degree by many educational institutions than a Ph.D. While some of this attitude can be attributed to the insidious legacy of particularly Eurocentric values of intellect over physical skill, it also belies the Design field's roots in craft traditions and its current professional leanings. This is perhaps the field's greatest challenge. In defining itself strictly in terms of a professional practice, determined by the marketplace, designers effectively remove themselves from serious and deeper academic enquiry. For example, when the American Institute of Graphic Arts held its annual conference in Seattle in the late 1990s, the HITLab offered its members access to otherwise relatively inaccessible immersive VR experiences. The AIGA declined, because, its leaders claimed, VR was not "design." Years later of course, VR is as much a part of Experience Design as are more recent technologies. Early interface designers in the Silicon Valley experienced much the same response. Needless to say, although design education needs to be responsive to professional practice, the short-sighted view of a few professionals does not always coincide with the longer term efforts of designers who devote their efforts to academic research, and should not be the sole or primary factor in determining the direction of design education. Finally, the development of Ph.D. degrees in Design in the U.S. and U.K. necessarily need to go beyond defining the field strictly in terms of professional practice, as systemic theorization is essential to that endeavor.

Lastly, reliable methods of dissemination, such as a globally accessible database of theses and dissertations related to research should be developed. This has been the case for the emerging area of research in the digital arts, by the MIT Press journal *Leonardo: The International Society for the Arts, Sciences and Technology*.

5 Conclusion

It would be naïve to suggest that designers themselves can substantively change the way emerging forms of technology are developed and deployed, or that their intermittent presence in interdisciplinary research groups alone could necessitate immediate change. However, the Open Source community makes a strong statement about collaborative power and acceptance, and the value of collaborative teams is that ideally, the whole is greater than the sum of its parts. Thus, if designers continue to implicate themselves as collaborative agents in interdisciplinary research arenas and could do so in numbers over time, their presence is certain to be felt.

Notes

1 Janusz Lekki (Department of Nuclear Spectroscopy, Institute of Nuclear Physics, Cracow, Poland), Saveen Kumar, Sunil S. Parihar Sebastien Grange, Charles Baur (Virtual Reality and Active Interfaces Group, Ecole Polytechnique Fédérale de Lausanne, Switzerland, VRAI-EPFL), Raphael Foschia, Andrzej Kulik (Nanomechanics and Tribology Group, Ecole Polytechnique Fédérale de Lausanne, Switzerland).

2 Dr. Chris Shaw, for example, continues to work with designers at the Georgia Institute for Technology, where his Videogame Design, HCI and VR classes regularly include designers; John Harrison works with artist Char Davies at SoftImage and routinely publishes at SIGGRAPH and other computer science conferences; and Dr. Mark Green heads an interdisciplinary Design department in Hong Kong.

3 For this and other VR environments that are used therapeutically, refer to Dr. Larry Hodge's company, Virtually Better, www.virtuallybetter.com.

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Stimuli for Change

Projects for building territorial design systems – *Methodology and Case Histories*

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Worldwide Italy is known more for design driven innovation capabilities than for technological innovations. Italian Design has been the key factor for the promotion and internationalization of Italian manufacturing sectors since the national crisis caused by the 2nd World War, giving birth to the undisputable success of the so called "Made in Italy" products.

Due to this success, many countries which are striving for innovation today, have turned to Italy for understanding the "innovation processes" in industries and the entity of design's contribution to innovation, in order to replicate the same circumstances in their national manufacturing systems. To satisfy this request, several projects led by individual professionals, institutions and associations have been developed abroad with the intent to promote, internationalize and transfer the different aspects of Italian design know-how to other contexts and international realities. However these projects have been sporadic events which, apart from their singular success, have not given birth to strong changes or autonomous developments/evolutions of the transferred know-how in local communities and therefore have not initiated the expected ongoing processes of innovation throughout the clusters of industries in the territories in which they were implemented. In other words the projects and actions lead till now in the field of design knowledge transfer to industrial districts or clusters of industries abroad have only had a "short term sense" and therefore cannot truly to be considered "change initiators".

Keywords: *industrial districts, territory, Made in Italy, university and enterprises, design projects*

Introduction

Worldwide Italy is known more for design driven innovation capabilities than for technological innovations. Design has been the key factor behind the undisputable success of the "Made in Italy" products since the 2nd World War. Many countries which are striving to replicate the Italian success in their manufacturing sector have turned to Italy to understand the "innovation processes" in industries and the contribution of design to innovation. For this purpose, several projects led by individual professionals, institutions and associations have been developed abroad with the intent to promote, internationalize and transfer the different aspects of Italian design know-how to other international contexts.

However, these projects have been sporadic events that, though individually successful, have not given birth to strong changes or autonomous developments/evolutions of the transferred know-how in local communities. These projects have, therefore, have not initiated the expected processes of innovation throughout the clusters of industries in the territories in which they were implemented. In other words, the projects that aimed at transfer of design knowledge to industrial clusters abroad have only had a "short-term sense"[1] and, therefore, cannot truly to be considered "change initiators"[2].

Answering Territorial Needs – Methodology Building

The methodology of the Politecnico di Milano to respond to national and international requests for innovation in industry has been developed over a five-year research process, which is briefly described in the following paragraphs.

The industrial production system in Italy mainly comprises industrial districts of SMEs. The crisis of the small and medium industries in Italy led to increasing requests from national and local entities to find new solutions for increasing the competitive value of Italian industries in the global market. A group of researchers of the INDACO Department (Industrial Design, Art, Communication and Fashion) of the Politecnico di Milano began to reflect on how design, and in particular, design research could help the Italian industrial districts in this battle against the crisis which was leading them to eventual extinction. In fact, design having been the main factor behind the success of Italian products, researchers believed that if Italian SMEs were to compete with other industries worldwide, design had to be its main strength and value for the future. The main questions and doubts that led the research were the following: Why is design the main competitive factor of Italian industries? How does it contribute to innovation? What role will design have in the future economic, geographic and political assets of the world? What is the role of the design universities in this new scenario?

In order to answer these questions, research was conducted through Desk Research and On Field Research methodologies.

Desk Research – System Research: Before looking at ways to help the Italian SMEs and in particular Italian districts to survive globalization, the group developed two main researches which have been defined as System Research because their objects of investigation have been the Italian Design System and the Italian Industrial Production System. The main aim of this System Research was to investigate and understand the birth and development of the "Made in Italy" phenomenon by mapping both the Italian Industrial Productive System[3] (a map of Industrial districts, meta-districts and main productive sectors in which design has a main role) and the Italian Design System[4] by analyzing/codifying both the tacit and explicit Italian know-how in design (identification of actors, processes and channels).

On Field Research – Action Research: Several On-field Research Actions have been developed in collaboration with local district entities (institutions, consortiums and associations) in order to test methodologies and research insights in different territories, industrial contexts and productive sectors. Since the year 2000, Sistema Design Italia[5], has carried out approximately 20 projects in different Italian territorial contexts involving over 150 students, 60 professors in research action projects guided by design innovation.

Therefore, as mentioned above, the methodology developed and consolidated in the past five years is based on the results of the actions described above, a series of case histories, experiments, attempts, errors, failures and victories have given birth to a mature vision of how to work with industrial districts and territories and lead them through ongoing innovation processes. Thanks to the work of many researchers, today we have a clearer view of how design systems work and interact with production systems and have developed the right tools for mapping and codifying other territorial systems and creating "ad hoc" strategic plans of action for developing innovation processes in specific territorial contexts.

Methodology Filters

The systems research has come to the conclusion that the competitive factor of Italian products is mainly due to the strong bond and interaction between peculiar competencies of productive know-how of specific territories and the project planning know-how of tacit and explicit design resources leading to continuous innovation processes. Therefore, the following methodology works on autonomous development of innovation by integrating local entrepreneur capacities (small and medium enterprises) with local project capacities (diffused design).

The role of a design research center, such as a design university, in this process is that of a mediator between enterprises and design resources, between local communities and global markets, between the productive systems and regional politics. The center also acts as a catalyst of design driven innovation processes, as an investigator of innovation between different cultural models and technical knowledge. The center aims to rediscover traditional techniques and find ways to reutilize them and serves as a guide through the transition from tradition to innovative concepts.

Before analyzing each step of the methodology, it is important to understand the main characteristics of projects undertaken in territories about which little is known to the research group. Some of these characteristics are not new to the design research community especially in the "Design for Development" field of research; but it is important to state the values that push the researchers in these projects since they are fundamental for the correct application of the method in each of its phases. Projects for building territorial design systems should:

Have a bottom-up[6] *and participative approach*[7] *:* To identify and plan research-actions in collaboration with local associations, institutions and entities and to involve the local resources in the project activities. If in some projects a top-down approach is used, in projects for industrial districts and territories a bottom-up approach is preferred since the stimuli for change is born inside the local community and creates change through different pro-action forms and modalities[8]. Participatory preparation of an action plan is the only way to find original and unique responses to a specific territory. In this perspective, each territory will have a different project response and there will be no pre-conceived "bundle" responses and no identical "case histories". The further away the context lies from the original context of the design research group the more this feature becomes important[9].

Build alliances with economy, political and social paradigms: Design can do nothing if the political, social, cultural and economical conditions are not adept for catalyzing project processes (Zurlo 2004). The fault of alliance with economy and political paradigms has been one of the major failure factors of past design knowledge transfer projects. However, to know political and economical issues does not mean to reduce the autonomy of the researchers to develop a project, but merely that in the planning phase they will take into consideration the restrictions imposed in order to bring forward an autonomous response. In international projects, this feature becomes more complex because the project will need to also take into consideration the internationalization strategies of each nation involved a part from the restrictions of the financier and of the actors and territories involved.

Build capacities: To enable local communities to express what people are actually able to do and to be (Sen) is the main philosophy that leads the project. The main goal is to give communities the capabilities to communicate their ideas, to express their selves; to build a bridge to other markets, to give industrial districts and productive territories the liberty to access to other markets, the liberty to communicate and collaborate with other realities and cultures and encourage cross-fertilization of cultures in new product generation processes. This vision is especially important in today's scenario in which "to export" final products[10] or "to delocalize" production appears to be vital for a company and therefore, they must be able to decide with whom to communicate and how.

Sustain regional identities: The definition of the identity of a territory or even of a cluster of enterprises is not a simple task, especially if one takes into consideration that the community of a certain territory is not able to read nor give it a form on its own[11]. Moreover, since the beginning of the communication era, the contamination of cultures both virtually (through media) and physically

(through emigration) has put aside all the traditional values and rituals transforming them into mere 'ethnic objects,' 'tourist gadgets' or 'souvenirs.' In these territories designers have neglected all forms of "ethnic" contamination and have abandoned their productive traditions. In projects for building territorial systems, territorial differences and specificities are considered to be a strength and not a threat to development. All projects must work on giving the local communities the tools to reinterpret their traditions and transform them in innovative solutions.

Never be in competition with the design community: All projects aim to integrate design communities (near and far) with local productive systems. Therefore, the design research group should create a strong trusting bond with designers and design firms in order to involve them actively in the project activities. In some cases, the designers can be part of the design research group and participate in the project planning.

Building Territorial Design Systems

The de-codification of the know-how achieved by past experiences and their reinterpretation in each new context has given birth to the following methodology, which becomes the framework in which each future project fits in creating unique results. Past experiences have shown that workshops and seminars that are not included in a long-term project are not sufficient for initializing autonomous innovation phenomena. Therefore, all projects proposed must aim to go beyond the past logics of sporadic consultancy visits that only solve small individual problems (single companies or small groups of students) without having a global vision of the development of a territory. These projects fail to have a long-term systematic approach and risk to abandon the territory in the processes of product development, promotion and distribution leaving a strong sense of frustration and delusion to local communities who are incapable of facing these challenges alone[12] .

Like all other projects, projects for building territorial design systems also need "triggers" (advantageous circumstances) to avoid barriers that prevent the start-up of the project. Even if the territory does not present any design actors, the following circumstances must be fulfilled:

- the presence of a cultural intermediary of the project;
- the presence of a local entity who believes in and supports the project and who has a good relationship with the other actors of the territory (in particular with enterprises);
- the presence of a productive system (industrial or artisan);
- the presence a stable financier.

These circumstances do not guarantee the success of the project, nor the continuity in time of innovation processes, but they are absolutely necessary for starting the project.

The phases:

Reading the Territory- analysis of the district's environment and definition of the degree of innovation
Can a territory be read through a "design research" lens?
The system research lead on the Italian design system has showed that not only is this possible, but it is also fundamental for defining the **degree of innovation** of a specific productive territory before beginning any kind of action. The first phase of projects for building territorial design systems, is to analyze the territory by organizing visits to design entities and non-design entities that act in the different phases of the Product System[13] (single companies, universities, design studios, design promotion associations, design centers, local design agencies, service agencies for districts, etc.) This phase can be called auditing. During auditing, the research group collects all information and systemizes it in order to give birth to a **territorial design map** in which the different entities are divided into groups[14] : direct actors (designers, stylists, design firms, etc.), indirect actors (prototype firms, photographers, etc.), flux actors (fairs, exhibitions, cultural entities, etc.) and support actors (design associations, design centers, etc.). Subsequently, a series of innovation indexes are calculated according to the number of actors present in the territory and the intensity of their interaction with the local productive system.

This phase reaches its best results when some local actors (local university or design center researchers) are part of the group of researchers. If the industrial district taken into consideration already has a high index of innovation and there is a complete collaboration on behalf of the enterprises, most information can be collected through a survey (questionnaire) to be filled-in by each entrepreneur.

Participative Action Planning

Once the innovative index of the territory has been defined and the local actors have been mapped, the research team defines the action plan in direct collaboration with the local entity and cultural intermediate of reference for the project. This is the most delicate phase of the project because it is in this phase that the research group must **build trust in design** on behalf of the local actors who will be called to participate in the single actions. The local actors must not only trust the research group, and therefore the project, but they must also be convinced that design can really initiate a substantial change. Trust translates project actions into economic advantages in terms of higher sales, new markets, lower costs, etc. Usually a **trust building seminar** is organized in which all territorial entities are asked to participate. The aim of the seminar is to share the action plan and look for approval, spread-out the culture in design as an innovating agent and competitive value, confront the project objectives with the district potentialities and search partners for each project action. To support this phase of the intervention, the team of researchers at the Politecnico di Milano began in 2002 a new System Research called "Design for Trust."

Action

All projects can be made of a combination of actions in the fields of design research, education and promotion. Each action has a specific aim that contributes to the creation of territorial design systems. The sequence of the actions will depend upon the presence of *design resources* in the territory and its index of innovation, i.e., the range from total absence of design resources and a very low innovation index, to a high presence of design resources and a high index of innovation (however, a high population of design resources does not mean that the district will automatically have a high innovation index, for instance, in the case of artisan production). The actions will lead the district through an increasing innovation process, starting from strengthening the relationship between the productive system and design actors up to creating local institutions for promoting design innovation processes. The sequence of the actions cannot be casual and must be based on the real potentialities of the examined territory.

The main aims of the actions are to:

- strengthen the education processes in design: contribute to the education of professionals, researchers, design service experts and design directors for SMEs;
- favour and push the birth of institutions which support design innovation processes (universities, design centers, specialization courses, etc.);
- favour and empower the creation of new entrepreneurial design initiatives (design studios, design incubators, etc.);
- strengthen strategic sectors of local realities (identity, tradition, etc.).

Monitoring the results

The final phase of monitoring the results is not just an observation phase, it is a pro-active phase in which, on one hand the local community has the possibility to continue actions on its own knowing that it can count on the support of the project research team, and on the other hand it is a time in which the project team can receive feedback on the actions carried forward and can evaluate its work. Evaluation visits can be useful if they have a real aim, for example, an exhibition or an evaluation of work done by the local community.

Archive of experiences

Since the field in which this methodology is applied is very complex and depends on an infinity of variables, the collection of all case histories, successes and failures is the only way to keep a record of the link between the typology of the territory and the kind of design project applied.

Case histories (three of the most significant projects)

1999-2001

DxD – Design for District_Design for Industrial Districts. Expertise systems and new net connections for the competitiveness of Local Production Systems

Founded by: Regione Lombardia (Lombardy Region, Italy)

Abstract: DxD was the first experimental project for investigation of new ways of transferring guided design innovation to the local productive systems that took place in collaboration with one of the most important district areas in Italy. The so-called "DxD operation" was originated by the similarity of intents and by some favourable circumstances (a framework agreement between Lumetel (territorial district agency) and Politecnico, a funding by Regione Lombardia, an aid by Camera di Commercio di Brescia).

Figure 1: Projects developed by students

The question was "what can a district agency and a design university do together?" The most immediate answer was: a design award for the students. This first suggestion is definitely interesting to stimulate new design ideas and to become itself a way to promote the creative vibe, but it was also clear that the well-established dynamics of a design competition wouldn't suit our partners too well. A competition is an unusual event, restricted in time, which rarely leaves any sign in the territory. Furthermore, participants and promoters normally don't have any kind of relationship other than through the initial announcement of the competition and the final award ceremony. The acknowledgment of these limits requested the definition of a new competition procedure that would have integrated the two realities: production (SMEs of the district) and project definition (young designers).

Aims: The aim was to lead the firms belonging to the district to undertake product differentiation policies as well as policies for the improvement of their communication system and for the development of services tied to distribution and marketing of the products, to better face the medium-high part of the demand.

Actions: Trust building seminar, 60 students worked for 3 months inside 25 companies giving birth to 40 projects (product, communication and services), final exhibition, and project catalogue.

Partners: Politecnico di Milano, Regione Lombardia, Agenzia Lumetel (Development Agency of the Italian District of Lumezzane), Club dei Distretti Industriali Italiani, Chamber of Commerce of Brescia

Figure 2: Prototyping phase

2002

Development of Industrial Districts in Brazil: starting from the experience of Regione Lombardia: Campina Grande

Financed by: SEBRAE (Brasil), PROMOS – Azienda Speciale della Camera di Commercio di Milano per le attività Internazionali, Camera di Commercio di Milano (Italia), BID

Abstract: The district of Campina Grande in Brazil is a very small productive reality, which produces final products in the shoe-wear sector. Campina Grande has a long tradition in working leather and producing leather shoes for woman and man, but because of a recent crisis all industries have abandoned this tradition and now produce only plastic and synthetic shoes.

Aims: The project has focused on building design capacities of young designers who were not able to find adequate education in their territory. After the success of this course, all students are now working in the local industries and the local university is starting a specialization course in fashion and shoe wear.

Actions: Mission and workshop, design course, monitoring the results, prototyping and local exhibition, agreement with local universities, design competition.

Partners: SEBRAE (Brasil), PROMOS – Azienda Speciale della Camera di Commercio di Milano per le attività Internazionali.

2002-2004
UDIP_Pyme: Design driven innovation for the SME in Chile: Centro di Excellencia in Valparaiso
Financed by: ISTITUTO PER IL COMMERCIO ESTERO (Italian Institute for International Commerce), REGIONE LOMBARDIA, Universidad Tecnica Federico Santa Maria (Valparaiso-Cile), Universidad de Valparaiso (Valparaiso-Cile).

Aims: Building a Design Centre in the Universidad Técnica Federico Santa María in Valparaiso, Chile ("Unità Specializzata nello Sviluppo di Prodotti ad alto Valore Aggiunto per la Piccola e Media Impresa" [UDIP -Pyme]). The Design Centre has the task to bring innovation to SMEs of the 5th Region of Chile through promoting design projects and linking the enterprises with universities and local, national and international entities. Therefore the aims of the project are:

- to give SME's the right tools for developing and bettering the role of Industrial Design competencies in new product development projects;
- to develop new project resources and design capabilities inside SMEs;
- to support the education and research in the industrial design fields;
- to support the promotion and diffusion of industrial design culture inside entrepreneurial environments;
- facilitate the development of entities and organizations that support SMEs in new product development processes;
- facilitate the development of relationships between Italian and Chilean enterprises (eg. through joint ventures, collaboration agreements, partnerships, etc.)

Actions: 2002-2004: Mission, auditing and forum. Design course in Italy for 6 professors of the Chilean universities (actors of the UDIP), Local workshops.

2005-2006: two Chilean PhDs in the Politecnico; Pilot Projects for SMEs: "Co-Branding project," "Private Label Retailing project," "Co-Design project."
Partners: Politecnico di Milano, ISTITUTO PER IL COMMERCIO ESTERO (Italian Institute for International Commerce), REGIONE LOMBARDIA, Universidad Tecnica Federico Santa Maria (Valparaiso-Cile), Universidad de Valparaiso (Valparaiso-Cile)
Cestec (Centro Lombardo per lo Sviluppo Tecnologico e Produttivo dell'Artigianato e delle Piccole Imprese).

Conclusions

As can be seen in the case histories, there is no specific production sector in which the methodology cannot be applied. Before beginning the project, a selection of experts from the Politecnico and from local universities is done according to the typology of actions and the productive sector of the district.

The methodology is still in its testing phase, especially at international level since three international projects are too few to be able to consolidate it. However, the results achieved till today are very encouraging and the international projects' success lies mainly in the will of the territories to continue working and experimenting even in absence of an external support (especially in financial terms).

The future challenge lies in building international networks of cooperation capable of merging territorial production systems and design systems in international new product development processes.

Notes

1 *"Cry for Physical Interfaces for Design Solutions: A case study of entrepreneurship for change through design,"* Ashok Bhandari, Subhashis Banerjee, Umakant Soni, in the Development by Design Conference 2002, India.

2 idem.

3 Simonelli Giuliano, Maffei Stefano, I territori del design, made in Italy e sistemi produttivi locali, Il Sole 24Ore, Milano, 2002.

4 AA.VV., Sistema Design Milano, Abitare Se gesta, 1999, Milano and Simonelli Giuliano, Paola Bertola, Sangiorgi Daniela, Milano distretto del design, un sistema di luoghi, attori e relazioni al servizio dell'innovazione, Il Sole 24Ore, Milano, 2002.

5 A network of research agencies for innovation and promotion in the design field, 8 centres inside universities spread out on all the Italian territory (Milano, Firenze, Roma, Chieti, Genova, Palermo, Napoli 1 e la Seconda Università di Napoli) in which small groups of researchers are fully active in promoting innovative research and education in the design field. - www.sistemadesignitalia.it.

6 "Technologies designed with user needs and local conditions as starting points would be quite different from those developed from above" (D. Raghunandan 2002).

7 "Ask the right question to those concerned so that they become freshly involved and seek a solution themselves." (Eames 1958).

8 Zurlo Francesco, Simonelli Giuliano "La ricerca Me.design. Valorizzare le risorse dell'area del mediterraneo: quale ruolo per il design?", in Designing Designers 2004, POLI.design, Milano, March 2004.

9 As said by an Argentinean writer and stated by Gui Bonsiepe in an interview, "The centre knows nothing about the periphery, and the periphery does not know anything about itself." A participative approach can, in these specific cases, be absolutely necessary to find solutions to a territories fault of innovation.

10 "The present imperative is: export or die." Gui Bonsiepe, "Peripheral Vision," Escola Superior de Desenho Industrial (ESDI) Brazil, 2004.

11 For those who live in a certain context its identity is transparent. Usually those who live a certain identity cannot see it. The identity must be defined by an observer, usually external, through linguistic distinctions (Bonsiepe 1995). Taken from: Zurlo Francesco, "Design Capabilities per le istituzioni socialmente capaci," in "Medesign_forme del Mediterraneo," Alinea Editrice, Firenze, 2004, pp. 81-87.

12 "Design problems will only be resolved in the local context and not by outsiders coming in for a stop-over visit. This typifies one of the great disadvantages of short-term consultancy jobs, with people flying-in from the central countries with very little knowledge about the local context and believing that issues can be resolved by remote control" (Bonsiepe).

13 The Product System is the integration of product, distribution, services and communication.

14 For a more detailed description see: Simonelli Giuliano, Bertola Paola, Sangiorgi Daniela, Milano distretto del design, un sistema di luoghi, attori e relazioni al servizio dell'innovazione, Il Sole 24Ore, Milano, 2002 or AA.VV., Sistema Design Milano, Abitare Segesta, Milano, 1999.

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Foundation Courses for Communication Design

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This research would contribute to evidence the multiplicity of different approaches in teaching Communication Design for first year courses. It starts from the premise that there could be a direct link among the discipline of Communication Design, the teaching and learning theory and the contexts of learning. The research, developed through an empirical work, takes into consideration three purposes:

(1) the construction of a local interpretative model, capable of systematising and structuring different connections and specificity of the Communication Design Education (analysis of methods in the context of first year Laboratories of Visual Communication at the Politecnico di Milano); (2) the confrontation of these methods in a global context (the most important Design Schools in Italy, Europe and Australia); (3) the development of a set of conceptual devices (web site, mapping on line…) that could help teachers to approach the complexity of the teaching system.

Operatively, the research aimed to collecting some interesting examples of best works from graphic design students (of foundation courses in Communication Design) around the world, through the analysis of contents, themes, tools and methodologies and using them as cultural prototypes and initiative promoters for the generation of a new culture and a new teaching method. Beside the operative side of the research, they are developing a conceptual framework, based on many interdisciplinary contributions, coming in particular from basic design, semiotic approach, project culture, psychology, perceptive laws, history of art, in attempt to bring out and integrate theoretical approaches into design practice and education. The main objective of the research is to understand propaedeutical methodologies to teach Visual Design and how to spread the best practices already existent but not yet visible.

Keywords: *communication design, foundation courses, output, models*

1 Introduction

The future of Design Education, notably in the context of Foundation Courses in Communication Design is a question that is shared by many universities and private schools all over the world. The debate is strictly connected with paradigmatic changes that characterise the discipline, technologies and the profession.

Facoltà del Design of Politecnico di Milano has a research unit named "d.com" for Communication Design where OdCV has been started. OdCV is an Observatory for Visual Communication Didactic

with the main goal of monitoring didactic outcomes from different contexts of learning. The work tends to realize a network among schools and institutions for Communication Design. The investigation presented here places itself in this research scenario. It is a research project with the main goal of mapping different didactic realities to create instruments of observation and consultation of informations: *mapping on line*, a web site (www.indaco.polimi.it/dcom). It starts from the premise that there could be a direct link among the disciplines of Communication Design, the teaching and the learning theory, and the contexts of learning. The research, developed through an empirical work, takes into consideration three purposes:

1. The construction of a local interpretative model, capable of systematising and structuring different connections and specificity of the Communication Design Education;
2. The comparison of these methods in a global context (the most important design schools in Italy, Europe and Australia);
3. The development of a set of conceptual devices (web site[1] , mapping on line…) that could help teachers to approach the complexity of the teaching system.

According to a historical perspective, there are some precedents inside visual culture and design for communication teaching in Italy. Initially, didactic programs were structured within the faculty of Architecture or private institutions in the wake of modernist tradition from Bauhaus. Between the 60s and 70s, education was about developing skills, acquiring knowledge and remembering techniques; the needs of profession and the practice of design prevailed upon theoretical aspects. The most representative graphic designers and educators of this period were Albe Steiner (in 1959 became the director of Scuola del Libro of Milan), Bruno Munari (Design e Comunicazione Visiva, Bari, Laterza, 1968), and Nino di Salvatore (in 1954 founded the Scuola Politecnica di Design of Milan). They conceived didactic as a professional pedagogy through practice and experimentation of colours, forms, materials, and techniques.

This approach was later integrated with programs and methodologies from Hochschule für Gestaltung of Ulm.[2] Scientific operationalism from HfG of Ulm was the datum point inside educational philosophy: "As a consequence the artistic dimension of the original curriculum became less and less important, whereas its scientific content was increased and emphasised, especially with contributions from the human and social sciences." (Alain Findeli, Rethinking Design Education for 21st century, Design Issues, volume 17, n.1, Winter 2001). The Faculty of Architecture, ISIA (Isituto Superiore di Industrie Artistiche, Monza), CFP Bauer, Scuola Politecnica di Design were in the decade from 1970 to 1980 the most important centres of diffusion of Basic Design and visual culture in Milan, that soon became the core of visual culture in Italy.[3]

In 1993 the degree course in Industrial Design was founded inside the Faculty of Architecture of Politecnico di Milano, while the Facoltà del Design was born in 2000. The degree courses were based on a multi-subject Foundation course common to all the areas of study with the following programs: Product, Communication, Interior, Fashion, and Ergonomics. Teachers were enrolled prevalently from the professional world and questions around education, programs, and methodologies became more complex. The number of students in Communication Design area increased considerably, the degree in Communication Design beside the Facoltà del Design of Politecnico of Milan became a necessity and it was founded officially last year.

Thereafter the expansion of the range of technical possibilities offered by new media increased the complexity of the discipline. As Lorrain Wild asserts, "The new media began to reverse the process that has led to the specialisation of graphic design out of a field of general design practice."[4] Priorities in education shifted away from the focus on perfection of craft, or from the fusion of art, technology and science predicated by the Bauhaus, the New Bauhaus in Chicago and the Hochschule für Gestaltung in Ulm.

Inside education in Communication Design "the balance between 'generalisation and specialisation' was thrown out whack by the overwhelming problems of digital competence, and the conviction that to

master the new tools was the most critical thing a student could do. […] We have to completely rethink the problem of design curricula, and the balance between the conceptual work and form-giving."[5]

Design education, as a subject, seems to offer something unique, a tool for creating connections between ideas, informations, people and objects and, according to Buchanan, "it integrates and connects knowledge in new and useful ways."

2 Experimental

The investigation presented here, in progress with the existing work of OdCV from Unit of Research d.com, could contribute to the understanding of multiple aspects and approaches of Communication Design didactics for the first year courses of undergraduate degree. *What do we teach in the realm of Communication Design? How do we teach? What is the output* of education in the field of Communication Design? And *where do we teach*? These are the main questions of our investigation through the transforming nature of the discipline. According to John Biggs' theories, "Teachers, teaching developers and administrators need to immerse themselves in the 'scholarship of teaching'." We have to consider not only the content of a discipline but also to think upon the knowledge of how the subject the teacher professes is best learned and taught. It is important for us to reflect upon the "3P model of teaching and learning" described by John Biggs[6] . (Figure 1)

We chose to develop our investigation exploring didactic field through phenomenology as a distinct qualitative research method. Research activity was built through a dualist approach: first of all through the examination of student works of first year courses of undergraduate degree, (the exploration of extant objects and ways of doing artefacts); second through the direct dialogue with teachers to understand their personal approaches to teaching Communication Design.

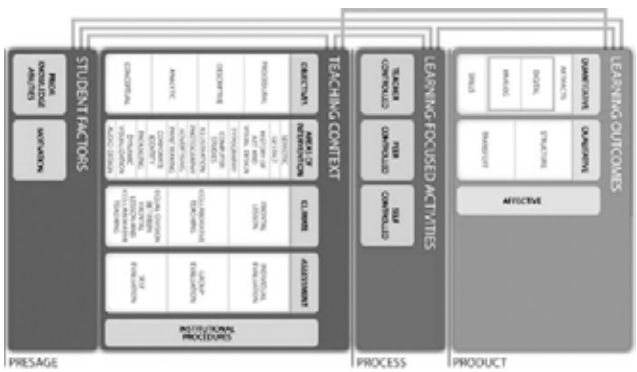

Figure 1. Learning system from 3P model of John Biggs

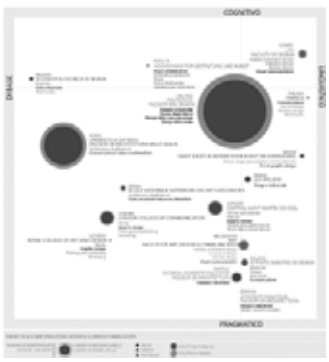
Figure 2. Contexts of research

The empirical work was carried out in different geographical contexts of teaching and learning: local (Facoltà del Design, Milan), national (Faculties of Architecture and Design, private institutions in Italy), and international (European and Australian Schools and Universities). (Figure 2) Interviews and questionnaires were conducted with 70 teachers from Communication Design departments or more in general from Faculties of Design. The interviews were structured and consisted of questions designed to encourage the respondent to talk about their experience of teaching and their conception of Communication Design. Artefacts collected here are not only the concrete examples of the actual teaching trends but they do outline how Communication Design is nowadays conceived by teachers and how it is translated by students of first year courses.

3 Results

The study has generated the panorama of Communication Design didactic at three different levels: *local* (Facoltà del Design), *national* (the most important schools and universities for Communication Design in Italy), and *international* (some of the best schools and universities in Europe and one in Australia).

The aim of phenomenological research was to develop categories of description, which illustrate the limited number of qualitatively different ways of experiencing a phenomenon. Bibliographical information was collected for upcoming general database around Communication Design for first year Communication Design courses. Student outputs represent the visual synthesis and material expression of the system. Every artefact was catalogued typologically (icon, symbol, sign) and categorised according to areas of intervention, themes, formats, techniques of realisation (analogical/digital).

We developed a conceptual and analytical grid based on four categories, starting from the theories on teaching and learning system, strengthened by the whole of artefacts collected and catalogued in terms of tradition and innovation. The models could be exemplified as follows:

1 **Pragmatic:** It regards structural elements of graphic design project from a professional point of view (grid, typographic pagination, visual hierarchy, formats, etc). Its goal is to develop practical skills, and the management of technical and practical aspects of graphic project. It is a 'project based' approach rather than 'subject based' one: students learn by doing (see Figure 3).

Figure 3. Artifacts from Laboratories of Visual Communication from: (from left to right) Naples (Facoltá di Architettura Luigi Vanvitelli, Corso di laurea in Disegno Industriale, Prof. D.Piscitelli), Rome (Facoltà di Architettura Valle Giulia, Corso di laurea in Grafica e Progettazione Multimediale, Prof. F.Guida), and London CSM School of Art and Design

Figure 4. Artifacts from: (from left to right) Laboratories of Visual communication of the Facoltà del Design of Politecnico di Milano (Prof. A. Marcolli), Les Ateliers (Prof.F.Drajer), and from Facoltà del Design of Politecnico di Milano (Prof.S.Ciotola)

2 **Basic:** It is strictly connected to Basic Design and it makes a synthesis of perceptive and formal components of the project. "This approach has many assumptions in common with those of modernism in the visual arts, in particular, a drive to articulate a set of universals that would always hold true within formal, visual expressions.[…] The systematic approach was premised on the belief that a formal system of rules for effective design could transcend historical circumstances."[7] Its main goal is the acknowledgment of fundamental rules and basic elements of perception (See Figure 4).

Figure 4. Artifacts from: (from left to right) Laboratories of Visual communication of the Facoltà del Design of Politecnico di Milano (Prof. A. Marcolli), Les Ateliers (Prof.F.Drajer), and from Facoltà del Design of Politecnico di Milano (Prof.S.Ciotola)

3 **Linguistic:** It starts from the importance of semiotics in the ambit of visual arts. This approach conceives every available artefact (visual, aural, material etc.) as a 'text'. The linguistic paradigm is projected onto the communication design project: a systematic analysis of the basic figures of rhetoric and of the visual syntax is the main goal of the model, finalised to the development of critical-analytical abilities (classification, systematisation of images) and argumentative (narration with images) (See Figure 5).

Figure5. Artifacts from: (from left to right) Laboratories of Visual communication of the Facoltà del Design of Politecnico di Milano (Prof. A.Veca), (Prof.V.Bucchetti), (Prof.V.Bucchetti)

4 **Cognitive:** It is hardly related to the thesis of "reflective practice" elaborated by Donald Schön. It is finalized to the development of critical capabilities of abstraction and conceptualisation through three steps: the preliminary examination of project goals, the documentation of learning phases, critical self-reflection. If 1,2,3 are connected directly or indirectly to "problem solving praxis", "cognitive" is connected to "problem finding praxis" (See Figure 6). The adherence to a model can be declared or indistinctive. Some courses can be placed between two categories or can bring elements of all the categories individualised up above.

Figure 6. Artifacts from UTS course in Visual Communication: Introduction toTypography (Prof. S.McLoughlin, Prof. L.McWhinnie)

Figure 7. (From left to right) Results from Les Ateliers ((Fokke Draaijer, Images: outils et pratiques, a.a.2003-2004), from HGK of Basel (Prof. W.Weingart) and from Typographic Laboratory of Les Ateliers (Prof. F. Draaijer)

Experimentation, as Tea Triggs wrote, "could represent a valid means of rational investigation, of taking risks and viewing those risks as crucial to development of the overall design process.[…] The experiment extends the work beyond the limits of 'newness' and plays it out into the territory of the unknown." We assert that experimentation characterises the four models of Communication Design didactics already described. The goal of experimentation is to generate "new ways of seeing", "new ways of reading" or "new ways of approaching the project of Communication Design".

Inside a course of Les Ateliers (Fokke Draaijer, Images: outils et pratiques, a.a.2003-2004) experimentation is expressed by a research through materials and visual languages. In the ambit of Typography didactics, the most important representative experimenter is Wolfang Weingart from Basel School of Design: his method of teaching is developed without the support of technology; students experiment manually type and letterspacing as far as the limits of readability. The Dutch graphic designer Fokke Draaijer beside the Typographic Laboratory of Les Ateliers (Paris), works with the expressive power of letters, manipulating and constructing 3D renderings, to reveal the "dynamic aspects of the letter form" (See Figure 7).

A sort of experimentation in terms of editorial formats is represented by the laboratory of Anna Steiner (Faculty of Design, Milan a.a.2003-2004). Another example is represented by a work (a visual diary) from Central Saint Martin School of Art and Design (a.a.2003-2004).

Figure 8. (from left to right): Results from the Laboratory of Visual Communication of the Facoltà del Design, Politecnico di Milano (Prof. A. Steiner), an artifact from CSM (London) and 3D experimentation from the Facoltà del Design (Prof. G.Illiprandi)

In connection with "3D experimentation" we mention the output from a laboratory of Visual Communication from the Facoltà del Design of Milan: the first one (a.a.2002-2003, Prof. Illiprandi) belongs to the interior area of research, (here Communication Design is intended as a visual support to architecture; students were invited to develop 3D models of habitable spaces). (See Figure 8)

Another area of experimentation is related to time-based digital media; if initially Foundation Courses were concentrated exclusively on the visual aspect in two and three dimension, "today they would be expanded to include the audio dimension (sound design) as well as the combination of image and sound in the phenomenon of interaction - in other words, the new design parameters and subject matter with which audio-visual studies deals the analytical level." (Gui Bonsiepe, The relevance of the Ulm School of Design today, in *Ulmer modelle*, a cura di Hatje Cantz, Ulmer Museum, Hfg-Archiv, Ulm, 2003). We report a Laboratory of Visual Design beside the Facoltà del Design of Milan, (Prof. Baule): it works in this direction, belonging to basic model, develops in the field of animation design with integration of sound and interactivity.

Inside first year courses of School of Art and Design from Basel, Communication Design is expressed "beyond the traditional design area of static communication products."

Interaction Design is entirely integrated in the Department of Visual Communication, and as Michael Renner (Head of the Department of Visual Communication) asserts: "The basis for an innovative form of interaction design is the communication of the designer with the computer through a computer language. Next to the creative, conceptual, and planning ability, the understanding for the functioning of the medium is a central factor for innovative developments in the area of interaction design and for the development of an appropriate aesthetic of the medium." (See Figure 9)

Figure 9. (From left to right): Results from the Laboratory of the Facoltà del Design (Prof.G.Baule), and from an exercise of interaction design of HGK of Basel (Prof. M.Renner)

Discussion

This study forms a theoretical perspective across three main ambits of research: generic studies around concepts of student learning (Biggs, Trigwell, Prosser…), the research in creative subjects (Reid & Davies, CTLAD, London) and Design Theory (Owen, Friedman, Buchanan). We could agree that the changes in the didactic for Communication Design are direct consequences of fundamental changes in the nature of the discipline, but also depend on how the process of teaching is conceived.

We require "an elementary consensus concerning the nature of communication design under the new cultural and technological conditions"[8], but also need an agreement about what the curricula might address and about what the goals or aims of teaching are. As Allan Davies (Center of Teaching and Learning in Art & Design, London) says: "Learning activity, when focused entirely on developing skills, cannot be seen as sufficient for enabling students to develop more sophisticated conceptual frameworks."

Conclusion

This research could have a 'documentary,' 'theoretic' and 'pragmatic' valence: 'documentary' because the analysis and the recording of didactic methodologies for Communication Design give a possibility of mapping a complex system, outlining particularities, signalising variables and recursions, confronting common and experimental approaches; 'theoretical' as far as our research represents a reflection on questions about Communication Design as a discipline, an analysis of its components, the comparison between implicit and explicit knowledge, and a sort of summary of different didactic contexts; 'pragmatic' in connection with our "research in action" that could produce a suggestion to a shared methodology of teaching and new didactic instruments. We don't want to give rules or fix a single method for teaching Communication Design; on the contrary we would like to explicit different kinds of methodological proposals, systematised and analysed in conformity with a common direction.

Our study about Communication Design didactics for first year of undergraduate degree could represent a general guideline of different orientations in a highly complex system; it could make simplifications, but it could contribute to the identification of "new practicable ways" for teaching Communication Design.

Notes

1 The web site in progress (www.indaco.polimi.it/dcom) could represent a first result of our program of research.

2 Basic Design was imported in Italy by a group of teachers – Giovanni Anceschi, Attilio Marcolli, Tomàs Maldonado; they generated a more critical conception of Graphic Design: theory of Gestalt, theory of Form and Colour brought new life into the discipline and didactic.

3 Other important schools, universities and private institutions were in Naples, Urbino, Rome, and Venice.

4 Wild Lorraine, "That was then, and this is now: but what is next?", in A.A. V.V. Looking Closer Four, NY: Allworth Press, 2002.

5 Ibidem.

6 Biggs, John. Teaching for Quality Learning at University. Buckingham, SRHE and Open University Press, 2003.

7 Drucker, Johanna. "The critical languages of graphic design", in A.A. V.V. Looking Closer Four. NY: Allworth Press, 2002.

8 Boekraad Hugues. 'Principles for Design Education', in A.A.V.V., Copy Proof, a new Method for Design Education. Breda: St.Joost Academy, 2000.

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Colour – A Programmatic Factor

Colour Competence in the Design Process through Consideration at Multidisciplinary Levels

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It is said that the 21st century will be the century of colour.

The results of design work have a global impact which is becoming greater all the time. Colours convey cultural information, influence activities, procedures, shapes, and the way we feel. In the design training given in all fields of design, an intense preoccupation with the antidisciplinary phenomenon of colour is becoming increasingly important.

Colour embraces all areas of the visual fields of perception, and today more than ever, allows us to communicate without words. Technology now gives design the freedom to do practically whatever it likes. The dependency of the effect of colour on its context can however lead to contradictory interpretations and phenomena. To deal competently with colour as an element of design, people must have broadbased knowledge, experience and sensibility. Existing two dimensional theories of colour allow the observer to experience the perception of contrast on a flat surface.

In a research project at Fachhochschule Hannover, a didactic model developed by the author allows the effect of colour and material on three dimensional objects to be investigated, contributing towards increased sensibility and sovereignty in handling colour as a crucial means of communication and design in two and three dimensions.

Keywords: *design case studies, visual design research*

Introduction

It is said that the 21st century will be the century of colour[1] . We are also happy to endorse this thesis. As never before in the past, today's technical possibilities allow colours to be precisely used in all areas of life. Whether in foods, skin colour, rooms, buildings, graphics or objects of all shapes and sizes, colour can be used in their design. Designers hold a great burden of responsibility in this

context because colours affect us psychologically and physically, and are responsible for either a positive or a negative orientation.

To harness these chances and opportunities with the proper degree of sensibility requires designers to look in greater depth than before at the complex phenomena of perception – and not only in the usual two-dimensional context, but also in product design. It is important that designers are made much more aware of this aspect to ensure that colour is used responsibly in our physical environment. The skilled use of colour as a design element demands broad-based knowledge, experience and sensibility.

The Phenomenon of Perception

The eyes, the sense of seeing, have becoming particularly highly developed in humans because of our evolutionary past (the need to survive in an arboreal environment). In addition to the ability to differentiate between dark and light, the quality of this sensory world also endows us with a highly developed sense of colour.

We are able to distinguish colours in a highly differentiated way. It is estimated that between 20,000 and 500,000 colours can be recognised. The latest studies indicate that people can distinguish approx. 100,000 colours under laboratory conditions. Some tapestries have 35,000 colours. 40,000 colour nuances were found in the Vatican mosaic workshop. However, today's colour systems only have approx. 2000 colours even though computers can display 16 million colours. Have we become colour desensitised?

Generally, the recognition of shapes depends on the perception of contours, which are made visible on surfaces by differences in colour. This enables us to classify objects such as the fly agric toadstool. This ability to differentiate is a fine instrument for orchestrating our communications. People perceive stimuli via the different organs in their bodies – skin, nose, ears, eyes – and orientate themselves using these senses.

However, instead of simply registering this sensual data, we interpret this information in different ways depending on the surroundings, the actual situation, and using all of our experience. We, therefore, automatically classify our impressions as SYMBOLS according to standard cultural norms and conventions. We communicate with these symbols, produce them, and are oriented by them:

"If you ask me which colour the book has, I would answer: it is red. Why is it red, you ask. I cannot say why. I just look at it and say it is red." (Ludwig Wittgenstein)

Beauty is, therefore, in the eyes of the beholder. Everyone is almost certainly aware how this saying applies to the world of colour, because in the case of colours – the coloured nature of all of the objects in our environment – we are literally dealing with an illusion generated by our brains. The objects themselves have no colours; colours are only created by the process of seeing. Philippe Lanthony (a Parisian ophthalmologist) called colour vision "a sensation in the brain of the observer, one could call it a language of communication without words". This non-verbal communication is growing increasingly in importance in our globalised world.

We can assume that approx. 80 % of our perception is vision-based. In other words, we perceive our environment through the differences between light and dark and coloured surfaces that create an impression of the objects we are looking at. We would become disoriented without the ability to perceive colour.

Artists, philosophers, doctors, psychologists, physicists, and many more, have attempted to explain the phenomenon of colour for thousands of years. Hundreds and even thousands of models have been created to explain this phenomenon in the search for the ultimate truth – although admittedly, a very flexible partial truth.

Changing the angle of the approach quickly produces contradictory results. One can, therefore, say that colour is not only an interdisciplinary phenomenon; it is also anti-disciplinary.

Because of this scientific fuzziness in the analysis of colour in a world where we are looking for ultimate truths, colour is happily pushed to the side as a subjective secondary issue.

In a world of extremely fast technological development, this is a catastrophe for the design of our environment. This lack of understanding results in an imprecise and spontaneous use of the non-verbal, communicative medium of colour. On the other hand, the technical possibilities enable us to have a very strong influence on people by way of such things as coloured products and spaces.

Truths

This phenomenon is rarely accorded the importance it deserves during training and education. Basic skills are communicated when it comes to the two-dimensional level, but there is a lack of training models that incorporate teaching the skills of three-dimensional chromatics. Countless chromatic theories have been produced since civilisation began. If we take a brief look now at the history of chromatics, we immediately sense the different approaches.

This phenomenon was already looked at by the philosophers of the ancient world. And all the way up to the present day, scientists, psychologists, philosophers and theologians, have looked for models that capture the world of colours and create a coherent and logical system of classification.

You will not find any answers here, but it is interesting and important that each of these chromatic theories is intrinsically logical. The fascination lies in the "beauty" of each chromatic system looked at from today's point of view, e.g. to consider the appearance and to analyse it again with new eyes.

There is a wide range of different objectives behind these observations: Philosophers like Aristotle, Empedocles, Democritus and Plato sought aesthetic and philosophical concepts of how the world was structured. The classical ideas of chromatics still formed the basis for the theories of authors in the middle ages. Tracts on technical painting theory were produced side-by-side with theological speculations and often unpublicised scientific intentions.

The development of an independent colour aesthetic was begun by artists in Europe in the 15th century who also analysed the practical side of the use of colours in painting. The isolation of colour typical of the Medieval period was supplanted. The question of relationships between colours stepped into the spotlight. Leonardo da Vinci's writings on colour (produced between 1505 and 1515) are characterised by their depth and the immediacy of their observations of the natural world. Thanks to his comprehensive analysis, Leonardo was emulated by many other artists. The harmonious coloration based on natural observations, the bright, light-filled atmospheres, and the wonderful impression of depth in his pictures impressed generations of painters, from Raphael to Titian, from Rembrandt to Delacroix. The scientific study of chromatics and the artistic theory of colour went their separate ways in the 17th century. In the Age of Enlightenment in the 18th century, the theories of colour aesthetics put forward by artists also reflected the knowledge gained from the study of physics. In 1704, Newton published his revolutionary work "Optics" on the spectral basis for the composition of light. Goethe's theory of colour was also derived from the study of Newton's chromatic theory, which he criticised much too severely from today's point of view in a "polemic chapter". This dispute reflected Goethe's understanding of nature: in his view of the world, light was something that could not be broken down, it was a whole, a force which flooded everything in the organic world. However, colours arise from the conflict between light and dark, and always when light is diffracted by an "opaque medium" such as a prism or the drops of water in a rainbow. Goethe had the intention of using purely phenomenological means to explain the "sensual-ethical effect" of individual colours on the eye and the "emotions" of the observer by considering the edge spectra of his own practice boards. Unlike Goethe who considered the key role to be played by the observing subject, Newton's influence proved the test of time because of his assumption that objectivity was the prime factor – which assured him the backing of the physicists.

The idea that poles can only be bridged by ideas has only very recently come to the fore, but no one knows how this type of complexity functions. The monumental work by Chevreul "De la Loi du

contraste simultané des couleurs" was published in 1839 (the Law of the Simultaneous Contrast of Colours; Paris 1839).

This was the work of the chemist and director of a dye factory who was dissatisfied with the results of his dye works. He simultaneously attempted to produce a systematic colour aesthetic. The aim of the system was to discover the laws governing colour contrasts.

Another scientific theory of chromatics which had a major influence on artists was the "Chromatic theory with respect to art and the art world" published in 1874 by Wilhelm von Bezold. This was based on the findings of Chevreul, Maxwell and Helmholz who also incorporated physiological and psychological factors. Because of this practical approach, his chromatic theory occupies a dominant position and was a vital platform for the chromatic investigations of Hoelzel and Itten.

Hoelzel's theory proposes seven colour contrasts. He is therefore the discoverer of contrast theory which gained broad acceptance in art pedagogics via the work of Itten. The chromatic theory of Ostwald, who won a Nobel Prize for chemistry, attempted to incorporate all colours in a numerical system. Kandinsky taught an elementary colour and form course at the Bauhaus and placed chromatic theory in a position of prominence in his teachings. He was supported here by Paul Klee whose own chromatic theory is certainly one of the most interesting creations amongst artistic chromatic theories.

The rationalisation of colour certainly reached a peak at Bauhaus, and this was also mainly pursued after 1945 by abstract artists such as Max Bill, Gerhard Lohse, and Gerter, who sought laws governing colours which would give their pictures the greatest possible degree of intensity and expressive power. But the gap between artistic vision and a scientific knowledge of chromatics was now almost irreconcilable. Whilst the physical chromatic theories of Küppers (1972) and Gerritsen (1972) placed a great deal of significance on the logical explanation of all of the optically measurable relationships of colour, the artists focused more and more on the intuitive and spontaneous application of colour. It is perhaps precisely this short-lived and irrational attraction of colour that stimulated artists and scientists throughout history to force colour into a rational corset from which it all too easily escapes. Not "either... or" but "not only... but also"!

We all know the problem of defining colour in the digital process chain. CIElab models etc. established the beginning of obligatory colour-metric definitions. Chromatic theories are fascinating because they attempt to establish a means of orientation within a field of very complex phenomena. There is an enormous desire to clarify relationships – especially when the possibilities know no bounds. Chromatic theories are, therefore, a means of gaining an insight into this complex field.

They enable us to participate, i.e. become involved, to understand – even partial truths. However, when seen in a different light or from a different angle, some theories begin to look very fragile. More than 200 chromatic theories have been developed within the last 200 years, and all sought the ultimate truth. The fame of a chromatic theory does not necessarily equate with its logicality because the degree of acceptance achieved by any chromatic theory also depends on the size of its following.

Graphic design, and also product design in part, make use of some models. But classifications of this type are not enough. In recent years, there has been an enormous increase in the importance of the marketing aspect of colour. There is a desire to use the psychological effects of colours according to the target groups to achieve product differentiation and to establish brands – people are analysed and influenced as "manipulatable" beings.

But training here often ignores regional, religious and cultural interpretations. The psychological modus operandi, the symbolism, as well as the physical impact need to be looked at. It is, therefore, necessary for designers to develop sensibility towards all these aspects!

Why? Because we can use colours to manipulate, heal and harm. This requires the development of appropriate training models!

Training concepts

An attempt has begun to give students of product design at Fachhochschule Hannover a sense of orientation in this regard. Orientation means finding an independent means and becoming involved. This demands the acquisition of a certain amount of knowledge:

In detail, design-specific fundamentals are communicated in the following theoretical areas.

Colour:

- Physical perception of light
- Physiological basis of colour vision
- Psychological effect of colours
- Subjectivity and objectivity
- Colour models and chromatic theories – fascinating partial truths
- Colour in religion and culture
- The properties of colour
- Recognising effects, illusions, associations
- Classifying phenomena
- Context and relativity
- Transparency, reflection, mirroring, appearance and disappearance of colours
- Colour and function (technology, marketing, use, materials, politics.)

The dependence of colour on context is the most important insight to be communicated to the students. The way colour arises and the effect of this colour is always dependent on other stimuli and processes.

In a similar way to numbers, different colours within an ensemble owe their value to their separate positions – their weight, quantity and quality correspond to the place and the space.

1/0/0 only makes sense because of our knowledge of the 100 position. 001 is a completely different animal. However, in the world of colour, perception, awareness and expressive force are much stronger. For us designers, this is the major fascination as well as the major problem. In everything that we do, our aim is to influence the perception of the observers and the users.

And time and space here can destroy all we have attempted to achieve. An illuminated illustration loses its intensity in the evening twilight, the deep-black velvet turns dull grey in reflected light, the machine tool turns a different colour when the factory is painted differently or there is a change of lighting – light, shade, space, and materials change the effect of colours. The wrong background can make cool colours appear warm and vice versa...

But every theory is worthless if it cannot be put to practical use. An important aspect of training is therefore carrying out investigations and exercises in raising awareness in the following areas:

- Surfaces, body/space
- Light/shade,
- Colour changes / reflections / transparency
- Materials and textures
- Illusions: form, weight, quality
- Colour in nature
- Colour in technology.

The work of minimalist Donald Judd shows in a fascinating way how designers can handle colour, three-dimensional objects and space. His works show in an exemplary way the power of colour with respect to the change of shape and material, highlight the possibilities opened up by reflection, and emphasise the relationship between space and colour.

He writes: "All experience is knowledge: subjective experience is knowledge; objective experience, i.e. science, is obviously knowledge. Colour is knowledge. As Albers says, it is very subjective and it

is also very difficult to remember it. Colour is also objective." Such as simultaneous contrast, for example. "Even if one admits that everything human is subjective, this is objective. Colour as knowledge is highly permanent."[2]

"In art, there is a history of colour. Every second generation produced a new theory of colour. But today's generation is without ideas. Today, space and colour share the fate of being completely ignored."[3]

Opportunities

The desire to produce perfect designs, the dream of unmanipulatable colour, has given rise to new designs. Previously, it was light which illuminated colours, material colours and surfaces: the change from night to day, a mixture of daylight and artificial light, changed the perception of colours, just as darkness does. It dulls all colours: in Germany we say that at night all cats are grey. So what could be better than a poacher turned gamekeeper. We have turned light into the colour. Architects and designers have discovered coloured light in recent years. Artificial spaces with ideal conditions for artificial light create perfect venues for colours or performances, just as is done on the stage.

Vital: Material / Technology

In past centuries, people used natural materials and colours. The possible range of colours was restricted later by industrialisation (examples: artificial fabrics, colours, durability, colour fastness...). Today, almost anything is possible: but the restrictions of early industrialisation and dogmatic chromatic theories means that there is now a problem in preserving the necessary sensibility required to handle colour. Colour never exists without structure and texture. The inaccuracy of digital design media (digital process chains only provide approximate colour values) also increases the level of tolerance of colour inaccuracies. This is a pity because the possibilities today are endless. Transparent materials, surfaces ranging from smooth to rough, colour changes, changing materials, materials which react to heat or other physical stimuli, are now all part of the design repertoire.

Only sensitive designers are able to make demands of the colour industry and material developers: for instance in the design of products in which functional changes in colour make operating instructions clearer.

If we realise that product design turns colours into symbols, into simple indicators of complex meanings, we need to focus a great deal more of our attention on these symbols, and not only in the sense of shape, technology, marketing or material.

Our world is a world of symbols. In the constant search for sense and meaning which affects our daily lives, symbolic character can be taken on by all things and events – not to mention our actions.

Requirements and Possibilities of Colour

Those working with colour as artists, art therapists, designers, etc. must know how colours work. Although everyone works with their colours individually, the effect should be universal.

If we assume that aptitude only accounts for one third of creativity, that is also involves environmental influences – which includes or should include universities – which nurture special aptitudes, and finally also involves knowledge of the creative field itself, it becomes clear that the winners will be those whose greater knowledge considerably increases the sensibility of their senses – what would a musician be without a sensibility for music?

Notes

1 Lanthony, P., >spezial< Farben, Spektrum der Wissenschaften, 4/2000, pages 6-8.

2 Elger, D. Donald, Judd Farbe, Judd: Einige Aspekte der Farbe im allgemeinen und Rot und Schwarz im besonderen (1993), Hatje Cantz Verlag Germany, 2000, page 99.

3 Elger, D. Donald, Judd Farbe, Judd: Einige Aspekte der Farbe im allgemeinen und Rot und Schwarz im besonderen (1993), Hatje Cantz Verlag Germany, 2000, page 93.

Learning From The Field

One of the major issues that face design education and practice today is striking a balance between global and local dimensions in the context of the dynamics and complexities of globalization. Not surprisingly, most of the papers presented at the DETM Conference dealt at length with the need to learn from the field and contextualize design education and practice.

Though there exists a strong Western orientation to design education, most Third World nations including India have had to reorient their approach to design education and practice to acknowledge the imperatives of traditional arts and crafts, vibrant local cultures and local sensitivities, socio-economic needs and environmental issues. There is an increasing acknowledgement of the need for design to contribute to the development needs of the Third World that is endowed with rich cultural traditions but beleaguered by pockets of abject poverty.

Design educator Maristela Mitsuko Ono of Federal Center of Technological Education, Brazil, calls for a cultural approach in design education and practice based on cultural diversity, and suggests that international students ought to develop a basic awareness of how cultural factors can influence the effectiveness of design. James Fathers urges designers to play a clear role in the crafts and artisan sector and empower design activity at the grassroots level. Ryan Fowler of University of Johannesburg, South Africa points out the fallacy of looking upon Western knowledge as superior to other indigenous knowledge traditions. In the same vein, design educator Ho Lai-Ching Helen stresses upon the need for designers to have an in-depth understanding and appreciation of the socio-cultural contexts because, "contexts matter and, more importantly, contexts differ."

The papers presented in this section largely acknowledge the need for design education and practice to take a closer look at the social, cultural and environmental dimensions of design practice and become socially responsive. As designer Arati Kawlra underscores in her paper, "the design profession is in overt recognition of the cultural, epistemological and ecological implications of its practice." As "Design for Society" emerges as the new mantra of design educators and practitioners across the globe, there is a refreshing shift from perceiving design as a mere provider of cutting edge to industrial technology, to design as a tool for socio-economic development.

Learning from the Potter

Jinan K B **Kumbham, Nilambur, India**

The author has spent the last 20 years or so trying to recover his authenticity with the help of rural tribal craft communities who are still outside the modern educational paradigm, in various parts of India. He has been also playing the role of designer/educationist to explore various possibilities for contemperorising their craft skills.

Site www.kumbham.org has the work done with a potter's community in Aruvacode, Nilambur, Kerala where he has been living for the past 11 years. He has evolved a method of working with culturally rooted people called 'Do nothing training method'.

This search has also prompted him to work with children who, till they get in to the education bandwagon, are authentic. His present preoccupation is to understand the process by which knowledge got textualized and thus created people who are alienated from themselves.

This could help us to prevent the digitization of knowledge being brought about by the digital culture, which is going to bring about much greater calamity. Modern man's alienation is a result of textualization of knowledge. It is imperative to reclaim senses and experience as the basis for existence.

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The modern educational process has ensured the colonization of our minds. The primordial gizmos that established our connectivity with the world around have been smoothened out in the process of education, as we know it today. The net result of this educational process has been that our culture and its inextricable characteristic, our sense of beauty has been colonized. While Jinan was in the process of developing exercises and activities to help children learn pottery, he was intrigued by the way with which the master potters arrive at form. He realized that there is biological assistance that guides our sense of beauty. People undefiled by modern ways are far more open and receptive to this biological guidance and seemed to act holistically endowing an aesthetic quality to their every act. If we consider knowledge to be a biological response to sustain life, then present level of estrangement between man and nature is unimaginable. Indigenous cultures have for generations honored nature's sanctity and their quest for knowledge was armoured with tools of intuition, sensitivity and creativity.

His interventions at initiating among the artisans proved beyond doubt that the trainer's interventions, if at all, need to be restricted to erecting a fence against outside influences that corrupt the genuine aesthetic sensibility and sense of perfection of the craftspeople. The Do Nothing method accepted the fact that each person is creative and intelligent and therefore the need is only to initiate a process by which the trainees get inspired to use their subdued potential.

This paper tries to trace a community's attempt at recapturing their craft traditions. Simultaneously it is also an account of the author's personal attempt to recover his authentic sense of beauty that he lost in the process of getting educated. It is in that sense also a sketchy documentation of the process of de-colonizing the self and an attempt in trying to evolve a new process of learning that is based on the senses and experience.

Keywords: *undefiled, authentic, de-colonizing, aesthetic quality, primordial gizmos,*

Introduction

Living traditions are not amenable to time divide. This notion is a construct of the co called 'modern mind' which claims for itself creativity and relegates tradition to a static state. Tradition has always counterpoised itself till the 'modern' education took control. The craft and designs of the rural artisan communities too cannot be classified into traditional or modern. The apt division would therefore be authentic and unauthentic designs. At another level, life sustaining and life destructive knowledge.

A close observation of the evolution of form — as in a potter shaping a pot on the wheel — among the rural artisan communities bears out the premise that their designs spring from a biological prompting. It is this biological prompting leading to products where beauty and utility coalesce wholesomely, that has been suppressed by the alienation that has befallen 'modern' practitioners and teachers of design.

Hence my proposition that rural artisan communities guided by 'undefiled' biological promptings are capable of and continue to contemporarise design to the requirements of the day. And design education today cannot but involve a process of detoxification of design principles, the pristine originals of which will have to be sought in the living traditions of rural artisan communities.

The modern educational process has ensured colonization and monoculturisation of our minds. The net result of this educational process has been that our culture — and its inextricable characteristic, our sense of beauty — has been colonized. In confronting this predicament, I decided to spend time with the rural tribal communities. Having escaped 'education' and 'development' I gathered that they would still be original and authentic people who are holding on to the culture and worldview, which sustained them for centuries. A learning journey that lasted several years found me interacting with the many artisan communities in Bengal, Orissa, Bihar and Tamil Nadu, practicing various crafts like pottery, brass, kantha embroidery, bamboo, stone, horn etc. While these interactions helped me distil myself in many ways, they also brought to light the umpteen hurdles that confront the artisans. From lack of availability of raw materials to the lack of demand for their products, one witnessed a pattern to the problems faced by the artisans. In the beginning it was only a material crisis but now with the 'do gooders' around their ability respond to these crisis has also been crippled.

I work amongst a community of traditional potters, considered as they are to be marginalized and impoverished. There was a time when the community flourished as they catered to markets for various artifacts made of terra cotta – from an array of kitchenwares to agricultural tools. These wares permeated life and living from birth to burial. The products touched all aspects of day-to-day life of common people in traditional societies and were an integral part of a rich culture.

You could well say that these potter communities then were rich – not financially, but were happy and contented. They felt wanted; they used their creativity and resourcefulness. They had enough and more to eat, and were well clothed. Now we have reached a day and age when our growing urban population no longer needs these traditional wares. Beautiful pottery wares have been replaced by cheap, ecologically insensitive mass-produced materials. The produce and the people have become poor and unwanted. These traditional, ecosystems people who truly reflect the ancient values and hoary cultural ethos of India have been marginalized.

What has led, over these last two centuries, to this sorry pass, to this unfortunate devaluation? Who in the real sense have become devalued and poor? Is it the marginal communities who are struggling to keep their culture alive, or the elite in the urbanized world, who have completely lost their self-esteem and culture?

Background of the Search

My journey into the world of the rural artisan communities was not with the intention of 'developing' them or educating them. I went to them to regain that which I had lost in the process of getting educated. To learn from them. Having escaped 'education' and 'development' they were still original and authentic and were holding on to the culture and world-view, which sustained them for centuries. I perceived the rural / tribal communities as being wise and evolved. And recognized that only by learning from them could we lead sustainable lives.

It was at the National Institute of Design, Ahmedabad, that I began my search into the issues on culture, aesthetic sense, creativity, conditioning etc. It provided the right opportunities to look deeper into the role culture, history, societal conditioning, innocence, spontaneity, etc. played in endowing creativity and a sense of aesthetics to individuals. The three years at the institute offered an intense period of self-exploration and lent some very basic insights into various dimensions of our cultural ethos. What came sharp in focus was the direct relationship that existed between colonized minds, cultural and spiritual alienation and formal schooling/education. At NID, the process of learning design is completely and clearly West-oriented. No wonder, when year after year students are subjected to a Western design process and learn design through Western history and Western sense

of aesthetics, generation after generation gets estranged from one's own history, culture and individual sense of beauty. This is true of all art, architecture and design institutions in this country. And undoubtedly, a conditioned sense of beauty then barely manages to gloss over a pathetic personality.

Working with Artisans

I had complete faith in the fact that working with the culturally rooted, rural and tribal artisans would be the best way to redeem the self. Working with and being part of the rural and tribal folks was the only way to de-colonize myself. I began working very closely with different artisan communities within the country. I started out first with the Ao-tribe of Mokukchung district of Nagaland and later interacted with many artisan communities in Bengal, Orissa, Bihar and Tamilnadu. I also experimented with diverse crafts like Pottery, Brass, Kantha Embroidery, Bamboo, Stone, Horn, etc.

While these interactions helped me distil myself in many ways, they also brought to light the umpteen hurdles that confront the artisans. From lack of availability of raw materials to the lack of demand for their products, there is a pattern to the problems faced by the artisans. These remain discernible problems and need direct solutions. Some problems or should I say consequences, are insidious in nature and spring from interventions that come in the guise of "helping" 'them' out. I view this as the uprooting of the rooted. 'Development' remains the mantra of the interventionist agencies and issues related to culture, lifestyle and ethos of artisan communities are given a complete go. The primary fallout of such approaches, be it by governmental or non-governmental agencies, undermines the confidence and self-esteem of the communities concerned. Certainly therefore, when I began working with the rural/tribal artisans, I was acutely sensitive of the intricacies involved in not letting their creative inheritance be disturbed. I made sure I assisted them in regaining and maintaining their dignity, distinctiveness and self-hood and all along hoped that they remain fastened to their culture.

With the Aruvacode Potters

All along while experimenting, learning and placing myself within different communities in different parts of the country, I had been leading a semi-nomadic life until I came to Kerala to work with the potter's community in Aruvacode, a tiny hamlet in Nilambur. My stay originally was supposed to be for six months. At the time Kerala to me was a far cry from my place of interest, as it seemed relinquished of almost all traditional craft and folk culture.

A news report on how the destiny of Aruvacode, from being a simple potter village had changed to becoming a hub of sex workers impelled me to proceed to Aruvacode. The reason for such a drastic transformation in the village was the rush of cheap substitutes of steel, aluminium and plastic products to pottery in the market. The rush had pushed the demand for earthenware off the edge and the artisans were left a troubled and distressed lot. Seized of their traditional labour, women of the village were forced into sex-work. Advent of consumerism had held out its stakes and the artisans failed to keep pace with the fancy needs of the new consumer. In earlier times the artisans had always responded excellently to the local needs of the people, as a strong cultural bond held the user and the producer in unison. But every nuance of modernity brought with it newer difficulties for the potters.

Growing up to the 'Do Nothing' Training Method

A fundamental premise of the training interventions at Aruvacode is the cultural, aesthetic and creative superiority of the trainees, compared to the 'developed' mainstream of Indian society. Thus the basic attempt at the training programmes is to help the individuals regain their wisdom and confidence, which lie embedded within their own communities and culture.

During the first training conducted in 1993, it was very difficult to convince the women about their abilities. The hangover of my NID days did not help matters either. Initially when training methods were introduced with a group of women, we began with drawing straight lines, circles, etc. in free

hand and moved on to exploring clay and making objects giving free vent to their imagination. But subsequent training programmes showed marked changes incorporating traditional aspects and leaving the NID baggage. I re-assessed my understanding of the indigenous/traditional process of transmitting skills more closely. As coincidence would have it, I came across during the period a potter girl in Mana Madurai scooping out in perfect circle the opening of a smokeless choola. I realized the futility of importing to the artisan milieu, training methods – drawing of lines, shapes, etc. – that suited urban alienated people.

And the latest of my interventions at initiating creativity among the potters' children proved beyond doubt that the trainer's interventions, if at all, in the natural learning processes need to be restricted to erecting a fence against outside influences that corrupt the genuine aesthetic sensibility and sense of perfection of the craftspeople. Through the series of efforts at recovering creativity, the realisation also dawned that what is actually happening in the name of teaching and training of rural and artisan communities is the corruption of their sense of knowing.

Design Process & Product Evolution

One of Kumbham's most significant feat has been in the region of design and product development. Ongoing efforts and experimentation that Kumbham has so far facilitated has helped introduce a range in product design that is extremely impressive. The product designs number to about 500. They include a vast range from household items to architectural and landscaping products, table accessories, and garden furniture and in fact a prototype of a complete living space. I wanted the aesthetic quality of whatever they made to be rooted in their own culture. I therefore limited my role to only incorporating utilitarian aspects into their creations. It was a slow process and the products that emerged were evolved at a natural pace.

The precursor to the first coil tile mural was a hemispherical shaped coiled plate, which was flattened and used as a wall hanging. This marked our first step towards developing coil tiles. The present red and black colored murals owe their origin to the double colored cut pottery, which I developed in 1991 while working with a potter community at Bagusala in Gajpathy District of Orissa. Our initial experiments with color were in simple geometrical shaped tiles, which were fired differently to get the red & black effect. Gradually as the potters gained experience the designs became more complete and varied. The tiles have come a long way and we have several new kinds both in terms of size and finish. The functional attributes too have become more encompassing so we have wall tiles, floor tiles, decorative tiles for borders, etc.

Professionals and Aesthetics

All through the late nineties I had been spending ample time with architects around the country, trying to get them to re-look at the potential of traditional craft skills in architecture. But the architects seemed unable to break free from their preconceived thought process and planning moulds. Over the years I have realized their approach to be typical - architects, designers, artists, in fact the entire range of professionals, churned out by our western oriented education system display a complete lack of appreciation of crafts as living traditions. Even when some of them liberally 'apply' craft in their works, what they seek is an ethnic feel that is mummified and museum curated or it is applied for damage control. To me this whole approach towards craft brought out the clear bankruptcy of education. The inadequacy of our architects and other professionals to appreciate and value craft is directly proportional to the inappropriateness of the western methodology followed in our educational institutions. The western model of design methodology is more of a 'factory process' and a factory process undoubtedly, entirely surpasses the craftspeople - their community, their knowledge systems, their culture. Even from a very practical sense, in a country like ours, such factory approach cannot provide solutions to problems related to livelihood of millions of people. What these interactions finally taught me was that it is necessary to intervene at several levels and effect attitudinal change in a host of players to safeguard the wealth of rural creativity.

Attempting a Curriculum for the Potters' Children

The need to evolve a curriculum for the children of the potter community had an element of urgency as the children were getting affected trying to conform to two paradoxical ways of life – one at home and the other at their schools. I have been closely studying the learning processes that take place within an artisan community. The ideal conditions of learning certainly no longer exist. The highly misplaced notion of admitting children to schools in order that *they learn and become something in life* is rendering them misfits within their own environment. Invariably they drop out at some point or the other, unable to cope with the elusive 'competitive' world outside. In the process, their instinctual skills in pottery get neglected at a crucial age and it becomes difficult to get them within the fold of their traditional work. The best way to overcome the situation is to create an enabling learning environment that will help them deal with modernity.

To preserve craft, it is important that the progeny is initiated into the craft as early as possible. There are three fundamental components in learning pottery as a craft – the physical *skills* involved, a keen *sense of beauty* and *creativity*. While the skills can be picked up from the experienced community hands, it is the latter two that need to be awakened gradually and naturally.

Skill: The intermediary processes involved in pottery are many. From identifying clay suited for earthenware, mixing it to get the right texture, using the wheel, making the kiln, arranging raw pottery in the kiln, etc. to ultimately firing the pieces. While for all these, the traditional methods are most appropriate and can be learnt from the master potter, the expertise in design development, packing, costing, marketing etc. is where outside inputs from people who are experienced in the various fields becomes crucial.

Initiating Creativity: In the true sense, initiating or inculcating creativity among any traditional artisan community is a misnomer. These communities were adept at product innovation and attunement of products to the needs of the user community. It is the uprooting of their customer populations from their cultural and aesthetic moorings and the consequent shift in their preferences that left the artisan communities bewildered. Suddenly they found themselves unable to respond to the fancy needs of the new and unknown customer with a pronounced proclivity to the artificial and the synthetic. A proud and creatively alive community became unsure of the usefulness of their craft and their creative abilities. Today therefore when we talk of initiating creativity among the artisan communities what we imply is rekindling of confidence in their own creative abilities. Similarly, making their craft contemporary does not and should not involve a break from their traditional creative moorings. On the contrary it should re-assert the strength and adeptness of their design and innovation capabilities to stand on its own against the glitter of modern kitsch. It is this resolute re-assertion of the inherent beauty of their creations even against the torrent of assembly line, mass produced, synthetic beauty that would lead to even the customers re assessing their choices and hopefully, re-discovering their lost sense of beauty.

Sense of Beauty: In a profound sense, it is a community's sense of beauty that delineates its culture. When a society or community loses its authentic sense of beauty or subjugates its sense of beauty to the corruption of alien influences, it loses its authentic culture. The most challenging aspect of 'craft education' (if such a term can be used) would be to reassert a community's authentic sense of beauty. In the Indian context it is all too evident that our sense of beauty and aesthetics has been distorted completely by colonial aesthetics and concepts of beauty. While this distortion is most pronounced among the educated, its reflection in the products churned out by craft assembly lines is all too evident. Thus it is imperative that the uncorrupted sense of beauty, which the rural artisan communities and tribals are still privy to, be resurrected and re asserted.

The Future of the Craft

While in traditional communities, the craft and all wisdom concerning the craft would get passed on to the next generation as a natural process, today a potter child learns his very own craft against

several odds. The pressures of formal schooling thrust upon him aspirations that are in least consonance with his very own roots. In the bargain the child garners disregard towards his traditional profession as well as the associated wisdom.

And the irony is that even while senior craftsmen voice their concerns regarding the uncertain future of their craft and also welcome attempts to prevent its alienation, they want their children to attain formal education and only then settle down to learn this craft. This is despite examples that abound of the children who pursued schooling to be fitting neither in their own milieu nor in the world outside. Surprisingly, many of the senior craftsmen learnt the craft at an early age, they did not choose it as a livelihood option. They spent a good number of their years in the unskilled labour market and tried earning their keep. Soon enough they realised the unsuitability of their pursuits and only then shifted their attention towards their traditional craft and it did offer them an independent and sustainable livelihood.

Paradigm Shift

Natural Learning Process

While I was in the process of developing exercises and activities to help children learn pottery, I was intrigued by the way with which the master potters arrive at a form. I wondered how the things they make could be so beautiful. I was keen to know what guides them to arrive at a particular form. Mulling over it for several days I realized that there is a biological assistance that guides our sense of beauty. People undefiled by modern ways are far more open and receptive to this biological guidance.

This internal capacity and the external natural systems collaborate in some manner to produce a distinct aesthetic quality to their lives. The rural, tribal or non-literate communities seem to act holistically endowing an aesthetic quality to their every act. What we understand as culture is a result of this collaboration. It is clear that in modernity this cultural distinction is totally absent. Therefore the modern artist, architect or a designer anywhere appears to be creating with a uniform and almost regimented aesthetic sense.

This insight opened up a complete new dimension in my search to understand the traditional and indigenous knowledge systems. In fact, delving a little further into the biological aspect of knowledge, I soon realized that all the games children play in the villages is a kind of a response to their biological needs. The idea of developing a curriculum for the children itself stood challenged. Children in natural learning cultures are similar to any newborn living being and nature has its own precious pace to make them grow.

Senses, therefore, play a very important role in the process of learning and are a sort of a reciprocal device that helps creation establish communion with the inner self. All the games children play in these communities have to do with sensitizing the senses, planning, balancing, guessing, developing the mathematical sense etc. This is the process of knowing the world. In the traditional societies every situation is a learning situation. Here to live means to learn. It was a rhythm followed from birth to death.

If we consider knowledge to be a biological response to sustain life, then the present level of estrangement between man and nature is unimaginable. How could knowledge and destruction go hand in hand to the extent that the very survival of the earth now edges on the brink of cessation? Knowledge, devoid of the biological content fostered the grounds for depredation. As I closely observe the primal ways of the indigenous people I find every connective tissue an extension of nature. Their dwellings, their artifacts all seem sprouted from the earth and are inspiringly concordant like the bird, the branch, the nest, and the twigs. It is imperative that we re-institute the traditional knowledge systems and restore the earth its pristinity.

The Critical Learnings

The most fundamental fallout of 'modernity' for us is that we have no words to talk about ourselves as all words have been appropriated and defined according to the notions of 'modernity'. So the need to redefine or look for meanings beyond the obvious becomes more and more necessary as we get jostled around with modernity pushing its way through all lanes and by-lanes.

Today in the computer age organisability and softwareability is becoming the criterion for the validity of what constitutes knowledge. There was a period in history when textualization of knowledge dictated and altered the notion of what constitutes knowledge. So in order to understand the experiential or intuitive cultures one needs to de-textualise and move out of the categories made by the text and subsequent Westernisation.

A notion that has firmly gained ground is that 'tradition' is static whereas 'modernity' is dynamic and vibrant – in fact creative. What is true is actually the opposite. Further, it is modernity that has brought us to a dismal standstill. Creativity within a modern setting just about manages to sell ideas or products. It barely can extend itself even to the fringes of true creativity. True creativity enfolds within itself the whole art of existence. Modernity on its part has dissolved creativity and transformed living beings into mere spectators. To see and experience life in its purest form means shedding every alien theory and rationale from one's psyche that obscures individual vision of life.

The maze of the modern educational system – a system that is merely an extension of the processes set in place by the colonizers of the past primarily to suit their needs, has continued its purpose even now, only serving a minority ruling class of the urban kind. To this day we have not bothered to create a single institution that attempts to explore the rich tapestry of our culture with regard and reverence for the values that these traditional ecosystems people have nourished. What exists as urban research looks at the lives of traditional communities as artefacts in a museum – with sympathy and condescension, not awe and respect and an attitude to learn.

What the marginal communities across India have lost is self-confidence. A mere two hundred years of the Macaulay process at schools have robbed the ruling elite of their understanding of the community dynamics that flourished for several centuries across India. It is this educated elite that has to do the unlearning that is required to renew our respect for these rich cultural offerings of traditional communities. This is an arduous, long process.

The potters in my village offer me a cheerful, dismissive smile when I tell them that it is I who is learning from them. It is far beyond belief for them. The paradigm shift is so complete, so far beyond recognition. All the notions that modern education gives us are devoid of meaning, and of respect for one's own cultural and personal bearing.

The urban all-devouring elite has arrogated to itself the power and ability to 'plan' for these communities. These diminishing tribes of traditional people are believed to be far from being able to plan. I have come to realize that we have planned our doom through a century of short sighted, self-centric planning. Those communities planned for eternity.

It is important to take stock of the results of both these learning processes. One which has sustained the mother earth for centuries, and the other which has just in about 500 years has destroyed it.

So what has been the learning process for the traditional communities? How did they sustain this earth for millennia, whereas the western, industrialised mayhem has brought the world to her knees in less than a century of callous, insensitive destruction? This disregard of life was unknown to traditional cultures, which, the world over had evolved lifestyles and knowledge systems over a few thousand years that sustained all life around them.

De-textualising Knowledge

An enquiry into man's alienation from knowledge:

The whole tragedy of modernity is a direct result of textualization of experience-fragmentation, alienation, boredom etc. With textualization of knowledge senses become the tools of the textualised mind and notions and belief replace knowledge. For true and authentic knowing to happen autonomy of sense becomes a must and text to become the tools to record experience.

In the digital age 'organisability' and 'softwareability' is becoming the criterion for what constitutes knowledge. With the change in what constitutes knowledge and how knowledge is accessed, the third cognitive shift is going to happen. There will be a total change in the paradigm. Many years ago a similar shift happened which went unnoticed. That was the shift from experiential paradigm to textual paradigm. Textualization of knowledge altered the notion of what constitutes knowledge.

Knowledge and the process of knowing has undergone three fundamental cognitive shifts depending on the process of creating knowledge. The knowledge in these three paradigms — experiential, textual and digital — are very different from each other even though for the people belonging to these respective paradigms their knowledge is very much real. And these are the three most basic worldviews. With each paradigm shift there is a re-organization as to what constitutes knowledge and hence experience itself is altered. This further leads to further cognitive shifts. Some experiential modes are dropped and new ones are added. When knowledge got textualised the feelings and emotions were dropped.

The present crisis in the West regarding feelings and emotion could be a result of textualization of their culture. The word intuition was out of use for many years and it came back few years ago when textual cultures started addressing its fragmentation, alienation and rootlessness. The overuse of reason and logic and the neglect of intuition is due to textualization of knowledge and by extension to the corresponding experiential mode it created. The textual experience is linear and fragmented which is the only way text can convey.

Imagination is a word overused by textual cultures as text demands imagination. Whereas in experiential cultures the reality is always present. At several levels one can see the fragmentation in textual cultures. The internal fragmentation has made us to fragment our perception and compartmentalize and reorder the world to suit our textual notions about life.

Textual experience being personal and independent of others separated the self from community. The individual and the ego must have begun at this point. The self is fragmented as male and female, as body and mind and as childhood, youth and old age. Spontaneous activities were broken up into planning and doing. Thus thought and action got fragmented beauty and ethics have been removed. Entertainment and boredom has become the new dichotomies. Boredom is also another of those qualities typical of modern mindset and so is waste.

The internal fragmentation has made us fragment the outer world. Thus beauty and knowledge, which is an integral act, is divided in to art, science and language, and into artists and scientists. Politics, ethics, religion are also separated.

Education has been the most powerful tool to condition and colonize the people as it has completely overturned the worldview of the so-called educated people of the world all over. It just replaced religious superstition by scientific superstition. It turned us into believers of a different kind. It turned us from active creators and inventers of knowledge to passive believers of text and experts. We no longer use our senses and feelings and experience to know the world. We are taught about everything-including beauty.

Beauty is the most fundamental of human existence. Beauty is what truly makes one authentic. Beauty is what binds us to the external world. Beauty is what creates culture, which comprises the architecture, the music, the artifacts, various dance forms and agriculture.

Even the spiritual state of being here and now also became impossible with the textual culture. A total act of being in the present encompasses both past and the future. Our relationship with the text is itself an absence of the present. Textualization removes the present and creates only the past or the future.

Another word that has got popularized is abstraction. Textual experience is an abstract experience. As far as authenticity is concerned experience is authentic and original. It cannot become second hand. Text by very nature is second hand.

Our relationship with the unknown, which was of awe and wonder, probably changed with textualization since knowledge is acquired within the comforts of the non-threatening text. The same must be the case with "controlling" nature.

Even beauty, which is an exclusive domain of the senses and experience, got textualised and it became a matter for intellectual activities. Children, because of their natural tenacity, remained out side the textual world so also most women. The crisis in modern schooling is precisely due the conflict in these two paradigms. Textual culture is attempting to textualise children as early as possible. This can also be seen as a conflict in intuition and reason. It is no wonder that there are no truly children's books today.

The whole tragedy of modernity is a direct result of textualisation of knowledge —fragmentation, alienation, boredom etc. Even at the activity level mechanization brought in mechanical and repetitive act further alienating the person from the present. Both at the level of activity and mind being here and now become unnecessary.

With the removal of the unknown from our experience predictability / planning and reasoning became the dominant relationship to the outside. Many people belonging to the textual culture are realizing the crisis and are also coming out with several solutions but are unable to break free, as all these solutions are textual. Systems thinking/holistic approach, their engagement with spirituality etc are attempts in overcoming this crisis.

The solution to make learning holistic is by adding more 'sensitive' subjects like ecology, gender, study of other cultures etc. The whole is not a result of adding fragments. The infinite is not the addition of finites. This is the quality of the mind which is holistic, spiritual, in communion with beauty all the time.

De-textualisation is essentially recovering the autonomy of the senses and experience. It is a reconnection to the life sustaining knowledge that is accessible only to the selfless minds.

It will be interesting to look at the world that belongs to the experiential paradigm. If we consider knowledge to be a biological response to sustain life, then the present level of estrangement between man and nature is unimaginable. How could knowledge and destruction go hand in hand to the extent that the very survival of the earth now edges on the brink of cessation? Knowledge, devoid of the biological content fostered the grounds for depredation.

This biological response is what is inbuilt in the knowledge of experiential cultures. Indigenous knowledge the result of collaboration between people and their surroundings guided by the natures need to preserve all life. The biological element in knowledge is what has made the indigenous communities to create 'life sustaining' knowledge.

The autonomy of the senses guides the people to access life sustaining knowledge. The so-called indigenous knowledge (This is a term invented by the textual world) is the knowledge of experiential paradigm. For over a decade now I have been in a process of unlearning and through creative engagement with the rural and tribal artisan communities. The unlearning process I am involved in is intended to scrub off the western influence that I had gathered through the years of "learning" in the alienating environs of some of the elitist institutions in the country. In 1991 or so I decided to stop reading altogether as I was only building on the already formed framework of the western

knowledge. In order to see clearly and authentically I felt I needed to clean myself of all isms that dictated my cognition.

After years of spending time with the rural tribal communities who were still free from modern schooling and were still very much part of the indigenous knowledge systems I began to see the fundamental difference between the two knowledge systems. In a profound sense, it is a community's sense of beauty that delineates its culture. When a society or community loses its authentic sense of beauty or subjugates its sense of beauty to the corruption of alien influences, it loses its authentic culture.

The classical forms in the human culture came about by this process. These are archetypal forms that came out as and when the need arose. The pyramids, the tombs, the ancient places of worship all over the world, the folk dances, traditional music, traditional healing systems are all evolved by a very different process adopted by modernity. These must have been the intuitive leaps of humanity.

And now with the information technology text is being replaced by the computer. The computer's criterion for dropping various elements from the textual knowledge would depend on the manageability and softwareability. Like text it would also bring in new elements in the realm of what they claim as knowledge. The comfort in seeking knowledge is far greater and they can also fake part of the reality though miniaturized and frozen. This could altogether remove imagination and bring in surety as they did see the event however miniaturized or even unreal it may be.

To quote from a writing on ' Human Nature and the Digital Culture: The Case for Philosophical Anthropology' by Dennis M. Weiss of York College of Pennsylvania – "*Where this world is chaotic and difficult to comprehend, the computer offers us the image of a world of order, logic, reason, and transparency. While we may have lost our cosmological map in this world, the computer offers us a ready replacement: the pristine, orderly lines of the flowchart, which becomes the new image of an orderly and computable nature. Flowchart, program, and microchip become part of the new cosmology. To the homeless and the rootless of this fragile world, images of the web spanning the globe, of the Internet encircling the world, of Netscape providing us with connections to the world are comforting on a metaphysical level. They assure us that we too may once again master the world and hold it in our hands. Our own lives gain a sense of order and stability when reflected back to us in our Web pages. While we may have little control over the world around us, we can define the world and our links to it via our own home page*".

The calamity of virtualization of knowledge will be far more destructive and elusive. Already the ICT shareholders are claiming many advantages over the textual knowledge.

The ultimate loss is that of human creativeness and the life at large.
If our experience is destroyed, our behavior will be distorted and destructive.

The natural state of being is to be creative, and in the creative state one is authentic and original. To be authentic and original means to be inventing all the time, to be discovering all the time; to be new all the time. This brings in concrete and first-hand experience as the basis for what is knowledge.

Senses are our tools that connect us to the concrete experience as well as our inner nature. This demands us to sharpen or sensitize our senses, as that is our primary tool for knowing.

Beauty seems to be the true way of relating to nature. The sense of beauty is experienced when the experiencer and the experienced become one, however momentarily it may be. It happens when all our senses are awake and we receive life in its totality.

Valuing Indigenous Knowledge

A revised approach to designing for non-Western product-users

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Ryan Fowler has recently completed a master's degree in industrial design at the University of Johannesburg where he has been lecturing part-time for the past two years. Through his research, he has developed a wax-fuelled stove that is intended to address some of the problems arising from use of paraffin stoves in South African townships and informal settlements. One of his early designs won a wax-stove design competition open to all tertiary education institutions in South Africa. Ryan has consistently been the top industrial design student at the Technikon Witwatersrand, where obtained a National Diploma in 3 Dimensional Design in 2001, graduating with the highest aggregate in the Faculty of Art, Design and Architecture. The following year he completed a BTech Degree in Industrial Design and was chosen to represent the Technikon Witwatersrand at the South African Bureau of Standards Design Achievers Awards 2002. Recently, he was acknowledged as the most promising postgraduate student in the Faculty of Art, Design and Architecture and named as the runner-up for the award Postgraduate Research Student Of The Year.

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This paper investigates the problems arising from approaches to industrial design, where the preferences of potential product users are not accurately addressed in the design of the product. These problems are conceptualized as a consequence of two of the means by which industrial designers resolve conflicting user preferences: through an intuitive perception of the needs that a product should fulfil, and according to a learned approach to industrial design.

Design decision that are made intuitively can be problematic when they are informed by the designer's exposure to Western knowledge, which is still widely considered to be superior to other knowledge traditions, and holds little regard for the values and needs prioritisations of these traditions that potential product-users may ascribe to. The current global re-evaluation of indigenous knowledge is proposed as a starting point from which the needs prioritisations of potential product-users can be assessed apart from the values and expectations of the designer.

The differences between the values embodied in learned approaches to industrial design and those arising from the socio cultural conditions of potential product users are viewed as a further explanation as to why several products that have been lauded as excellent examples of industrial designers have failed to gain widespread acceptance among the intended product users.

Research approaches that address this situation are then reviewed with reference to lessons that have been learned through the author's involvement in designing a wax-fuelled stove that is intended to address some of the problems arising from the use of paraffin stoves by the urban poor in South Africa.

Keywords: *industrial design, indigenous knowledge*

Introduction

…design cannot but respect the cultural differences of users…
…it has to respect different rationalities. (Krippendorff 1995:155)

Paraffin stoves are widely used by the urban poor in South Africa because paraffin is one of the cheapest sources of domestic energy in the country. However, paraffin is poisonous and highly volatile, and dangerous when used in inferior quality stoves – problems that are compounded by the adverse living conditions of South Africa's urban poor. In response to this situation, the South African based petrochemical giant, Sasol, has proposed the use of non-toxic and less volatile wax-fuels as alternatives to paraffin. Wax-stove design initiatives have demonstrated that these waste waxes could indeed be used as cheap and safe domestic fuels. However, it has become apparent that most of the wax-stoves designed to date (including the author's first stove design) are unlikely to be widely accepted by the urban poor because they only attempt to resolve the functional criteria

related to wax combustion, without considering other needs that potential users would want to have addressed in the design of a wax-stove. This paper considers the failings of this approach and suggests one that more accurately addresses the needs of potential product-users.

Discrimination in Design

Tooling for mass-production generally requires extensive capital investment that is amortised and made profitable through the sale of large volumes of the article being produced. The task of maximising sales is partly the responsibility of the industrial designer, who, in the design of the article, must satisfy as many of the preferences of potential users as possible, so as to ensure widespread product acceptance. However, the number of differing preferences concerning, for example, the form or function or cost of the article, will be as multitudinous as the number of potential product-users, each having his or her own opinion of what constitutes the ideal. Conflicting opinions will invariably arise. One user may insist on the product being cheap, while another will rather pay a little extra for a product that is more durable, but the nature of mass-manufacture is such that individual preferences cannot be catered for. Industrial designers, therefore, have the unavoidable responsibility of prioritising user preferences in the design of products such that some preferences are better catered for than others. Papanek, in his landmark text *Design for the Real World*, refutes the idea that this prioritisation of user preferences is in anyway a democratic process in saying that "a very substantial part of our population is discriminated against in design." (1985:185). This discrimination can be attributed to two of the means by which industrial designers resolve conflicts of user preferences: through an intuitive perception of the needs that a product should fulfil, and according to a learned approach to industrial design.

Intuition

Design theorist Whiteley describes Intuition as *tacit knowledge*, "an essential component of the skills and qualitative decision-making processes of designers." (1993:145). However, the use of intuition as a means of resolving conflicting design preferences presents cause for concern when the designer and intended product-users do not share a common knowledge tradition. Papanek introduces the following reasoning for this contention:

> [Intuition] affects design in a profound way. For through intuitive insight we bring into play impressions, ideas, and thoughts we have unknowingly collected on a subconscious, unconscious, or preconscious level. (Papanek 1985:4)

For many designers, these impressions, ideas and thoughts are formed by their exposure to Western knowledge, predisposing them to the view that Western knowledge is superior to other knowledge traditions, and that other knowledge traditions are therefore of little real value. Most political commentators will agree that such a view was actively perpetuated in South Africa under the Apartheid government, while eminent authors of the likes of Fanon (1993) and Said (1994, 1995) concur that, both in South Africa and internationally, Western knowledge is still widely considered to be superior to other knowledge traditions.

The South African energy researcher, Bank, reasons that, as consequence of this misconception, the values of other knowledge traditions are disregarded when they do not reflect Western values, on the grounds that these traditions supposedly "[prevent] people from knowing through reason and observation… what they really need." (1999:129). Treurnicht, a South African sociologist, describes how needs are "ignored or regarded as primitive" (1997:18) when they differ from Western expectations. Designers who are guilty of this charge, and design according to their own intuitive perceptions of the needs that a product should fulfil, rather than those of potential product-users, are at risk of failing to achieve widespread product acceptance – hence the opinion of Bank that "whether needs in consumer society are *really* basic or trivial, true or false, may be quite besides the point" (Bank 1999:129). Designers should concentrate on how to best satisfy the needs of potential

product-users rather than pronouncing judgement on what may appear to be illogical needs prioritisations. The difficulties involved in achieving this end have been described by a developmental practitioner:

> Our way of thinking (and consequently, of seeing) takes place within the contextual landscape of our time. We walk within this landscape; its parameters provide guidance, meaning and form. All this takes place largely unconsciously, as part of the 'given' within which we function. It demands tremendous effort of will to step outside these given parameters, to free ourselves sufficiently to see the terrain within which we walk from the outside, to become conscious of the underlying assumptions which we take for granted, and to think (and see) afresh. (Kaplan 2002:1)

Whiteley also acknowledges that intuitive misconceptions cannot easily be overcome: "Any system that one lives within is liable to seem normal, if not 'natural', because one's values and expectations are largely conditioned by it." (1993:2). However the current re-evaluation of indigenous knowledge provides a platform from which one can begin to see beyond the parameters of one's landscape and gain an appreciation of other knowledge traditions and their differing needs prioritisations apart from one's own values and expectations. Indigenous knowledge is defined as knowledge that has been developed in a particular locality to address the specific agro-ecological and socio-cultural needs of those residing in that locality (Raza & du Plessis 2002:70).

Several prominent academics now agree that the global dominance of Western knowledge over indigenous knowledge traditions is a consequence of the manner in which Western knowledge is portrayed, rather than as a result of any ineluctably superior mode of thought or of methodological excellence. The editor of *Postcolonial African Philosophy*, for example, describes Western knowledge as having being able to 'posit and represent itself' as the embodiment of reason (Eze 1997:13), but Le Grange, a South African educationalist, notes that, despite this "appearance of universal truth and rationality," Western knowledge also has "cultural fingerprints that appear to be much more conspicuous in other knowledge systems." (2000:115). Other educationalists refer to Western knowledge as "the product of complex social activity" (Hodson S.a.:26) and as having been "*constructed by people* as a way of making better sense of the world" (Carr et al. S.a.:155). With this revised view of Western knowledge, Le Grange concludes that all knowledge traditions then have "equal claims and respectability" (2000:116). In appreciating the validity of other knowledge traditions, designers can also begin to appreciate the values and needs associated with these traditions, and design products that address needs in a manner that is consistent with the values of those who are to use the products.

Learned Approaches to Industrial Design

The industrial design profession is rooted in Western capitalist economies and is thus shaped by the values of these economies. Similarly, the expectations of Western product-users are conditioned by constant exposure to capitalist values. Any incongruity between the values of Western product-users and the values that are embodied in the designed product is thus likely to be limited. Whitley, in reflecting on the converse of this situation, states that "A conflict of, if not cultures, then at least value systems in design has been witnessed in many third world countries" (1993:4). Industrial design products do not always embody the values of non-Western product-users who are less exposed to the capitalist West than are most designers.[1]

This has profound implications for industrial design because, as Whiteley points out, "Values must be translated into standards and criteria, and inevitably lead back to the fundamental question 'What is good design?'" (1993: 161). An industrial design approach that does not acknowledge the values of non-Western product-users is unlikely to be able to accurately address the needs of these users, and widespread product acceptance is then unlikely to be achieved – a problem from which South African industrial designers are not exempt. Campbell, a South African industrial design educator, notes that "Product design in South Africa is taught with a similar syllabus and in a similar manner to

product design internationally" (2004:8). This helps to explain why some functionally sound South African products, which have been lauded as excellent examples of design for the poor, have failed to gain widespread acceptance among the intended users. The *Freeplay* range of wind-up radios is a good example.

Freeplay radios are powered by wind-up mechanisms, rather than electricity or batteries, and therefore do not incur any operating expenses. The intention of this design innovation was to provide low-income households, particularly those that do not have access to electricity, an alternative to battery-powered radios, which are costly to operate because the batteries have to be replaced regularly. However, Freeplay radios cost several times more than battery-powered radios.[2] Thus, though Freeplay radios can provide long-term savings, battery-powered radios are still more accessible to low-income households who cannot afford the initial capital outlay involved in buying a Freeplay radio. Consequently Freeplay radios are reportedly more often found on the desks of affluent designers than in the homes of those without access to electricity (Maykuth 2002:1).

A similar problem has beset the acclaimed Vesto biomass-fuelled stove, which recently won the Design Institute of South Africa's Chairperson's Award for design excellence. The stove is said to be very safe and up to three times more fuel-efficient than an open fire (DISA 2004:online), but the designers of the Vesto have failed to account for the poverty levels of the intended stove users. The R299-00 price tag of the stove is, in the words of a township shop owner, "a huge problem for many potential customers" (quoted by Gedye & James 2004:41).

Biomass-fuelled stoves (most of which have also been shown to be more fuel-efficient than traditional cooking methods) have been promoted in a number of developing countries with the aim of reducing wood fuel consumption and slowing rates of deforestation. However, few, if any, of these stove programmes have achieved this goal. In India, for example, the wood fuel saving from the 23 million biomass-fuelled stoves distributed since 1984 is estimated at less than 1% of the total national wood fuel consumption (Hulscher 2000:17). This programme, like many others, has since been suspended for failure to achieve its objectives. A stove designer has explained this paradox of functionally successful stoves but unsuccessful stove programmes as a consequence of a "lack of adequate attention to social… issues" (Sharma 1993:i). Some stoves, for example, feature combustion chambers (the area in which the fuel is burned) that have to be closed once the wood has been ignited. This can improve fuel efficiency but necessitates that longer branches be cut into smaller lengths if they are to fit into the stove – a process that can take more time than collecting the extra wood needed when cooking over an open fire. The user is thus left with little incentive to persevere with the biomass-fuelled stove. Open fires also have several other often-unacknowledged ancillary benefits over biomass-fuelled stoves:

- Little expertise is required to control an open fire.
- The visibility of the flames serves to warn children that the fire is dangerous.
- In addition to being used for cooking, open fires provide light and heat, and a social focal point around which a household can gather at meal times. The inability of electrical stoves to fulfil this latter function has been suggested as a reason why coal braziers continue to be used on the South African Highveld, even by those with access to electricity (Viljoen 1995:83).

Tucker, a stove researcher, contents that, "If these extended or latent functions are not met by the new stove or provided by some alternative means, the technology is not likely to be accepted permanently" (1984:online). This contention is also applicable to the design of wax-stoves, yet none of the wax-stoves designed to date show evidence of any attempts to address or even find out what extended or latent functions are provide for by the paraffin stoves used in South African townships and informal settlements. Rather, wax-stove designs have tended to exhibit misconceptions regarding the needs of paraffin-stove users.

A good example is found in the design for a wax-stove, which has a small fuel tank so that if the stove is not refuelled within 25 minutes of the time of ignition, the fuel will run out. The designer

viewed this as "an excellent safety feature because an unattended stove is a potential fire hazard, whereas this unattended stove extinguishes itself" (van Niekerk 2003:65). However, this short refuelling interval would inconvenience stove users who need to buy additional fuel or cooking ingredients while a meal is being cooked, as has been seen to be a common practice in South African townships and informal settlements.

In South Africa, those most likely to use a wax-stove (current paraffin stove users) are disadvantaged black women, while most qualified industrial designers are white men who have had access to sufficient financial resources to afford a tertiary education.[3] These groupings have markedly different economic and socio-cultural backgrounds, largely attributable to the effects of the Apartheid system, which the political writer, Thornton, refers to as having being responsible for "the meticulous making and marking of difference" (1996:142). Thus, it is especially likely that South African industrial designers and wax-stove users will have different prioritisations regarding the needs that a wax-stove should fulfil. Designers, therefore, need to be aware of socio-cultural conditions that may contribute to differing needs prioritisations, and should then address these needs according to the prioritisations of potential users rather than those of the designer. This suggestion is supported from various sectors:

Energy researchers, Mehlwana & Qase, view the study of energy and appliance use among the urban poor as "a study of a social process" (1998:2); Bank states clearly that needs cannot be evaluated "independently of the specific social and cultural contexts within which these needs are understood and experienced" (1999:129); indigenous knowledge researchers Raza & du Plessis are of the opinion that "a deeper insight into the cultural complexities of thought that prevail in a society is imperative for suggesting workable solutions to socio-technical problems" (2002:57); and the participatory research approaches suggests that researchers should gain insight into people's "attitudes, behaviours and beliefs" (Scott 2002:60) because the "priorities [of the researcher] often differ from people's own views" (Pretty quoted by Buhler et al. 2002:115).[4]

Conclusion

The industrial design profession has long emphasised the importance of designing according to the needs of potential product-users but has often failed to recognise that the needs prioritisations of these users will not necessarily reflect those of the designer, especially when the user and the designer do not share a common socio-cultural background or ascribe to similar knowledge traditions. Other fields of research have, for several years, been stressing that needs prioritisations are affected by socio-cultural conditions, and these fields are now taking a lead in acknowledging the validity of other knowledge traditions, viewing them as the foundations of values and needs prioritisations. The industrial design profession would do well to pay attention to these developments.

Notes

1 Whiteley also states that "few – if any – Third World countries are cocooned from Western values when it comes to design" (1993:119) but indigenous knowledge researchers say that even in urban communities where there is constant exposure to Western values through print, radio and television, many people still ascribe to values that are rooted in indigenous knowledge traditions (IIRR 1994:online; Loubser 2004).

2 The Freeplay Ranger wind-up radio retails for R499-00 whereas cheap battery-powered radios can be bought for as little as R25-00.

3 It is widely acknowledged that, in South Africa, women are the primary users of paraffin stoves (see Annecke 1992:81, 1993:92; Mehlwana & Qase 1998:120; Bank 1999:131; Posel 2001:662) while records show that, in the last 10 years, 90.63% of those graduating from one of the two industrial design schools in South Africa have been white men (Technikon Witwatersrand 2004).

4 Several participatory research approaches have been developed, including RRA (Rapid Rural Appraisal), PRA (Participatory Rural Appraisal), PLA (Participatory Learning and Action) and most recently PAR (Participatory Action Research). All stress the need for community participation as a means of validating research findings; the importance of acting upon research findings; and the value of empowering research participants by disseminating any knowledge generated by the research.

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A Participatory Approach to Design Education for the Crafts Sector

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In November 2000 he took the opportunity to undertake a doctoral research programme alongside a full time teaching position.

His area of Research interest is Design in Developing countries. Since September 2004 he has been a resident researcher at the Srishti School of Art Design & Technology in Bangalore. A recent research project initiated by the LTSN provided the opportunity to expand this theme, and the recently published book, The Travelling Case published by LTSN, documents this project.

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This paper reports on recent findings from a doctoral investigation into appropriate design education methodologies and practices for crafts persons. The study has concentrated particularly on Indian craftsmen and has been conducted in collaboration with a number of Indian Higher Education Institutions.

The paper argues that a participatory approach to design education in the crafts sector is a more sustainable approach in the long term. This assertion is based on a comprehensive literature review of the subject since 1950 as well as interviews with key persons in the field and first hand experience of a number of crafts education initiatives across South Asia.

A participatory approach to design practice has been the subject of discussion for many years. In 1983 Victor Papanek commented that participatory techniques had been used to good effect in many disciplines such as medicine, law, planning and architecture, but he concluded that the design profession had "responded slowly if at all" (Papanek, 1983).

The paper, however, recognizes that participatory techniques cannot simply be applied to any context as a panacea. To inform this argument it draws on the continuing debate in Development Studies around these issues.

If it is not as simple as applying borrowed techniques from Development Studies, the question is then posed: Is there a productive way forward to conduct design education in a manner which responds to the needs of the crafts sector, as apposed the needs perceived by so-called expert designers and educators?

These issues are discussed in the context of examples taken from exercises conducted during fieldwork with craftsmen and artisans. The paper concludes with an overview of initial research findings and an initial framework of principles defining appropriate and sustainable design education interventions in the context of Indian craft workers.

Keywords: *design, development, participation, crafts, training*

1 Introduction

The theory of participatory approaches to design is not new, although the gap between theory and practice in the case of design is significant. This paper discusses the application of participatory techniques and approaches to the education of artisans in the craft sector in India.

The primary argument of this paper is that a participatory approach to design training is more sustainable in the long term. Participatory design training is needed as it can begin to re-address the power relations between the trainer and those involved in the training. It recognizes that trainees

have an active contribution to make to the learning experience, as they are the experts in the reality of their life and work. As Balaram so succinctly put it "*Most artisans are poor as well as illiterate. Nevertheless, they are highly skilled and well 'educated' in terms of the long and rich experience… It is aptly said that in oral cultures where an artisan dies, 100 libraries are burnt down*" (Balaram, 1998b).

Participatory design training gives an opportunity for the trainees to creatively express their ideas, opinions and priorities. To some degree it at least allows the *opportunity* for participants to set the agenda and therefore is a more sustainable process, and there is likely to be increased ownership in the learning process. In addition it allows for more peer level training and sharing of existing knowledge and experience.

Before these issues are discussed, it may be helpful to address the question: Why is it helpful to offer training to artisans?

One simplistic way to address this question would be to cite the large number of organisations involved in this activity from government initiatives through to small NGO groups. If such a large number of groups and governments across the developing world think it is a good use of time and resources to train artisans in order to promote sustainable livelihoods then it must have some perceived value.

However to address the question more rationally, I turn to a number of authors in the design field.

David Poston, in his doctoral thesis (Poston, 1991), and a later book on the same subject, concludes that training in design and analytical decision-making could play a significant part in the activities of a small workshop and make an essential contribution to its development. He coins the term contextual training, which he describes as a method which allows for "*…the continuing development of skills by both direct transfer and empirical development, and facilitates the acquisition of vocational skills by illustrating continually the relevance of the context, and encourages the trainees to judge the validity of what is being transferred, particularly where the training capacity of the community itself has been developed*" (Poston, 1994).

Balaram expands this argument commenting on appropriate design education methods in developing countries:

"*Instead of 'parroting' borrowed design processes and education…it must be an appropriate process which fits the people, their cultural minds, their economic conditions, their own skills and their available resources*." He proposes an alternative approach which he terms 'barefoot designers': "*What is now required …is not a skilled designer…but a broad based, socially well integrated, humane designer with a broad global vision*" (Balaram, 1998c).

In India, with its population of over a billion and an estimated 650 million of these living in 500,000 villages, Balaram's proposal for 'barefoot designers' seems all the more relevant and appropriate (Balaram, 1986). However with an estimated 30-40% of the population being craftsmen of some form (Aziz, 1994) the task of making design training available to this group of people is vast. Even if every one of the approximately 2000+ designers which have graduated from India's design institutions since their inception were interested and motivated to spend all their time addressing the needs of the crafts sector this would not even scratch the surface.

So… Is the solution to the problem to train craftsmen to be designers?
This in turn poses the question, what is a designer?

In his paper provocatively titled "The Best Designers in the World?" Victor Papanek states that *"If we define design as finding working solutions that are immediately applicable to problems in the real world, the answer, or my answer at least, is readily apparent: Inuit are the best designers. They are forced into excellence by climate environment and their space concepts."*
In highlighting untrained designers as the 'best' Papanek is sending a clear message questioning the monopoly of institutionally trained designers. (Papanek, 1995)

Phillip Pacey, in his paper 'Anyone designing anything?' continues this argument looking at non-professional designers in the history of design. He argues that the concept of design being a process that all human beings engage in is in danger of being marginalized to the point of extinction by an over-emphasis on design as a professional activity. He highlights a wide variety of examples, which illustrate the case for the recognition of non-professional design. He concludes by saying;

"To declare that we are all designers is no longer (if it ever was) to state a 'truism' of such obviousness as to merit no attention whatsoever. It is to draw attention to a category of design which in becoming marginalized, has a radical, subversive role to fulfil, and which deserves to be encouraged, alongside and in dialogue with professional design" (Pacey, 1992).

He further suggests that design should "…enlarge its role, even beyond reaching down to help people who are presumed to be helpless, to include empowering the designer in everyone" (Pacey, 1992).

Luiz Guimães in his PhD study focussed on artisans in Brazil. As the result of his research he defines design as "…*a process, which is not the sole domain of formally trained categories such as engineers, architects and industrial designers*." (Guimarães, 1995) In a later paper he expands the point by saying that:
"Those that consider professional design as the only alternative for product development will limit the potential of design interventions for the poor. Rather industrial design must be understood as a tool for development, one that is part of the wider strategy to bring together all who are involved in enterprise development. Enhancing a small firms design capacity and technical expertise would give the most innovative an advantageous position in the market, thus supplementing a firm's potential for survival and growth." (Guimaraes, 2000)

And finally Balaram from an Indian perspective states:
"Innovative men from all walks of life — the poorest street vendor, the social worker, the engineer, the craftsman and the teacher are designers without being called so" (Balaram, 1998a).

It would, therefore, seem that there are some grounds to encourage, facilitate and empower artisans to undertake design activities as part of their crafts practice as a means of improving their products and in turn contributing towards a more sustainable livelihood.

In order to provide a context for this paper the following story of a local potters village is related.

2 A Potter's Story

Ramkrishnapa is a potter who works in a village of potters North of Bangalore. His family are potters and he started to help in the family workshop at the age of seven. At fifteen he set up a small workshop in his own right and has been working in a similar small scale for the past 28yrs.

In 1988 he got married and chose to move to his wife's village. An unconventional decision, but one prompted by a number of influences, the main one being the village was close to the city and therefore had a greater chance of selling products for a higher price.

Soon after he was married, he was invited to attend a training course at the local government-training centre.

During the course he learned that if he made other items apart from the traditional ware, such as Chula and water pots, he might be able to charge a higher price. At the end of the course he experimented with making other items such as lamps, flower vases and storage pots as well as Ganesha and other religious items. Many of these were the result of exercises run during his training. After the course the training centre would send him referrals for clients and orders.

A couple of years later he was invited to do another course at a local centre for design training. This time the content was more design based and he was paid a stipend during the three-month course. Afterwards he returned to his village to further develop a range of non-traditional designed items.

He also arranged to rent a small stall in one of the suburbs of Bangalore to sell his products, which is now run by one of his sons.

Slowly his interest in making non-traditional products rubbed off on the other villagers. His brother in law started to make other items and others also experimented. The older potters in the village looked on and said, "we'll see."

About four years ago the Taluk Panchayat asked him to train the other potters in the village, in the skills he had developed. These could loosely be termed as design and innovation skills.

Today the potters in the village make a range of items. The older craftsmen have continued to make traditional items but the majority of them at some points in the year, especially in preparation for the major festivals, make a wider range of craft based products, which have some elements of design.

This village may be atypical in that there are probably many other villages that have had less design training input, both as direct external input as well as from local trainers. However, what can be taken from this village scenario, are the strategies for interaction and methods of discovering needs.

In this vein, the key issue of interest is that this group of potters have never been asked what do they want to learn. Nor have they been asked what would be most useful to them since all of the prescribed training materials were put together by experts in the field of design, without consultation.

In a recent discussion about possible further training, Ramkrishnapa expressed frustration saying, "We don't need another course on firing methods or marketing. What we really need is help to design products which will sell."

Some may suggest that artisans are not in a position to know what they really need and even if they do have some idea, they don't have the ability to communicate it effectively. Others may make the point that in the majority of training and education contexts, the content and programme is designed by experts and has no input from the trainees, and of course this would be right. However, it has been well established by prominent experts in the field of development, that unless training is related to the needs and context of the trainees, it has little chance of any sustainable impact on their continuing practice (Poston, 1994, Grierson, 1997, Frost, 1991).

3 Participation

Participatory techniques grew during the 70's and early 80's out of agricultural development initiatives in Southeast Asia. At that time, it was called Rapid Rural Appraisal RRA. In recent years, the term Participatory Rural Appraisal PRA has become popular. The rural element of this term has remained but the techniques have been used in many non-rural situations. They have been extensively used over the last decade to attempt to access the real needs of communities in order to reflect these priorities in any development plan (Chambers, 1983).

One of the problems with participation in development projects is that it can be merely lip service to a required methodology. True participation in development needs local people to participate in more than the planning stage of a project, or merely identifying their own 'real needs.' Local people need to be actively involved in the design, delivery and evaluation of projects. They need to be equal partners in the process, recognizing that project workers and local people have different roles to play and different expertise in the various stages of the project, and most importantly, the primary concern must be to facilitate sustainable continuation of the initiative once external project workers have withdrawn.

One of the critiques of the participatory process is Majid Rahnema. As mentioned earlier, he is a leading voice in what has been termed the 'post development school.' In his article entitled 'The Last Temptation of Saint Development,' he suggests that participatory action is simply putting a human face on the existing patriarchal system. He questions whether the changes are as different as they seem. *"…What the 'change agents' actually do is quite a disturbing question. Are they*

really embarking on a learning journey into the unknown, where everything has to be discovered? Or are they concerned more about finding the most appropriate participatory ways to convince the 'uneducated' of the merits of their own educated convictions?" He goes on to comment on the dangers of empowerment: *"When A considers it is essential for B to be empowered, A assumes not only that B has no power but that A has the secret formulae of a power to which B has to be initiated."* He concludes by saying that in his view participation fails because by definition it is designed to affect a change in the short term. True participation, he suggests, is undertaken on much longer timescales, building relationships and becoming involved in communities and above all being *"…critically self aware and yet passionately compassionate, by fully participating in the world, such a person becomes not only ones own change agent but one who by the same token changes the world."* (Rahnema, 1990).

Rahnema, when considering intervention, asks the question, "*Who are we, who am I to intervene in other people's lives when we know so little of about any life, including our own*?" and goes on to suggest that intervention should be considered very carefully when an outside body proposes an intervention, "*Hence the need… to be aware that he or she is launched on an adventure fraught with considerable danger. Such awareness makes it necessary for interveners to start examining the why's and wherefore of their actions. Exceptional personal qualities are needed to prevent 'well intentioned' interventions producing results contrary to those planned - as has been the case in most 'developmental' and many 'humanitarian' instances*" (Rahnema, 1990).

It would, therefore, seem wise to conclude that although there are many benefits to be accrued by following a participatory framework, there are also a number of potential negative impacts, which need to be kept in mind. These, as Rahnema suggests, can be summed up by being self-aware and asking the question repeatedly and honestly, 'Whose agenda am I following?' Or to put it in another way as Chambers did in the title of his book in 1997, 'Who's Reality Counts?'(Chambers, 1997).

4 Participation & Design

Participatory designers… Is this a contradiction in terms?

What do we mean by participatory practice? For a concise definition I will turn to Robert Chambers, a recognised expert and occasionally a controversial figure in the field of participation. He defines it as: "*…A family of approaches, methods and behaviours that enable people to express and analyse the realities of their lives and conditions, to plan themselves what action to take, and to monitor and evaluate the results* (Chambers and James, 1996).

One of the key issues that need to be addressed is the existing lack of participatory practice amongst the design community. If we take the above working definition and look at the current design practice, we find that over the 20 years in which these issues have been discussed, there is little evidence to suggest that the design community has engaged in any tangible manner, or paid anything but lip service to the concepts of a participatory approach to design activity. This is particularly evident in design education.

Victor Papanek was one of the first to suggest the use of participatory approaches to design projects. He suggests that the design profession has "*responded slowly if at all.*" He attributes this lack of response to the fact that consumers have not forced the profession to behave in a participatory manner and attributes this in turn to the invisibility of the profession. In the intervening years one might suggest that the profession has 'come out of the closet' but the accessibility of the design process has improved little if at all. Papanek gives examples of many projects that encourage user participation. He concludes by stating: "*Participation in design is based on trust. Although most people are inexperienced in design and are not used to working with designers, the design profession must reach out and ease the way for dialogue. The task is difficult, but it is absolutely essential if design is not to bankrupt itself morally. Only in this way will the designer become a tool in the hands of the people*" (Papanek, 1983).

As part of her PhD study Southwell conducted a number of interviews with practising designers. She concluded that the level of engagement with users and potential customers was surprisingly low. Her findings point strongly towards a majority in the profession that has little interest in engaging the views of the customer, rather preferring to prescribe their perception of the consumers wants and needs. One design manager, when questioned on how his team of male designers had designed a product for a female market, stated, *"We have a bunch of hermaphrodites upstairs." When asked how this team engaged with user issues faced by females, he said, "You have to cast yourself in other peoples shoes… do a mind bender*" (Southwell, 1999).

There are of course exceptions to this rule in the work of consultancies such as IDEO, Design Continuum and Sonic Rim, but on the whole these practices are seen as being an unaffordable and unnecessary luxury, both in terms of time as well as money.

In a recent workshop for industrial designers in India, Uday Dandavate of Sonic Rim proposed the concept of 'co-creation,' suggesting that "Co-creation treats these stakeholders not as passive respondents but as active constructors." He went on to say that "*The seeds of user relevant design can be found in the dreams and ideas of everyday people*" (Dandavate, 2004).

In the broader field of design, participatory techniques are not new. They have been used in architecture for a number of years, and have had a mixed reception. Lawrence looks at a number of examples of participatory design in architecture, and suggests that a clear methodology for participation should be established to combat the accusation of '*design puppetry*' (Lawrence, 1982). One example where such techniques have been used to great effect in recent years is the Pen yr Englyn School in the Rhondda Valley, South Wales. The building has had a very positive effect, involving the whole community in the design of the project as well as the subsequent life of the school, concentrating particularly on giving space for marginalized groups. In addition the architect was nominated for the prestigious 'Sterling Prize' and was described as the best example of 'joined up thinking' in architecture in many years (Woods, 2000) (Young, 2000).

5 Design in a Development Context

If we look at design practice in a development sphere, we need to take in to account two threads: one of a potential devaluing of participatory practice in the field of development; and a general lack of participatory practice in the field of design.

J Corlett, in a conference paper in 1997, proposes that designers have a critical set of skills, which are of decisive importance to a nation's development. '*By part of their training and something of a natural inclination, designers are able to perceive and act upon potential problems and opportunities*' (Corlett, 1997).

She notes that these skills point to another important reason to introduce design education in Developing Countries: '*There are skills that designers possess in analysis and synthesis, which could be used for other purposes than the creation of objects. This 'discovery' appears to be encouraging designers to view their skills in a much more general context than has hitherto been offered. Surely this is the central key to understanding why design education is vitally important in development situations*' (Corlett, 1997).

In India in particular, these issues were raised in possibly the most significant initiative for design in the subcontinent: the Eames Report, which stressed the need for design education and its impact at a grass roots level (Eames, 1991). However over 30 years after the Eames report, Chattergee, an Indian design theorist, concluded: *"Design has emerged as a high profile activity, indispensable to quality in sophisticated sectors of manufacture and communication. Yet the original inspiration for bringing design to this land – to lift the quality of life for millions living at the margins of existence in villages and urban slums – remains virtually untouched"* (Chattergee, 1990).

Pacey, commenting on design activity in a development context, reinforces this point saying: *"When design professions have emerged within developing countries they have generally done so in response to Western influence, and professional designers have found themselves designing Western-style products for an affluent elite rather than serving the more urgent needs of people at large; needs which might best be served by reviving and developing indigenous craft and another practices which were undermined by colonialism, and by regarding people themselves, their culture and their identity as a resource"* (Pacey, 1992).

There is, of course, clear evidence to counter Chattergee's criticism, especially in the work of India's design Institutions, but the challenge still remains. And as with many things in the subcontinent the job is one of vast proportions.

The emphasis on the grassroots impact of design is precisely the aim of participatory design training. In recent years a number of authors have suggested its importance in design practice.

Masera worked with artisans to produce accessible training in sustainable product development. He suggests that the training should be *"as practical and participatory as possible based on the artisans' own experience and existing knowledge"* (Masera, 1999).

Kogi, in a paper dealing with ergonomics in Small & Medium Enterprises (SME's) particularly in the context of industrially developing countries, points to an increase in the role of participatory approaches both in Western industry as well as in a development context. He states that these methods "…are characterised by their enabling methods that facilitate the local change process." (Kogi, 1997)

Southwell, in a conference paper, suggests that participatory methods could be used to redress the imbalance in the relationship between designers and users particularly in a development context (Southwell, 1997).

However, in the course of this research since 1998, the author has found little evidence of sustained initiatives that have made a positive impact on the livelihood of artisans.

Southwell supports this conclusion saying, *"The opportunities for participatory design are currently only available in theory… and although there is revealing criticism of participatory processes in the literature… there is potential for good practice"* (Southwell, 1999).

6 Fieldwork Examples

Since 1998 the author has been involved in design work in developing countries particularly in South Asia. In November 2000 this work was consolidated into a research proposal for a PhD programme. The programme to date has consisted of a critical review including a literature review and interviews with key figures in the field (Fathers, 2003). The research has been extended with a number of field research exercises in Sri Lanka and India. The most recent of these is a 12-month residency in Bangalore, Karnataka. The primary purpose of this extended field research is to observe, record and analyse appropriate strategies and methodologies for design training for the crafts sector. The initial work will centre on the small village near to Bangalore described in the earlier story.

The following section will describe in some detail two recent field research initiatives and will then outline initial research conclusions.

The River Exercise:

One of the most successful techniques tested to date is a participatory analysis tool, 'The River'. This tool was a development of a technique described in Robert Chambers' book 'Participatory Workshops.' In it he briefly describes an icebreaking technique called 'The River of life,' the aim of which is to describe significant events and choices in one's life via the visual image of a river (Chambers, 2002).

This concept was used as the core of an analysis tool to facilitate the life cycle of product development. It was envisaged that it could be used either in a group context as the basis of discussion and reflection, or as a diagnostic tool for individual artisans to map the methods they use to develop a product.

The technique was initially run as intended, as the basis of a discussion on product development, visually charting the influences and decisions taken along the route from idea to market. The river metaphor was well accepted once the participants had understood the reason for visual mapping using an abstract metaphor.

The participants quickly added to the metaphor, discussing the seasonal flow of rivers and product sales. The concept of Intellectual Property Rights (IPR) protection was also discussed prompted by the concept of the removal of water from the river. During the discussion one of the facilitators suggested, "The River is not frightened that people are taking water because she is strong and she knows that her water will always flow." This sparked a conversation on constant innovation being a guard against IPR theft.

This analogy was then further developed by describing the hydrological (rain water) cycle of sea to clouds and then to rainfall at the head of the river. This was used to illustrate the need for connection with the market, which had been previously identified as the sea, emphasising that this connection and subsequent information will stimulate the flow of ideas to keep the river running.

The river illustration was developed via discussion with the participants. The facilitators were the main sources of illustration, drawing connections and asking prompting questions, but by the end of the process, the whole group had bought into the process. Once the various stages had been mapped, they were revisited to discuss in more depth adding further connections and influences.

This technique was also used later in the workshop to emphasis some of their own priorities such as the importance of drawing and the need for variety in the market place. One of the most important concepts highlighted was that of user-centred design and how the needs and requirements of the user influenced the design process.

The resultant visual map was left on the wall for the whole workshop and was often referred to, illustrating a point or reinforcing an issue.

User-centred Design:

Another key theme that has emerged from field research is the importance of the user in the development of products. A number of exercises have been tested to emphasise this issue, the purpose being to encourage the artisans to interact with the users of their products and so discover how they can make improvements to better meet their needs.

'It's for everyone'

In general the initial response of the artisans, when asked who a particular product was aimed at, would be to suggest that it could be aimed at anyone and everyone. The idea that a product should be aimed at a particular target market seemed to be an alien and limiting concept. However, once they had engaged in discussions with potential users, they began to understand that in order to meet user-needs a product had to be targeted at a particular population with particular needs, aspirations and desires.

In one particular exercise the participants were initially introduced to the idea of specific user requirements via a question and answer game involving a selection of products. A range of bags was then displayed and the question was asked, '*Whom does this bag belong to*?' The game then progressed asking which bag would belong to a specific person in the group and when would they use it? The game illustrated that these issues had generally not been considered before and that judgements were based on preconceptions.

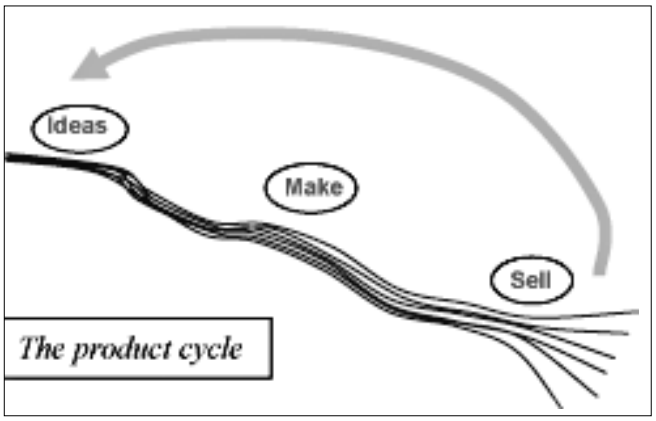

Figure 1. A development of this concept as illustrated expands on the input of user information.

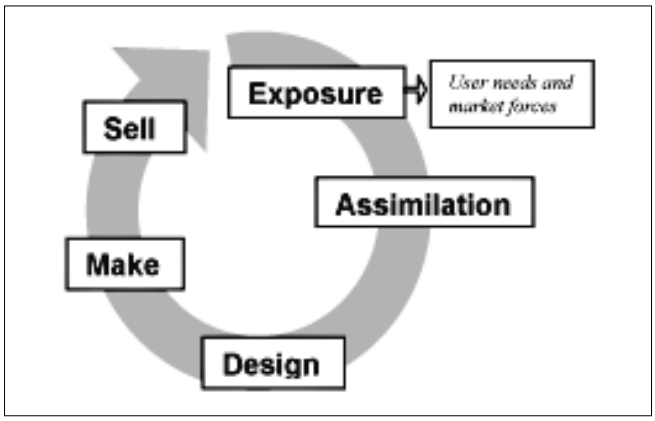

Figure 2. In this second model the analysis and assimilation of users needs are explored. The model illustrates the development path followed by those artisans who included user information in the development of new designs.

A second phase of this exercise was to design and make an oil lamp for one of the facilitators. Again, this underlined the fact that asking questions of a user was an alien concept, so products were produced based on what they thought the user would like, without asking any questions.

This process was then extended by asking the participants to question an existing product using the 5 'W's & an 'H' as a framework, e.g. 'Who is it for?' 'How is it used?' These then became a framework of questions to ask potential users.

Both of these field trials yielded valuable information, both immediately in the form of observations, images and recorded conversations, and later in comparisons with previous field experience, providing insights and connections. These collected initial conclusions are outlined below.

7 Initial Research Conclusions

The River

The river exercise has proved to be a versatile method of engaging a group of artisans in discussions about their practice. The success of this initial trial could well point towards a range of diagnostic visual mapping and illustration techniques for use in focusing training to specific local needs. The use of illustration as a problem exploration/solving technique is well established in the field of creativity training. However the innovation here seems to be the corporate nature of the activity, which in turn facilitates discussion and provides a visual narrative onto which further discussions can be mapped.

The technique needs to be refined and from this initial trial there are a number of small modifications that will be tested.

These are:

- Using the technique at the end of the workshop as an evaluation tool
- Using the techniques as individuals and then later as a group
- Using a simplified version of the technique as an ice breaker and then following the established metaphor with the technique as piloted in Srishti

An Iterative Cycle

During the period of reflection since the workshop, a cyclical pattern has been identified based on the observations of the artisan's product development process. In general terms, the process begins with the idea phase, and progresses via the making and selling phases. In the river exercise, this was expanded to reflect the hydrological cycle as seen below. The point that was made during this

exercise was that unless information from the market is fed back into the ideas phase in the form of trends and user needs, then the flow will dry up.

The use of the term 'exposure' in this model denotes an embryonic or transition mode. As the artisan becomes more comfortable with the practice, this phase would be better described as research.

Having expressed the development cycle in this manner, the similarities between the standard western development models are evident. This is not surprising as the priorities of user need balanced with sales are equally important to both groups.

Rapid Iterative Exercises

One strong conclusion from recent field research has been the benefit of rapid iteration exercises in three dimensions. This is a technique that has been well used in Western design education in exercises with card and foam, and can easily be imitated in this context using materials such as clay, and even for other crafts sectors using other materials.

The insights gained by rapid iteration can be drawn out and reinforced, particularly as the artisans are comfortable with their materials and skills, and therefore, can make a series of fast ideas in three dimensions to explore a form or potential solution far faster and easier than trying to use sketching, which is far more common in traditional design education.

8 Conclusions

The author concludes that the design profession is still struggling with its identity. Over three decades after Western designers began to question the human and social role of design, there is little evidence that the design community is making any progress in setting goals, standards and strategies, which derive from or respond to the needs of society.

Or as Ekuan puts it, *"Design seems to be in a state of stagnation in terms of both ideology and activities. One gets the impression that design has drawn apart to simply keep watch while the world grapples with numerous problems"* (Ekuan, 1997).

Designers have a clear role to play in the crafts and artisan sector as facilitators and enablers, to empower design activity at a grassroots level and promote self-propagating indigenous training and mentoring initiatives. These will extend the influence of design far wider than one design course or institution ever could.

As Guimarães states, *"The role of the designer may be that of an 'enabler' or a 'catalyst' co-operating with the small entrepreneurs to develop their own capacity and their own ideas, introducing new techniques, exchanging experiences and learning with the local innovators"* (Guimarães, 1995).

Participatory approaches to training offer the opportunity to facilitate this type of activity in a manner that both reflects and responds to the priorities of the recipient crafts community, rather than that of an institution or funding body. A further benefit which has the potential of going a long way to address the magnitude of the challenge, particularly in India, is the that of artisans being trained, who in turn train others. This potential of exponential growth is greatly needed if design is to make any meaningful, sustainable impact in this context.

Another key issue is that of time. As Rahnema stressed in the paper quoted earlier, time to build relationships and spending time to be involved in a community, will go along way to ensuring a sustainable result in any intervention.

To the trainer, the difference between empowering and dis-empowering practice can be very small, although the effects on the artisan and craftsman can be far reaching. In a paper on empowerment Labonte illustrates this difference by quoting a challenge to professionals made by Lilly Walker, an Australian aboriginal woman:

"If you are here to help me then you are wasting your time. But if you come because your liberation is bound up with mine then let us begin."

Lilly Walker (Labonte, 1994).

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Cultural Approach in Design Education

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Design is co-responsible for the development of a wide range of products which have been brought about within societies along history. We lead our lives surrounded by artefacts that have been made available to us and that contribute to shape our lives. In this context, design establishes, in a cultural way, a vast array of different possibilities, constituting symbolical signs that bring meaningfulness to social relations, as well as references to people's identities. Based on the interpretive approach of culture, proposed by Geertz (1989), this paper emphasizes the importance of tuning the design and the cultural diversity on developing products for society, and the necessity of adopting a non-reductionist and non-determinist cultural approach in design education, based on a holistic perspective of the world, considering its complexity and the plurality and variability of significances of artefacts for individuals and social groups, as well as the inter-relationships between them and the contexts where they are inserted. The strengthening of the globalization process has intensified the international competitiveness strategies of the dominant industrial oligopolies in world markets, restructuring the industrial complex of several countries, and promotes the incorporation of countless national companies. Such a scenario has directly affected the design of artefacts, which finds itself facing impasses between the catering for imperatives of standardization of components and products and the consideration of cultural identity aspects. This demands a new approach to the design education, theory, research, and practice to support it. Based on case studies carried out in the automotive and household appliances industrial field, this article discusses about possibilities of a cultural approach in design education, supported by analyzes of how symbolical, practical and technical requirements of products have been translated by design, facing the question of cultural diversity.

Keywords: *design education, cultural approach, design, culture*

Introduction

Design plays an important role in the development of the material culture, considering that it involves planning, decisions and practices that directly and indirectly affect people's lives, including that of the designer himself.

Based on the understanding that every design object is a cultural sign and belongs to historical, social, environmental, economic and political contexts, design can't be generalized and reduced to a hermetic and pre-deterministic issue. On the contrary, the consciousness of the complexity and cultural diversity of the world in design studies and practices is fundamental. In this sense, it is necessary to adopt holistic and interdisciplinary approaches, taking into account the various factors involved within the product development process, and consider the ambiguous nature of design, which is both linked to development processes and to products that emerge from them, comprising a confluence of objective and subjective aspects, as observed by Denis (1998).

The design area has historically sheltered various movements and discourses, some of them more and some others less directed to universal and particularistic approaches, which have, in turn, influenced design both in theory and practice.

Within the context of globalization and capitalism, whose expansion necessities have been continuous, we observe the promotion of homogenization of production means, and the search for controlling individuals' and societies' wishes. Nevertheless, such homogenization doesn't mean that resources, ownership and control of production means will be equalized between the various classes and societies, in spite of an illusion being created that everyone can enjoy, even if only virtually, the same conditions as those of ruling groups.

Market industrialization and globalization will probably not lead to design standardization and to "cultural variety eradication", due to the consumers' resistance to "the flood of uniform mass products," as argued by Beck (1991).

The globalization process has reflected the paradoxical nature of human societies, which present contradictory forces; some of them tending to divergence and particularization, and others to convergence and affinity, as inferred by Lévi-Strauss (1970). In this context, global, regional, local, hybrid and individualized products have emerged and co-existed.

Based on an interpretive view, as proposed by Geertz (1989; 1996), culture is here understood as the network of meanings woven by people in the societies in which they develop their conduct, thoughts, values and practices. Such meanings vary, according to each individual along the dynamic process of his/her existence. Culture is seen as a phenomenon which is able to represent, reproduce and transform the tangible and intangible elements that shape the social system and life, influencing and being influenced by the economic practices and symbolical relations, as understood by Canclini (1983).

It takes into account that people must be attentive to local particularities, as well as to cultural diversity, respecting other cultures, and, at the same time, have a critical vision and a moral commitment to society. It is considered that, in intercultural relations, people must search for understanding the experiences of other cultures, assimilating and reinterpreting those that can bring benefits to them, in terms of quality of life. Furthermore, it is understood that cultural diversity is not limited to generalist concepts, territorial and political boundaries, such as those of "nations" - considering that these are "dichotomist phenomena" that have been hierarchically built top-down, but that can only be understood if they are analyzed from base to top, which means "in terms of common people's suppositions, hopes, needs, yearnings and interests, which are not necessarily national, and much less nationalist," as affirms Hobsbawn (1990 : 19). Cultural diversity is, actually, particularized by the identity of each individual and social group, and it is a plural and dynamic concept.

Methodology

The adopted methodology is inserted in the interpretive paradigm, which proposes the description and interpretation of the world's phenomena within a subjective epistemological approach, which considers that the truth is relative within a context where facts and values are intrinsically related, conjoining the historical and social-cultural dimensions where we have been inserted and our vision about the world.

The research follows a qualitative approach, and is based on a "holistic vision of the phenomena", which means that it takes into account the group of components of a situation, "in their interactions and mutual influences" (André, 1995: 17).

The case studies, conducted by Ono (1999; 2004), are focused on the practice of industrial design in Brazil, which is a country that belongs to the group of nations so called "from the Third World," "developing," or "peripheral," and in whose context the globalization occurs in a complex, unequal and contradictory manner, co-existing with the dynamics of plurality and cultural hybridism. In such a scenario, the issue of the "local" and "global" dimensions has been crucial to the practice of the industrial design, in relation to its social, cultural and economic role. They are concentrated in the last decade of the 20th and the beginning of the 21st centuries, when the process of globalization was intensified.

The qualitative approach was applied in this research through semi-structured interviews with Brazilian industrial designers. The interviews were conducted from 1998 to 2001, in the design units of Brazilian subsidiaries of the following multinational corporations: 1) from the automotive field: DaimlerChrysler, Fiat, Ford, Volkswagen, Volvo; 2) from the home appliances field: Electrolux and Whirlpool (its Brazilian subsidiary is called Multibras).

The main results were grouped into five main categories: 1) the translation of symbolical requirements in industrial design; 2) the contextualization of practical requirements in industrial design; 3) the materialization of technical requirements in industrial design; 4) imported products and consumer preferences: divergences and influences; 5) the paradox of cost factor in industrial design: driving to diversification and standardization.

This paper basically aims to contribute to studies and reflections about possibilities of a cultural approach in design education and practice, based on cultural diversity, considering people's symbolical, practical and technical requirements for artifacts - illustrated by some examples from the case studies (Ono, 1999; 2004) - in order to cater for needs and yearnings of individuals and social groups, respecting their identities, and enhance a better quality of life for society as a whole.

General Organization of the Design Activity Within Multinational Corporations in the Context of the Globalization Process

The multinational corporations have developed a non-centric or polycentric relationship with their subsidiaries (Bartlett; Ghoshal, 1992).

There are some of them, such as Ford, Volkswagen, Electrolux and Whirlpool, for instance, which have decentralized their design activities in some regional units, whereas there are others, such as Volvo and Fiat, for example, that have centralized design activities in their headquarters, usually restricting the participation of their regional units to some engineering works for adapting products, according to some economical and technical factors that are demanded to make them suitable to regional markets.

For instance, Electrolux, a big multinational corporation with headquarters in Sweden, maintains a few regional design centers that work in different ways in terms of design management, in spite of being assigned similar general tasks. It has presently seven Industrial Design Centers (IDCs) in the world: two in the U.S. and one in each of Italy, Germany, Sweden, Australia and Brazil, the later being responsible for the South American markets. All IDCs are subordinated to an Industrial Design Management Team, which, at its turn, is subordinated to the Designer - Vice-President of Electrolux. The corporation has also some Industrial Design Offices (IDOs) in Europe, which are subordinated to the Swedish Industrial Design Centre. These IDOs are responsible for the European and New Markets. The Electrolux Co. defines some general design guidelines, according to different markets, which predetermine some general characteristics of the products' design. Nonetheless, the corporation has given the local units more freedom to work as far as design management is concerned.

Julio Bertola - Design Supervisor of Electrolux / South America – and Newton Gama Jr - Design General Manager of Multibras S.A. Eletrodomésticos - emphasize the importance of considering the cultural diversity on designing products for society. This was a determinant factor, in both cases of Electrolux and Whirlpool corporations, in their decision for maintaining regional design centers, such as the Brazilian ones. This approach was not quite clear at the beginning, when Multibras was incorporated by Whirlpool Co. and Refripar was incorporated by Electrolux Co. Both Electrolux and Whirlpool corporations had at first planned to centralize the design activity in their headquarters.

Remarkably, in the last few years, automotive multinational corporations — which have dominated the Brazilian market since the first automotive industries were established in the country – have also begun to give more autonomy to their regional design centers. The SUV Ford EcoSport and the Volkswagen Fox, for instance, were developed taking into account some specific requirements for the Brazilian market. The Ford EcoSport, for example, launched in Brazil in 2003, was conceived as a compact SUV to be used in both country and urban areas, and with lower price in comparison with imported SUVs.

Figure 1: Detail of an AEG refrigerator, showing its handles (Germany, 2004; 1997)

Sources: Available at: http://www.aeg-hausgeraete.de/, accessed on 02.22.04; AEG HEM et HUSHAL. AEG Köks- Och Tvättutrustning, 1997 / 98

Industrial Design and Cultural Diversity, in Relation to Symbolical, Practical and Technical Requirements

The case studies conducted by Ono (1999; 2004) at Brazilian automotive and household appliances industries emphasize the necessity of considering the cultural diversity of people to whom products are destined on designing them, in relation to symbolical, practical and technical requirements.

Symbolical requirements have varied, according to different cultures, in terms of, for example: shape, color and graphic composition, finishing, and symbolical value of products, amongst other aspects.

Straight shape composition predominates in German home appliances, for instance, and the reason for that is the German consumer's usual profile, which is "traditional" and "conservative." Moreover, Germans are usually experienced and rational in the purchase act. They demand a "robust" product, "without any ostentation," "rational" and "without anything to be considered too much or too little." The product must have "ergonomics, elegance and quality," and "every detail must be very well made," as affirmed by Julio Bertola. These characteristics can be observed, for example, in AEG products (Figure 1).

Figure 2: Details of Brastemp refrigerators, showing their handles (Brazil, 2001)

Source: Brastemp Catalogues, 2001

The Brazilians are usually more impulsive in the purchase act, and therefore the product must have an affective appeal, and "at least, must attract the attention of the consumer at the first glance, because of something special that will hold his attention when looking at a number of different products," as observed by an Electrolux Designer and confirmed by other Brazilian household appliances and automotive field designers. (Figure 2)

The above mentioned examples ratify Arnheim's vision (1996), amongst others, about the fact that the forms of the products must be defined, considering the symbolic meanings and the ways of representation that they take over individuals from different cultures.

Practical requirements also have varied, according to different cultures, in terms of, for example: dimensioning, compartments division, serial and optional items, accessories, safety systems, visual communication (texts, pictograms, etc.), and environmental management of products, amongst other aspects.

Figure 3: Brastemp and Electrolux washing machines (Brazil, 1997; 2004)

Sources: Available at: http://www.brastemp.com.br; http://www.electrolux.com.br, accessed on 12.18.04 and on 01.06.04

The practical requirements of products vary between markets, concerning safety, due to differences in legislation, as well as of perception and demand of consumers in relation to that issue. All Brazilian washing machines, for instance, have a safety system that automatically stops the functioning of them, whenever the user opens the lid. The problem is that people sometimes swindle the security system, in order to activate the machine and to see it functioning. "That's why they have been made with glass lid" (Figure 3), as asserted by an Electrolux Designer.

The North Americans have trucks with cabins, where they live (Figure 4). These cabins are much bigger, and also more equipped (they have bathroom, cabinets, table, TV, microwave-oven, refrigerator, cooker, etc.) than the Europeans, South Americans and Asians.

It is also common to sleep inside the trucks in Brazil. But, their cabins are much smaller, have no bathroom, and are much less equipped than the North Americans. (Figure 5)

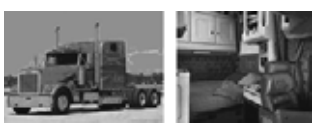

Figure 4: Freightliner "Classic XL" truck (USA, 2004)

Source: Available at: http://www.freightlinertrucks.com, accessed on 02.26.04

There is evidence of a tendency to use global platforms and modularization of components in the development of vehicles and household appliances. And this significantly affects the catering for practical requirements of people from diverse cultures.

The design of Volvo trucks, for example, has followed a "modular" principle that allows a series of variations from basic models. However, strategies like that do not broadly cater for the practical requirements of distinct markets.

In many cases, when the design is treated in a more generic and global way, there is an interference in the composition of the products by the users themselves. The installation of varnish rugs, curtains, sun visors, mud guards, water containers, rear stirrups, amongst other non-serial accessories, for example, is quite common in Brazilian trucks.

The significant development of the parallel industry of accessories and companies who carry through adaptations in vehicles makes it evident that the standardization of design, either in the global, or national, or any other generic level, does not usually cater sufficiently for the needs and yearnings of the people, who end up searching for alternative solutions, many of them palliative and inadequate, when the basic products that are offered to them by the companies do not fulfil their requirements.

The industrial design must take into account the cultural diversity of people to whom the products are meant, also in relation to technical requirements, such as: materials, finishing, functioning systems, structure, amongst others.

The materials that have been used by the companies are, in a wide range, "global commodities," as in the case of automotive and household appliances field. However, there are certain particularities in terms of technical requirements between markets that demand their differentiation.

The perception of the consumer varies in relation to the quality of the materials and this affects the specification of products.

The materials of Electrolux household appliances, for example, are differentiated depending on the markets to which they are destined. The product of AEG German brand "[...] is the most sophisticated that Electrolux has," because, in Germany, people demand materials used in products to be "noble," because they have to be durable. On the other hand, in Italy and France, for example, people are more flexible. In the case of the Alpha line, commercialized in Scandinavia, the quality of the materials is a little lower, and, in the remaining portion of Europe, "there are [products of line] Deltha, which is the most popular, that goes to India, China, some regions of Italy, France, Spain, Portugal..." (Electrolux Designer).

Figure 5: Mercedes-Benz truck (Brazil, 2003)

Source: Available at: <http:www.mercedes-benz.com.br>, accessed on 04.01.03

The technical requirements of the products vary between distinct markets in terms of durability. German cookers, for example, "are designed to last 15, 10 years…", whereas "the Brazilian cooker is designed to last 4, 5 years, maximum, and the consumer begins to imagine himself with a new model." On the other hand, it is demanded that the high-pressure washing machine should be more resistant in Brazil than the European ones, because it is "expected to be jack of all trades" in this country (Electrolux Designer).

The above mentioned examples, amongst others, demonstrate that, although a tendency has been identified towards a bigger balance between the companies within the technological sphere, the demanding of specificities, due to the cultural diversity of individuals and social groups, as well as to environmental and economical factors, amongst others, constitutes relative barrier to the homogenization of symbolical, practical and technical requirements. These must be considered on designing products for society, thus demanding a cultural approach in design education and research.

Interpretive and Holistic Cultural Approach in Design Education

Design, as a sign and as a mediator between artifacts and human beings, represents an important role in the process of developing artifacts for society. Therefore, it must indeed be considered in a perspective of the complexity of the world, as well as of the particular contexts where it is inserted, taking into account their uncertain, multidimensional, plural and dynamic nature.

Design education plays an important role in the development of design knowledge, research and practice, and it is essential to adopt an interpretive and a holistic approach, taking into account the

complexity that characterizes life within a world where cultural diversity and social, economical, industrial, political and environmental contexts, amongst others, must be focused on the fulfilling of people's requirements for artifacts, from a perspective of cultural and social responsibility and commitment (ONO; SANTOS, 2001).

Based on researches on industrial design and cultural diversity conducted by Ono (1999; 2004), this paper demonstrates some fundamental inter-relations that could be helpful for orientating the design education and practice, based on the respect to cultural identities, and focused on the catering for people's requirements for products, and on the development of their autonomy, identity and wisdom, as well as on the sustainable, social and economical development, as illustrated by the Figure 6.

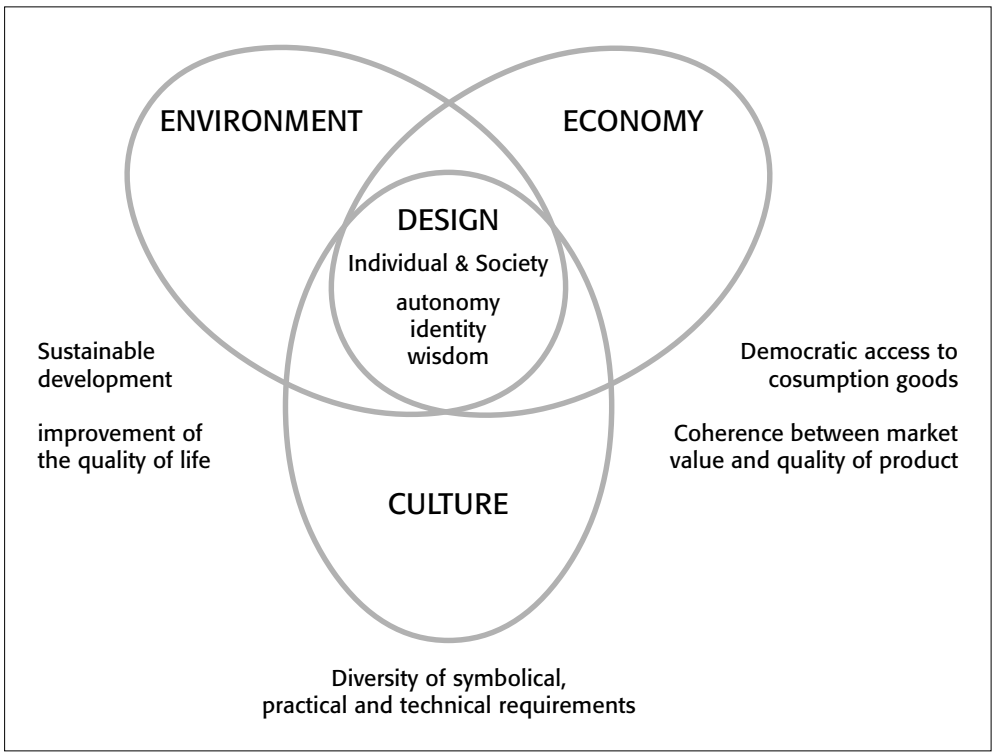

Figure 6: Representation of the inter-relationship between design, individual, society, culture, environment and economy
Source: Ono, 2004: 1047

Conclusions

We are faced with crucial problems related to the cognitive dimension of knowledge, as argued by Edgar Morin.

> There is an increasingly large, profound and serious inadequacy in our disjointed, broken knowledge, compartmentalized between disciplines, and, on the other hand, more and more polidisciplinary, transversal, multidimensional, transnational, global, planetary realities or, ultimately, problems. In this situation the complex groups, the inter-relations and feedbacks between parts and the whole, the multidimensional entities, as well as the essential problems, become invisible (Morin, 2000: 11).

This problem has also affected the design stratum, whose education, research and practice have reflected reductionist visions that refuse to lose force, despite the context of complexity that shelters the development and transformations within cultural, social, economical, political and environmental strata, amongst others, and demands the adoption of another paradigm.

Therefore, it is necessary to rethink and reorganize strategies, structures and actions, through the adoption of interpretive and holistic approaches on developing studies and projects, in order to break fiefs of power, which keep on being inculcated, hindering interactions, co-operative work, and immobilizing innovative processes and the sustainable development of useful products for society.

This paper basically aims to contribute to studies and reflections about possibilities of a cultural approach in design education, research and practice, based on the respect to cultural identities, and on social responsibility and commitment, and searching for the sustainable development, the improvement of the quality of life for all society, and ultimately the development of people's autonomy, identity and wisdom.

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Infusing Culture into Design Education:

Examples from Singapore

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Curriculum in product design has traditionally focused on transmission of technical skills and the application of technology in design. Although these standard skill requirements continue to be crucial, there is an increasing need to view design, and design education, as inextricably interwoven and connected not only to each other but to other disciplines such as psychology, cultural anthropology and sociology. Such a perspective views the development of such sensitivity and understanding of the surrounding socio cultural context, as important in the training of designers. This paper seeks to look at some of the ways in which these skills are nurtured during design studio classes in a School of Design in Singapore. More specifically, it describes how critique and relevant illustrations of common products are used strategically to set the stage for students to learn the importance of culture in product design. In addition to highlighting how the inclusion of cultural awareness reinforces other technical aspects of design education, this paper also suggests that to groom designers who are able to produce diverse and innovative products, design education should encourage and provide avenues for design education to explore cultures and the contextual background of products.

Keywords: *product design, culture, design education, Asian*

Introduction

Will a product design that is wildly successful and appealing in one context be a guaranteed success in another? Any product designer's answer would probably start with "Of course not, success of a design depends on so many other factors," before he or she launches into how context matters. The truth of the matter is that even though designers may harbour dreams of designing the ultimate universal design that is able to transcend time, space and culture, it often remains an impossible dream. Why? Because contexts matter and, more importantly, contexts differ.

For this reason, having an in-depth understanding and appreciation of the socio-cultural contexts which products are designed for, is an essential quality product designers require. In order to achieve this, design education needs to help aspiring designers understand their potential clients and their *particular* contextual needs even as it seeks to cultivate in designers the ability to cultivate generic problem solving and application technical skills. This is a delicate balance that is difficult to achieve partly because design education today promotes the transfer of a standard and accepted body of design knowledge. It is with such textbook knowledge that new designers get the license to call themselves "professionals," set apart from non-designers. Another reason for this imbalance is that sensitivity to the cultural and social changes requires the development of a keen sense of observation and awareness of one's environment. This is a trait that is not easy to cultivate among design students because it demands maturity and reflexive ability to apply knowledge of human behaviour and psychology when designing products.

Despite these challenges, in the School of Design in Singapore, there has been a concerted effort to train design students in such qualities. Particularly, in design studio classes, I have been attempting to sensitise my students to Asian design. Having been trained and exposed to both Western and Eastern design ideas and concepts, I have been struck by how much design curricula of design schools are influenced by Western models of design education. Even design schools in Asia that are

training designers for the Asian market often use Western products as examples of good design. This is useful, as many innovative designs have originated from the West; but I also believe that ample examples exist in the local context and can be used as excellent teaching aids.

As a result of my conviction, during my studio class, I use illustrations of Asian product design from my own research and observation of life in Singapore to teach design and cultural innovation. I have seen this exposure opening the eyes of my students to a new Asian world of design. They have become much more aware of products that are "birthed" in Asia and the unique socio-historical reasons behind their evolution. It is a newfound respect and appreciation of culture and it is my hope that such an insight would make them more adaptable as designers. This is especially important because in an increasingly cosmopolitan and globalized world economy, designers would need to straddle designing for the East as well as the West.

In the remainder of the paper, I would like to share the Asian examples I use during my studio classes.

Examples from North Asia

While researching for my Masters dissertation, I spent three years looking for stellar examples of Asian product designs in Korea, China, Japan, Hong Kong and Taiwan. For me the guiding question was, "Are there interesting Asian product designs which are unique because of their socio-historical origins?" As a product designer trained in Art Centre College of Design, USA, my design background was distinctly Western. But as a Chinese Singaporean, I knew intuitively that Asia was not a design "black-hole" and my journey led me to explore my fundamental premise that unique products were "birthed" as a result of a specific cultural or a social need at a specific historical moment. In previous papers (Ho, 2001; 2003) I have discussed my research findings more extensively but for the purposes of this paper, I would be discussing two striking examples I use in my classes.

These two excellent examples of unique Asian designs are the Kimchee refrigerator in Korea and the farmers' washing machine in China.

Kimchee Refrigerator

Kimchee or preserved vegetables served cold with a spicy and sour taste is a staple of the Korean diet. Kimchee is to Koreans what soy sauce is to the Chinese. In the past, in order to keep the Kimchee at the optimum temperature during the fermentation process, large pots were buried underground during winter and retrieved as needed. However, as people began moving into apartments without plots of land, this method of storing Kimchee became impractical and not possible. Refrigerator manufacturers caught onto this and LG Corporation introduced the concept of storing Kimchee refrigerators in the 1970s. This was followed up with sale of specialized Kimchee refrigerators in 1985. Today, this type of refrigerator is mass-produced and found only in Korea. It is a fine example of a culture induced and adapted product (see Picture A).

Picture A: (Kimchee Refrigerator)

Picture B: (Haier Washing Machine)

Chinese Farmers' Washing Machine from Haier Corporation

We often think of washing machines as used solely for washing clothes. However, in rural China, this is not the case. In an effort to save time, some farmers in the agricultural southwest of China used their washing machines to wash their produce such as potatoes and vegetables etc. This had the effect of clogging up the pipes with soil and eventually led to machines breaking down. The frequent breakdown complaints in that region baffled the manufacturer, Haier Corporation. After sending in a team of engineers to look into the problem, they realized the "resourcefulness" of the Chinese farmers. The result of their inquiry was a washing machine designed to wash potatoes, fruits, vegetables and clothes! By using an interchangeable washing barrel and widening the diameter of

the pipe, Haier could maintain the same technology and provide the farmers with a low cost solution. Haier Corporation's dual functional washing machine is a good example of innovating a product according to the needs of that particular niche farming society (see Picture B).

Examples from Singapore

In my class, I also use local examples from Singapore, which would be familiar to students. The idea is to make students realize that these designs have come about because of the lifestyle of the Singaporeans live and the uniqueness of their society.

The Drinking Plastic Bag

Singapore is a hot and humid country, situated only 2 degrees north of the equator. In the tropical heat, it is not uncommon to feel thirsty while walking along the streets of Singapore and look for a drink. You may be able to buy can drinks but the drinking plastic bag is Singapore's solution of a portable and disposable drinking device. Made of plastic with a plastic string attached to it, vendors who sell drinks pour the contents (both hot and cold drinks) into it, sometimes even adding ice on request. A straw is then inserted into the bag, and one can walk away with their favourite drink safely contained in a light, easily carried and disposable drinking plastic bag (see pictures C1 & C2).

C1

C2

The Portable Milk Can

This is the Singapore version of takeaway Starbucks coffee. Older Singaporeans maintain that this is the best way to savour the traditional taste of coffee or tea. A used/empty can of condensed milk is recycled and used for takeaway drinks. As the can still has remnants of condensed milk in it, tea or coffee tastes sweeter and hence better. A raffia string is tied to function as a carrier. Although paper cups are often used now, some vendors I spoke to said that this method helps them to cut costs and promotes recycling. Moreover, customers still demand this style of drinking (see pictures D1 & D2).

D1

D2

The Bamboo Holders

In Singapore, majority of Singaporeans live in government subsidized housings known as HDB flats (88% of Singaporeans live in HDB flats while 12% live in private residences)1 . These are high-rise buildings and a single block can house as many as 400-500 families. This extremely high population density per block is inevitable because Singapore does not have land in abundance and building vertically upwards is the only way to house its 4 million residents. Unlike in the West, where washers and dryers are common household items, the latter is not popular in Singapore. Instead, clothes are hung out to dry from each flat. This is sensible as it capitalizes on Singapore's sunny weather. The usage of bamboos to hang clothes out to dry is a tradition from the pre-1960 days when Singaporeans did not live in flats. But with the mass move to living in high-rise flats, new products such as the bamboo holders and covers have been designed to make it easier for this practice to continue. The bamboo holder is a metal-cast piece that holds the bamboo in place while the plastic moulded cover is designed to cover the bamboo holder when it is not used. This is to ensure that when it rains (which happens quite frequently in tropical Singapore), rain water will not collect inside and encourage the breeding of mosquitoes (see pictures E1 & E2).

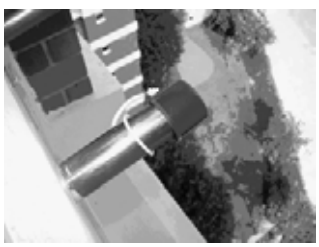
The Ticket Coupon System

Singapore has a parking system that uses ticket coupons. This ticket coupon represents the value of the parking fee needed when you park your car in a public car park. Ticket coupons are prepaid with cash and hence contain cash value. Each ticket coupon has a value of fifty cents or a dollar. It also has push tabs for date and time. As a user, you just need to push the tabs for the appropriate time and date when you are parking the car and display it clearly on your car's dashboard. Parking coupon attendants who randomly move around public car parks check that drivers have paid for their parking via these coupons. Those who have been spotted to have invalid or expired coupons are then fined accordingly. The parking coupon is unique because of its design, which is a graphic design solution more than a product design solution. It is also an innovative way which the parking authorities are able to monitor paid parking in the island using relatively low resources since no parking machine is needed and the onus is on the individual drivers to purchase and display the tickets, or risk the chance of being fined. This is an entire parking system that was thought out and designed right down to its smallest element: the ticket coupon (see picture F).


E1


E2


F1


F2

The Studio – Culture in Design

The above product examples show that within Asia, there are many products that are birthed by what I would call "cultural convenience" – conceived and devised on the basis of materials, resources and needs available locally at that point of time and the local environment. Each illustrated example sought to inspire students to be aware that we often take products around us for granted. But when given time to observe and think, they can better understand the world around them and the products that exist in their cultural sphere.

After observing the examples I provide, students are given an opportunity to explore cultural themes themselves. The design studio class runs on a 14-week schedule in four phases. The first phase comprises lectures. During the second phase, the students undertake field observation. They go to streets, markets, cinemas, shopping malls, suburban areas, and visit bus terminals. Their task is very simple — observe, document and reflect upon the way of life that is being unfolded before their

eyes. Once back in the studio, the students share their thoughts and findings. Then they choose to work in groups or individually to concentrate on a theme that they would further pursue. My only requirement is that the theme of the project has to be related to the way of living in that particular environmental context. The next four weeks and three weeks are then broken into further research and conceptualisation of new product ideas based on their findings.

The following are examples of some projects undertaken by students.

Student Joseph Lim's project:

In attempting to design an object of transport, Joseph chose to adopt the cultural icon of trishaws. Joseph started out with the research of icons that are used to promote Singapore culture; something that people would be familiar with and would be able to relate to the Singapore culture. Although the trishaw is not the main form of transportation in Singapore any more, it used to be as common as what the taxis are to us now. Mostly human powered, a trishaw was a very agile "machine," and could weave itself through small streets and corners. Today, it can be seen ferrying tourists on mini tours around Singapore. During his process of designing his contemporary transport, Joseph relates back to the original cultural expression of the trishaw. His new product proposal is a design that can be fixed to any standard existing bicycle and is used for moving goods or carrying a passenger. His product will be targeted for mass consumers' personal use.

Student Chong Ming Li's project:

Ming Li's researched and observed the food and eating habits of the different races found in Singapore. She found out that one commonality is the consumption of preserved food. There seemed to be a great variety of preserved foods and a culture of making their own pickles and their own rice wine. Some examples are the "achar" from the Peranakan ethnic group and preserved prunes/plums from the Chinese. In the past, preservation of food was done when the people had to prepare for winter and it was a way to ensure that they had food to survive. Interestingly, even as people migrate south to tropical Singapore and didn't need to preserve food as much, they kept their traditional habits of preserving food and their taste for preserved food.

Salting, smoking, sugaring, steeping, prickling, drying and soaking in many different sauces can preserve food. Successful food preservation often involved combining two or more of the five basic methods: desiccation, heating, freezing, fermentation and chemical preservation. Preservation of food also requires certain skills and knowledge, most of it being passed from mother to daughter. In view of increased urbanization and technology, most preserved food is commercially made and can be bought. To promote customisation of taste and personal exploration of different kinds of ingredients, Ming Li is proposing a product that will enable the consumer/user to customise his way of preservation. With the ease of modern technology, Ming Li's FPA will contribute to the variety of existing preserved food and even "strengthen" the cultural roots of Asian eating habits.

Student Melvin Lee's project:

Melvin believes that there is strong social cohesion between people from all different ethnic groups in Singapore. Students of all races in schools come together to learn and to interact. In the workplace, people from different racial background work together for common goals. On the social platform, people gather to interact, to exchange information, and to enjoy leisure activities together.

Melvin's research studies the behavioural aspect of the different races. He studied the gathering habits of Indians in Little India, the Filipinos in Orchard Road, how people gather around train stations, on empty grasslands, or just at the parks. He observed how they sit, how they squat and how they stand around and the configuration of their gathering. Although of different cultural backgrounds, there is still a similar bond between racial groups, and a need to gather and to communicate. What is interesting is that the predominant manner of gathering is in a very circular form.

Melvin attempted to design public furniture based on his observations and its selling point is to address the manner of gathering of different races. He argues that this would further enhance and promote an even stronger inter-racial bond in multi-racial Singapore through communication and relaxation.

Conclusions

Presently, there are many products existing in our complex world; many different types of products created and designed for our different needs and wants. How can we enable our students to use their imagination and creativity to create products that are necessary and applicable to our ways of living? How do we bring across the need for them to think about culture related issues when designing products? In the book 'Designing for the Real World,' American design educator Victor Papanek wrote, "But it is not possible to just take everyday objects and without regard to context expect them to work in a different society…" Papanek explains with the example of the Japanese tatami in an American home as there was a time during the 1980s, there were many importers selling tatami to American home makers. Japanese tatami are rice straw floor mats that cover Japanese traditional homes and rooms. Such methods of flooring will simply not work in an American home, as Western styled leather soled shoes and spike heels will destroy the rice straw. Americans also have the habit of wearing their footwear into their homes and bedrooms while the Japanese leave their footwear at the doorway, before entering their homes. He believes that the content of a design must reflect the times and conditions that have given rise to it and must fit in with the general human socio-economic order in which it is to operate.

Many a time, a product successful in one particular environmental or cultural context may not be successful when transplanted and placed in another environment and culture. The understanding of that particular cultural role in the product is extremely vital for the product's survival in that environment. Hence the importance of the product designer to have an ability to "visualize" how a product can be adapted or innovated to suit the environment or cultural inclinations at that time of history.

In our generic design education curriculum, training the designer to have the skills necessary to practise as a product designer has always been the main priority. It is without any doubt that is very important and has been our core fundamentals. However, it has been getting increasingly important too that the designer needs to possess certain values in the area of design judgment that makes them a cut above the rest who are technically competent but may not make good design decisions.

Such projects, if delivered properly, can enable the following learning objectives.
Students are able to

- Have a better understanding of the link between culture and product design.
- Cultivate keener observation skills that can prove to be helpful in their other design projects.
- Study a topic or theme that is based in present time and develop insight into how new future products that can be created through the perspective of socio-cultural understanding,
- Apply their understanding of the existing socio-cultural contexts and changes into their design process and thinking.

As a designer and design educator, and from my interactions with my students, it is clear that a development of cultural understanding can lead to a creative advantage and an edge in design education and the conceptualisation of products.

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PRAYOG in Design Education: Lessons from the Khadi Archive

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For khadi to reinvent itself today and go beyond the debates on tradition versus modernity or designer fabric versus way of life, it needs to understand the method in the khadi movement, especially its notion of the experiment. Prayog was one of the key elements of the khadi movement that linked ideology and practice and had diverse institutional forms. This paper explores the possibility of design education through an alternate reading of the khadi movement based on the hitherto ignored technical literature of the khadi movement. The khadi archive used in this paper highlights the importance of these institutional forms for science such as technical books, saranjam sammelans (technical conferences), Prayog Charcha Sabhas (meetings for discussions on experiments), the journal Ambar and the Khadi Gramodyog Prayog Samiti in taking khadi forward.

Readings of khadi in the past have often looked at events such as Gandhi's death, setting up of the KVIC, or the introduction of the Ambar Charkha as defining points creating a split between the way khadi has been seen before and after independence. However an alternate reading indicates the unique contribution of the experiments of the khadi movement to Indian science. Some of the features of this model of science in the vernacular, a model hitherto ignored by science policy makers and the design community alike, is the synthesis of artisanal skills and scientific work, peoples' participation in making technology, close connection between the laboratory and the field, de-centralisation of the design innovation process, and creation of a different kind of research and design professional. Reflecting on the design of institutions that gave and can give diverse meanings to khadi and reinventing prayog is the only way to prevent khadi becoming a fetish for Gandhians or a fad for designers.

Keywords: *vernacular knowledge, prayog, scientific dissent, khadi archive*

Introduction

Looking back with hindsight at the Eames Report one wonders what would have been the nature of design education in India had Charles and Ray Eames looked at the Charkha along with the *Lota*. They were, as we know, fascinated by the lota and converted the lota into a design question. They felt the need for an institute that would produce the 'Lotas of our times.' Eames adds, "No one man designed the Lota but many men (sic) over many generations." This paper is not a debate about lotas and charkhas but an attempt to reflect on design education practice on producing lotas of our times, not just as product, but also as a social and technical process. The reinvention of the charkha by Gandhi is part of everyday textbooks of history of India, a revolutionary tool that got India its freedom. However what is not known is that the charkha, like the lota, was not designed by one man (Gandhi), but by many women and men, by community workers such as Gangabehn Mazmundar who found the wheel for Gandhi, and Maganlal Gandhi who translated a local experiment in Vijapur into a national phenomenon through innovations in the ashram as a laboratory. Here was a product like the lota that was there for centuries in India, but unlike the lota had gone out of use and needed reinvention through social and technical processes to give it new meanings by Gandhi and others.

The Indian sense of history is selective. We know a lot about how the charkha transformed the political climate of the nation (Parekh 1989, Brown 1992, Pantham 1998, Tarlo 1996) but little about the social or technical process or about people like Gangabehn through whose experiment in Vijapur Gandhi had the confidence to place the charkha before the nation, or Maganlal Gandhi who was behind the design of its spread from the Satyagraha Ashram.[1]

As a product the charkha went through several innovations in its reincarnation in India prior to Independence. Eames' description of the criteria for design of the lota reminds me of the Charkha Prize for the 'Spinning Singer' (an improved spinning machine that would have the features of the Singer sewing machine) constituted by Gandhi in 1929, a prize of rupees one lakh that invited designers from all over the world and that had strict criteria that were both technical (16000 yards in 8 hours of 12-20 counts) and social (operable by women with their hands for eight hours without strain and hand carded slivers) and a challenge to designers. More striking is the coincidence of the setting up of the Khadi Gramodyog Prayog Samiti (KGPS) in 1958 at Ahmedabad, the same year that the Eames Report was commissioned and Jawaharlal Nehru had placed the Scientific Policy Resolution before the nation. The resolution saw Western technology as the key factor in bringing India to the modern age. The aims of the SPR were to be pursued "by offering good conditions of service to scientists and according them an honoured position." Unlike this governmental approach that sought to privilege scientists, the Samiti charted a different line emphasising people and the need to develop their technical skills.

Readings of khadi in the past have often looked at events such as Gandhi's death, setting up of the KVIC, or the introduction of the *Ambar Charkha* as defining points, creating a split between the way khadi has been seen before and after Independence. Deepak Mehta's sociological study (1992) provides a good critique of post-Independence khadi under the KVIC. Mehta points out how, by applying a managerial notion of work, planning had separated forever the instrumental value of khadi from its symbolic character, thereby excluding from its ambit those symbols and actions that could not be planned. While Mehta's textual reading of the KVIC's understanding of khadi ('official' khadi) remains valid, the exclusion of the movements' literature from the 'khadi archive' suggests almost no response or resistance from the khadi movement to this process of ordering khadi. Further, it is moot if the separation of the symbolic from instrumental values is inherent to the Ambar charkha as a tool, or, were there different ways in which this tool could be viewed? The critiques of the Ambar plan, whether from planners for whom modernisation meant technical improvement alone, or from scholars for whom the symbolic was lost, meant that the new khadi had little potential for technical improvements and generating meaning in newer contexts. However a closer examination of the khadi literature, especially in the vernacular, suggests a different picture. What I hope to do in the rest of the paper is to explore some of the implications from this 'khadi archive' for vernacular knowledge and design education.

1 Khadi and Design Education

While pursuing my research on science in the khadi movement I spent a week at some of the institutions in Ahmedabad, the (erstwhile) textile city. The sheer diversity of material on textiles struck me. The Calico museum had some of the most fascinating collections of textiles that art and textile historians were documenting. At another level there was this large collection of material on textiles at the National Institute of Design (NID) where textiles is taught to design students. I also spent time at the Gujarat Vidyapeeth and the Sabarmati Ashram and the Khadi Gramodyog Prayog Samiti looking at their collection of books on textiles. I had by then come across the classic book by Dattoba Dastane on weaving, titled 'Bunai' (1948), which some Gandhians had. Soon I realised that the 'modern' institutions that were building up information on textiles and the Gandhian institutions were like two parallel worlds working independent of the other. The Calico Museum, by definition, was looking at traditions — and lost traditions at that — while NID was involved in detailed craft documentation that included khadi (there was a lovely book by Kurma Rao on handspinning of Ponduru in Andhra Pradesh). The latter was visual and the former was following the old texts. Where could one place khadi and Dastane's *Bunai*?

NID library had, as expected, no copy of *Bunai*, which was in Hindi. Why is Dastane's book Bunai important? As a technical book *Bunai* was elaborate and would rate very high for the level of details in explaining weaving and loom preparation. Why a book on weaving when there are thousands of weavers in India? Technical books in the vernacular are indeed rare. In fact vernacular knowledge is associated with 'oral' traditions but here was vernacular knowledge that was written and contemporary and not relying on the *sastras* alone. *Bunai* was a book in design education and was part of the syllabus of students of the khadi schools. Dastane, like Maganlal Gandhi before him, was not from the weaving community but became an expert in weaving and used this expertise to teach many others and felt the need to write a book for practitioners. Can Dastane be seen as a modern day design professional producing the 'lota of our times?' Or was he an isolated native scientist doing something in the vernacular?

2 Innovations and the Khadi Movement

Few technological innovations in the twentieth century have undergone as rigorous a process of social shaping of technology as the charkha by the All India Spinners Association (AISA). The announcement of a Charkha Prize for one lakh Rupees in 1929 is a good example of this process and has been commented on. Relatively unknown is the complementary effort by Gandhi and his co-workers to make a charkha in the early thirties. Though not part of the prize competition, these efforts reveal how Gandhi believed that the scientific process of innovation had to include the self. While in prison, Gandhi recreated a workshop like atmosphere inviting co-prisoners and even the British supervisors to participate in this collective quest for improving the charkha. Gandhi's notion of innovation lay not merely in the instrumental aspect of producing the perfect machine but in the larger social process of creating an expertise that would have competence and yet, at the same time, be sensitive to aspects of craft and village life. Though not articulated in that manner, what Gandhi did envisage was an Indian Arts and Crafts Movement. His hope was that this technical expertise would spearhead technical change in the country. This process of innovation was not bound by tradition to specific caste groups. The inventors in later developments of the charkha were to come from the class of community workers that the movement had nurtured, those who offered their experiments as sacrifice and were in the forefront of khadi science.

The Kirloskar Brothers and their inventor Kale came closest to meeting the criteria of the Charkha Prize. Gandhi's correspondence with the Kirloskar Brothers is fascinating, for it reveals the possibilities of collaboration while maintaining different ideologies. Gandhi did not attach too much importance to the prize per se but saw it as a means to further the direction of experimentation on improved hand tools. Instead of an outright rejection of Kale's machine, he preferred continuous experimentation. He suggested that AISA buy a few machines for experimentation and test their workability to help determine whether they could declare the machine as the prizewinner. He invited them to make a bold initiative of placing their knowledge and expertise in the public domain. He wanted that the Kirloskars participate as "comrades in a common humanitarian cause and not as commercial men." Through their organisation they could suggest or make improvements in village tools in his Village Industries scheme, especially the village *chakkis* for grinding wheat, the rice-pounder, the oil press and the cane crusher. It was in this spirit that Gandhi asked them to send a sample of their machine for him to test along with Kale, the inventor. The Kirloskars, however, were not keen to part with their drawings against what they perceived as their business interests.

The collaboration between science in civil society and the market ended prematurely. This very failure became the compass for an uncharted territory for later experimentalists to follow. The invention of the Ambar charkha in the early fifties shows how the khadi movement resolved the same predicament successfully. Not only was it able to involve the mill-based inventor Ekambaranathan as part of the social movement but it also got the ATIRA, established to serve the mill sector, to contribute its technical expertise to the movement. These efforts assumed an institutional form in the khadi movement and the AISA initiated *Saranjam Sammelans* (implements conferences) for certification and demonstration of improved tools. These meetings revived interest in technical

matters and encouraged research and experimentation. Several Saranjam Sammelans were held by the AISA between 1947-50 for a better charkha and as a result of the public and shared atmosphere of innovation, Ekambaranathan, a mill worker from Pappankulam village in Tirunenveli district of Tamil Nadu independently invented the Ambar Charkha in 1949.

The first prototype was a two-spindle charkha. Ekambaranathan's work brought to fruition earlier work to introduce ring spinning in the charkha but these earlier machines by Kale and Purushottamdas were bulky and could not be easily placed in villagers' huts. Between 1949 and 1954 the Ambar Charkha went through several modifications, first by Ekambaranathan himself who carried out independent research for two years and tried perfecting the idea. Later (1951-53) AISA provided the institutional and technical support to Ekambaranathan and involved him in a collaborative effort. Eighteen different models were made with a largely all-metal construction. However following a decision taken at the Saranjam Sammelan 1955 in Ahmedabad a wooden model with rosewood was finalised. The choice of wood was deliberate as the charkhas could then be made in a decentralised manner in the villages.

2.1 The KGPS

Research activities acquired a new direction and vigour in the khadi movement with the invention of the Ambar charkha in 1949. Though the government did not act on the recommendation of the ACEC Report to set up a Textile Research Centre, the Akhil Bharat Sarva Seva Sangh (ABSSS), the newer form of AISA, passed a resolution to create a khadi and village industries laboratory in 1957. Such a centre, called the Khadi Gramodyog Prayog Samiti (KGPS in short), was set up in Sabarmati, Ahmedabad in 1958 to cater to the research needs for 'all round development of khadi and village industries.' Specifically, the Samiti was to look into the technical and organisational requirements of the Ambar plan like availability of seasoned wood at the village, training of village carpenters and improvements on the charkha wherever necessary. The Samiti recognised the need for scientific and technical manpower to provide village oriented laboratories and research schools and saw itself undertaking scientific experiments and research for this purpose.

The expectations from the Ambar charkha were indeed high as the planning regime projected it and it was seen as a solution to the country's unemployment problems. Also, the new governmental dispensation through the provision of funds and grants had placed the movement under a management regime of planning. The KGPS was in a way trying to mediate between the old khadi and the new. The demands for greater productivity and the immense technical possibilities of a ball bearing or a gear, or the use of metal in the Ambar charkha instead of indigenous material like leather, rope or wood, were indeed high and tempting. However, the KGPS was often not taken over by these possibilities as most advocates of technical advance suggested. Nor were they rejected outright as many Gandhians suggested. The KGPS sought to maintain a different viewpoint from the technicists and traditionalists. The articles in *Ambar* have several instances where ball bearings, the use of power in carding etc. are discussed at length. This attempt to work out an alternate path beyond the binary opposites of 'tradition' and 'modernity' was a significant feature of the khadi movement of the fifties. Every technical change had to go through a review process or audit through experimentation on the one hand, and forums such as Prayog Charcha Sabhas on the other.

3 Technology and Institutions in the Khadi Movement

When the Ambar charkha was invented, the KGPS had to create a new scientific manpower to look at the issues of khadi and village industries. The KGPS, under the leadership of Krishnadas, instituted several novel institutional mechanisms to facilitate this. One such was the Khadi Research and Training Cell (*Khadi Sanshodan aur Prayog Vibaag*). Another was the *Prayog Charcha Sabhas* or meetings where issues of research were discussed every two months. This internal strengthening of institutions to facilitate research went along with an exercise, to use Gandhi's phrase, in utilising the "talents of the mills."

3.1 Collaboration with the Mill Sector

With a view to benefit from the technical expertise of the mill sector, the KGPS collaborated with ATIRA, the Ahmedabad Textile Industries Research Association. The shift to Ahmedabad from Wardha, which till then was the headquarters of the AISA and the centre of research, was undoubtedly of significance. It indicates an attempt to provide contemporary relevance through closer involvement with the mill sector. ATIRA was involved in the ACEC Report wherein its technical opinion was sought. The technical report of ATIRA on the charkha is interesting for its objectivity and lack of bias towards the mill viewpoint. ATIRA also established a khadi laboratory where experiments and tests were carried out on a continuous basis at least up to 1963 and headed by Ramaswamy who was instrumental in introducing systems for quality control for the new khadi. The khadi movement saw this unique and long-standing collaboration between KGPS and ATIRA as a model for all government laboratories in the country. Through its collaboration with ATIRA, it tried to show that it was possible to maintain technical autonomy while collaborating with its ideological adversary provided there were institutional mechanisms to enable it. In fact it is the absence of these institutional mechanisms that have made recent efforts by KVIC to involve IIT Delhi and thereby the larger scientific community, extremely top heavy and hierarchical.

There was a change in the direction of research from 1961 onwards with greater attention being paid to the other stages in manufacture of cloth, specifically on carding. KGPS did not believe in compartmentalising its research and sought to carry out research on all aspects of cloth manufacture. KGPS continued the research of AISA on cotton varieties suited to khadi. Work on carding that began in 1961 was highlighted after a committee was set up in April 1962 to look into improvements in carding of cotton. This committee met regularly and published its findings and discussions through *Ambar*. The idea of the movement was to involve at least 50 experimenters in various parts of the country in this program. In the first year, there were six types of cards and 37 people made nine models at KGPS. A look at the various innovations and experiments at KGPS reveals that an overwhelming portion of research of KGPS was in its first few decades, later obstructed by the march of centralised planning embodied by the KVIC. Of the 90 innovations listed by Awadh Prasad from the various annual reports of KGPS between 1956-86, 63 were before 1968 (1994: 50-51). This substantial activity in research and development in the khadi sector post-Independence is embodied in KGPS's technical journal *Ambar*.

3.2 *Ambar*

Ambar, published from the KGPS from 1956-72 occupies an important place in the history of Indian science as India's first technical journal in Hindi. Much of the debates that have highlighted the role of good national journals in the building up of healthy, functional and purposeful institutions of science have been interested only in English language publications (Krishnan C. N. and Viswanathan B. 1989a and b). We feel the debate needs to be extended to the relatively unknown journals in the regional languages. *Ambar* can be seen as an important contribution in this context.2 Right from its inception, the journal saw itself as serving a very specific target audience - the khadi workers. The journal was meant as a 'knowledge vehicle' for khadi workers and as necessary for creating or founding '*Ambar Sastra*' or the science of Ambar. The main focus of the journal was to provide information on khadi technique and it was seen as a link between the *prayogshaalas* or laboratories and the khadi kendras as it was felt that 'new inventions and discoveries were happening daily and new experiences were coming from the field.' Workers were expected to read and contribute to the journal. The journal was started as a bi-monthly and was to have from 8-16 pages. In 1962, the subscription of *Ambar* was 264 and this shot up to 825 in 1963 indicating its popularity amongst khadi researchers.

The role of the journal was more in creating the right research atmosphere firstly by placing the problem and secondly in giving the field experimenters their due. The journal underwent constant changes from its inception both in its format and content reflecting the concerns of the movement. It was not until the fifth year that the first article in English appeared. The stated focus was still that 'new research has brought about a new science and that needs to be published.'

3.3 Saranjam Sammelans and Prayog Charcha Sabhas

People's participation in technology continued as an essential feature of the developments of the khadi movement till the seventies. The movement was able to channel the energies of lay persons through *Saranjam Sammelans* and technical conferences held all over the country. Trainees, artisans and enthusiasts from outside the khadi sector, all of who contributed their labour, time and ideas, made some of the key inventions. Ekambaranathan, a mill worker from Erode, who was interested in the movement, invented the Ambar charkha. The Samyukt charkha was made possible due to the efforts of a Gujarat spinner who provided the idea that later developed at the KGPS. The madhyam dhunki, a carding instrument, had the involvement of a Jubilee mill engineer.

This extensive involvement of people in research is best exemplified by the responses to the Rs. 1 lakh charkha prize by KVIC in 1958 following the Ambar Charkha Enquiry Committee report. The initial prize of 1929 had attracted twenty entries; the latter one in 1958 saw 135 people who sent their drawings and 30 who made working models.

The Saranjam Sammelans also included extension workers, and artisans as participants. They had a two-fold purpose. The first was to give direction to research in current innovations in the field through technical discussions in the context of exhibitions that displayed improved implements from various institutions. The second was an attempt to build a community of scientists with a view to pool their work and build internal strength in the movement by providing guidelines for research. It was at one such Sammelan in 1957, at Ahmedabad (the first after the successful introduction of the Ambar charkha) that an interesting resolution was placed and accepted. It was agreed that as the research of the Ambar charkha had come about through the efforts of several people, future research too should not be incentive driven as that would go against the khadi spirit. Mazumdar who addressed the gathering highlighted the point that it was not important to increase productivity at all costs.

These Sammelans were well attended and had several kinds of displays in the exhibitions that were part of them. The discussions were structured around the improved working models with large part of the participants' time spent at the exhibition site with the machines. 108 people attended the sammelan in Sewapuri, Benares in 1948 from various parts of the country. The sammelan at Ahmedabad had no less than 17 different sections. Consequent to one such Sammelan was a decision to send a team to Japan to examine village industries in Japan. The team left with a detailed questionnaire and even returned with a small-scale machine. Arvind Pandya who headed the team visited Japan and wrote extensively on his visit. In all he had been to 27 cities and saw 157 big and small industries and 14 labs. He lists 22 industries that could be set up in rural India.

While the Saranjam Sammelans were continuations and extensions of earlier efforts by AISA, the *Prayog Charcha Sabha* (PCS) was a forum that was started by the KGPS. This forum discussed research ideas and directions in progress before the prototype stage and was the khadi movement's equivalent of a peer review. Experimenters from all over the country used to discuss and evaluate various research direction and models. A noticeable feature of the effort was the number of people involved in the effort and it often had more than 40 people. If the PCS was a forum largely for experimenters alone, the *Prayog Sahayak Charcha Sabha* was more broad-based and had other khadi workers as well. The intention was to involve several people to look at the models made and envisage the problems at the field. The Sammelans and the Charcha Sabhas all point to people's involvement in research in the khadi movement in the sixties.

3.4 Training and Technical Literature

Training in the khadi movement was a process that was co-terminus with research and other activities. A Khadi Sanshodan Talim Varg (Khadi Research Training Cell) was started almost immediately after the setting up of the KGPS. Its aim was to train and create the manpower for research that it felt it sorely lacked and to familiarise khadi workers with new tools and processes of cloth making. The numbers here were also substantial. In five years the training cell trained 173 students, 111 of them were absorbed in various institutions.

Apart from this institutional initiative to train workers for research who would be of use in the khadi centres, the movement also had envisaged and carried out training programmes to support technical staff who, in most modern institutions, have no forums to meet on professional grounds and exchange views. Thus, we notice that a 'Technical Assistants Shibir' was also organised. Mistris or masons were also brought to KGPS and underwent training to make new charkhas. *Shilpkaari Talim* (Training Program for Artisans) was another initiative to upgrade craft skills through scientific training and was seen as the Khadi and Village Industry's own ITI (Industrial Training Institute). It was started due to the perceived need in Khadi and Village Industries for people with the knowledge of both artisanal or crafts skills and technical knowledge. KGPS felt that the question of achieving this was also a matter of research and embarked on experiments with a few trainees to work out the mechanisms.

The research of the khadi movement resulted in a continuation of the publication of technical books on various aspects and kinds of khadi. Table 1 gives a list of the technical literature generated by the movement over the years.

Table 1: Technical publications of the khadi movement (1923-61)

Sl.	Year	Name of Book	Author
1	1923	Vanaat Shastra (G, H, E)	Maganlal Gandhi
2	1926	Essay on Handspinning and Weaving	Punatambekar and Varadachari
3	1926	Takli Sikshak (H) Takli Teacher (with Gregg)	Maganlal Gandhi
4	1928	Desi Rang va Chapai (H, G)	Prafullachandra Ray
5	1935	Takli Kaise Kaaten (H)	
6	1938	Madhyam Pinjan (H, G)	Mathuradas Purushottam
7	1940	Magan Charkha (G, H)	Nandlal Patel
8	1940	Katai Ganit (H)	Krishnadas Gandhi
9	1940	Otna, Tunna va Dhunna (H)	Satyan
10	1940	Takli (H)	Kundar Diwan
11	1944	Dhanush Takua (H)	Keshav Devdhar
12	1945	Sawli Charkha(M)	Keshav Devdhar
13	1945	Saranjam Parichay (H)	Keshav Devdhar
14	1945	Nai Tunai (H)	Dattoba Dastane
15	1945	Sutarane Tantane Swarajya (G)	Kanu Gandhi
16	1945	Katai Ganit, 2nd ed. (H)	Krishnadas Gandhi
17	1945	Kisan Charkha (H)	Prabhakar Diwan
18	1946	Gharelu Katai ki Aam Baaten (H)	Krishnadas Gandhi
19	1946	Dubta (H)	Krishnadas Gandhi
20	1946	Sulabh Pelu (M) Sulabh Puni (H)	Keshav Devdhar
21	1947	Katai Ganit Prakaran (H)	Krishnadas Gandhi
22	1947	Khada Charkha (H)	Keshav Devdhar
23	1948	Bunai (H)	Dattoba Dastane
24	1949	Katai Shastra (H)	Satyan
25	1950	Kapas ki Samasya: Khadi ki Drishti se (H)	AISA
26	1950	Vastravigyan Lekhsangrah (H)	Prabahakar Diwan
27	1954	Takli aur Dunki ki Prarambik Gyan (H)	Parashuram Mehrotra
28	1957	Ambar Charkha Kyon (H)	Keshav Deodhar
29	1957	Ambar Charkha Yantra (H)	Keshav Deodhar
30	1960	Tanth Banana (H)	Satyan
31	1961	Kapas (H)	Dadabhai Naik

Source: Collated by author.
H - Hindi, E - English, G- Gujarati, M - Marathi. All books published by the All India Spinners Association or by the Akhil Bharat Sarva Seva Sangh (to which it merged after 1949) except nos. 5 (Gram Sewa Mandal), 9 & 10 (Hindustani Talimi Sangh), 27 (Gram Udyog Trust) and 28 & 29 (Ambar Shiksha Vibagh).

These books constitute an important part of khadi science and are a valuable contribution of the khadi movement to technical literature in textiles. Though primarily used as manuals for teaching, they were well-researched, meticulous in detail, and practice oriented. Books like Dastane's classic, *Bunai* (1948), and Naik's *Kapas* (1961) are significant for their contribution to the articulation of a different science. The technical literature shows that it was on such practical technical aspects as much as on ideology that the difference between hand and mill made cloth manifested. We note that there was a slow but sure decline in publication in later years. There has been almost no addition to this literature in later years.

4 Khadi, Prayog and Science

There have been several attempts to infuse dynamism into the khadi sector, the latest being the setting up of the Mahatma Gandhi Institute for Rural Industrialisation (MGIRI) at Wardha. However much of this dynamism seems misplaced, as it does not seek to build upon some of the institutions that the sector have already produced. Even assuming that the original institutions are in decline, reforms in the khadi sector need to look at the unique institutional mechanisms of people's science that the khadi movement has produced. This resource of the movement undoubtedly has implications for khadi but it also has broader implications for design education. It seems to argue for another approach where the designing (cap)abilities of indigenous designers are enhanced. There seems to be an inherent divide in the country where design is taught at modern institutions whilst the large rural populace has to contend with ITIs and often poor quality ones. The research directions of the khadi movement has recently led to a fascinating redesign of the pre-spinning operations by a team of researchers based in south India who have picked up ideas from the khadi movement and worked on machines that were abandoned by the KVIC. These machines now based in the field have provided weavers with much needed access to raw materials and greater control over the production process. The contemporary understanding of the institutional dimensions of the khadi movement however needs to be understood.

The experience of the khadi movement however suggests that there could be alternate models of vernacular knowledge where there is a synthesis of artisanal and scientific work and binary oppositions of tradition and modernity are bypassed. If the Science Policy Resolution saw the flow of the effects of science as uni-directional from the state through its scientists to people, KGPS on the other hand involved a large number of people in research and even trained people through its training programmes to orient them for research. One of the significant contributions of the khadi movement is to the debates on the nature and structure of science in post-independent India and in defining and showing what constitutes a 'Peoples Science'. Khadi workers like Maganlal, Dastane and others not only saw themselves as heirs of an ancient knowledge system but also sought to update it through their experiments. It was a result of these experiments that *Ambar* came into being demonstrating the possibility of science in the vernacular. It was also through their efforts that the khadi movement has been able to establish a rich treasure of contemporary texts on an ancient knowledge system. The khadi movement did not fight shy of using modern methods of organisation, if necessary, like technical forums and journals, and the creation of new texts, to further its agenda. Neither did it rely only on traditional communities or traditional texts alone in this very 'traditional' technology. These texts were new, based on experiments and proven practice. Their significance lies in the extent of technical details that need to be seen as models of standards for textbooks or manuals in traditional technologies. The khadi movement developed skills in the people within an overall educational process, from which contemporary design pedagogy even can certainly learn. The need for producing 'lotas of our times' is as relevant as it was in 1958 and the experiences of the khadi movement shows one such method.

Notes

1 Maganlal Gandhi who died in 1928 was described as the 'soul of the ashram' and Gandhi, in a moving tribute titled 'My best comrade gone,' described his contribution to the spread of khadi. While Maganlal lies forgotten in a corner of the Ashram, Gangabehn finds no mention on several articles on Gandhi and women including more recent articles that speak of Gandhi and the charkha (Jha 2004). For more on Maganlal Gandhi and his role in the spread of khadi see Shambu Prasad 2002.

2 It is a sad commentary on the degeneration of this legacy that no set of copies of this unique journal is traceable either at the KVIC or KGPS even today. We are grateful to Naginbhai Salaria due to whose efforts a set could be traced.

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Informal Sector Services: The Waste(d) Discourse in Design Education

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The paper argues for a sociology component in design education, using the field of municipal solid waste (MSW) in India as a case study. In the past, the stigma attached to the handling of waste in Hindu society led to an indifference and apathy to local efforts in MSW on the part of the professional design community. Today, when waste has "become gold", the scenario is very different. The best minds the world over, are deeply concerned with enhancing waste's value, while reducing its longterm environmental costs. As corporate solutions, these remain however largely technology and industry based. On the other side of the divide, given the growing environmental awareness of the middle-class, NGO and civil society involvement with MSW has also increased manifold. But these efforts focus more on labour activism and how to bring about behavioural and attitudinal change in human consumption. They have little use for professional designers and even less for design theory. To complicate matters further, both these corporate and 'developmental' initiatives are opposed by stigmatized waste workers - members of the Dalit (earlier Untouchable) communities, employed predominantly in the municipality - who are afraid to lose their 'monopoly' over waste.

A design education, which is socially aware, can take all these divided positions into account and help professionals reach out to the wider public without alienating state municipal authorities and/or the experts. The widely held view that poverty leads to pollution, it can argue, is only one side of the picture. The urban poor in India have been Waste Service Providers of long standing and cannot be confined to the role of Polluter alone. The absence of the informal economy in the solutions offered by designers, urban planners, activists, politicians, technocrats and municipal officials, renders them ineffectual. Design pedagogy must tackle the continuing 'invisibility' of the social sector in its programmes, if it is to achieve its professional promise.

Keywords: *municipal solid waste, informal sector, Indian culture, sociology, design pedagogy*

1 Introduction

In India, the local community has been a Waste Service Provider of long standing and cannot be confined to its role as Polluter alone. Though deemed an unorganised, even illicit sector, it has been involved with all activities from collection, segregation, lifting/carting to storing, recycling and trading in waste. A study by Chintan, an NGO in Delhi, informs us that the average daily collection of waste by a rag picker is about 25-30kg/day. Almost 125,000-130,000 Kg of waste are collected and sold by rag pickers in only two Zones of the Delhi Municipality. Large-scale transportation and treatment of waste alone has remained exclusively in the municipality's purview. Annually, the contribution of the informal sector to the municipality is as much as rupees 20-26 crores (2001). And yet it has been rendered 'invisible', abandoned not only by official statistics and policy plans but by mainstream design practice and pedagogy as well.

Clearly, waste is not the only global resource. Even those dealing with it reflect a human resource with great potential for generating sustainable economic and social capital. Particularly so at a time,

when rapid urbanization and resource crunch has crippled municipal bodies in the discharge of their statutory functions. Under pressure from unplanned urban growth, official bodies, it is well known, are handling only about 30% of waste services (UNCHS 1994). In the National Capital Region of Delhi alone, municipal bodies are unable to clear all the waste that the city generates. An IPCA (Indian Pollution Control Association) report is equally damning. Only 62% waste generated in Delhi, it argues, is being collected (2001). The rest of the waste handling is being done by rag pickers who collect, sort and transport waste free of cost, as part of the informal trade in scrap, saving the government a large amount of money daily.

In a situation where households, neighbourhoods, public agencies and commercial and industrial establishments are all implicated in unplanned urban growth, official strategies of MSW management cannot cope alone. The need of the day is for partnership effort, particularly since employment generation in the formal sector has lagged behind urban labour force growth, leading to an automatic spill over into the informal sector. Public sector employment is stagnant, if not on the decline. India, under pressure from Structural Adjustment Programmes (SAP's) has reduced public expenditure drastically. If the burden of employment generation the world over, seems to be shifting to the urban informal sector, in India, 65% of all employment in urban areas is already attributable to the informal economy (ILO 1998, 2001). A public spokesperson of the Ministry of Urban Employment and Poverty Alleviation recently argued at a public panel organised by the India Habitat Centre, that more than 90 per cent employment in India today is in the informal sector with about 59 percent involved with waste alone (December 2004). The ILO and the World Bank have strongly advocated increased complementarity of the two sectors through ending discrimination against activities of the informal sector that are often seen as an offence. And indeed, right after Agenda 21, programs for minimizing waste, for waste re-use and re-cycling, for ecologically sustainable waste disposal and treatment and for greater waste service coverage had begun looking not only at the environment but at community participation and livelihood issues as well (UNCED 1992).

To enhance the social value of design solutions however, clear research goals on MSW, which incorporate all the structural elements and major interest groups or 'stakeholders' in the field, need to be evolved. There can, for instance, be no collaboration with the municipality in the informal sector, without "Re-cycling" even figuring in the official charter of activities. Just as, there can be no viable solutions for the organisation and upliftment of poor rag pickers, without new legal statutes coming into place, under whose rubric Identity cards, social security and the like can be provided by the state. Even the design solutions offered in collaboration with the technocrat and the corporate manager are incomplete, if they do not include the informal economy operating on the ground in MSW.

2 Sociology in Design

The partnerships and *bhagidari* initiatives being promoted today between the municipality and the corporate sector on the one hand and the unorganised sector on the other, cannot be presumed upon a model of formal-informal alignments *in the abstract*. Nor can the designer, in the search for socially responsible solutions, presume legal structures, not yet in place. Without exaggeration, there is urgent need today, to examine the field of MSW and observe what is actually happening on the ground in people's lives and living spaces, before intervening professionally. It is here that sociology and the methods of ethnography and participant observation in particular can inform design pedagogy to great advantage. The normative focus in design education has been fed so far by technology and economics inputs - both of which have not found it possible yet to come up with a holistic solution to the problem of waste. Sociology with its research focus on i) concrete and everyday household and community practices, ii) the larger cultural discourse surrounding things or objects and iii) the documentation of actual, not ideal citizen attitudes, behaviours and practices, can help design set socially responsible goals in its solutions for waste. It can also enable a critical examination of the direction alignments are already taking, between the informal and the formal sector- both corporate and municipal.

3 Privatisation & the Informal Sector

The flexibility, viability, comprehensive scope and self-sufficiency of the informal sector, can contribute very substantially to the plans for a greater "privatisation" of MSW management in India. But so far, privatisation has only meant the corporatisation of waste services, to the exclusion of the informal sector. The MCD's handing over of the rights to waste and to waste-related functions to private contractors, has largely worked against the informal sector. The private sector ruthlessly protects its terrain. Waste-collection by rag pickers, within its boundaries, now comes at a price, with a fee having to be paid to the contractor. Equally, the Municipality's charter of waste activities continues to include only - "sweeping" by municipal employees, "collection" in dhalao-s built by the authorities, "transporting" in municipal trucks and "land-filling" in approved public sites. Nowhere is "re-cycling" or "trading" mentioned, which automatically excludes the rag picker and the *kabari-wallah*, ubiquitous on any urban street of India!

In actual fact today, only large-scale transportation and treatment of waste remains in the exclusive purview of the municipality. And yet, the formal rules regulating MSW in India: Municipal Solid Waste (Managing and Handling) Rules, 2000 (MoEF), by their very nature, presume a division of private from public space, unauthorized slum from official colony, *safai karamcharis* (municipal staff) from lumpen rag pickers, residences from commercial establishments and the like. Clearly, such conceptual divisions do not reflect realities on the ground, where in more ways than one the official and the informal spaces are already merged. The *dhalao* encroaches on the street where rag pickers sort and segregate the waste; and the slum becomes an informal *dhalao* when its living space is used as an unauthorized waste collecting and sorting zone. The municipality may worry about "illegal" and hazardous recycling going on in urban areas but cannot under existing rules, allocate city space to the rag pickers even when they are substantially contributing to its public duties. For similar reasons, it *officially* collaborates only with the corporate, not social sector in waste, which is seen as parasitic or peripheral to city governance. Its plans for *bhagidari* with Resident Welfare Associations (RWA's) and other such citizen bodies, also pay scant attention to the alignments already existing between individual urban households and informal service providers, from *within* the social sector. This invisibility of the informal sector in tabled municipal solutions does not however absolve the design community when it makes the same mistake.

4 The Waste Pyramid

The informal sector's involvement with waste is by no means parasitic or peripheral but presumes a long-standing partnership with the municipality, which has so far been officially denied (Srinivasan 2002, 2003). Case studies testify to the informal sector's skills and services and comprehensive scope, which has made this partnership endure and enabled the lowliest of livelihoods to the most lucrative of businesses (Chickermane, Deshpande & Narayan 2001, Snel 1997, Galloway 1993). It is important therefore to keep the different components of this sector distinct in research methodologies. Today, privatisation threatens the livelihood needs of the waste-pickers, the lowest segment of the informal sector, the most. Significantly, the involvement of urban residents in household segregation and recycling also ends up hurting them the most. Official intolerance and citizen apathy and ignorance seem to have combined against this segment, already the most vulnerable to disease and police oppression. At the same time, this sector cannot just be wished away. Its very lack of organisation keeps it permanently open to infiltration and association with marginalized, migrant communities who seek urban employment arenas marked by ease of entry, irrespective of the social stigma.

The possibility for direct family involvement makes waste picking further attractive to the very poor, because it provides some income even to the women and children of the household. Waste-Buyers who are itinerant, also include both men and women but they specialise in buying and selling different kinds of waste and their life conditions are consequently much better. Next in the hierarchy, come the Retailers, Stockists and Wholesalers, with an increasing degree of earnings from waste and a greater involvement in work by the middle-class. The high ends finally of the pyramid, made

up of Reprocessors and Registered Dealers in waste, though often licensed and part of the formal sector, own up to the responsibilities and liabilities of the latter, only in name. Blatant disobedience to the various legislations covering the Shops and Establishments or the Factories Acts of 1948 is quite in evidence here (ILO 2000). There is a complete absence of institutional credit facilities being availed of. Small-scale or family-owned enterprises predominate in some segments but women as also lower castes are universally absent as entrepreneurs, though they may work as hired labourers. Entry to the trade is highly restrictive and internal mobility from Waste-picker or Retailer to Dealer or Re-processor is totally absent.

Quite clearly, a socially aware design education in waste cannot ignore these highly structured aspects of the waste service and trade sector already in existence in the country, even though they may be completely 'invisible' officially! The money to be made through waste handling, though varying tremendously from level to level, keeps it a vibrant option for many, in spite of the prejudices associated with what in India certainly, continues to be seen as 'dirty work'. The lucrative possibilities at the higher end often attract people to this sector from regular salaried professions such as management, banking even stock broking! Indeed waste-handling or '*kabari*' in general is seen as a 'win-win' situation for everyone in the cycle: households get rid of their trash and pay lower prices for goods made from recycled material. Waste-pickers, buyers and retailers earn a living (from a few hundred to twenty thousand rupees or more per month) in a segment that continues to have room for newcomers and migrants to the city. Factories pay less for re-processed materials and the nation gains by not having to spend foreign exchange reserves on imported wood pulp and plastic resins (DA Report 1993). Having said this, however, it is primarily in the area of waste re-cycling and reuse maximization, that sociology can contribute most to design's research goals seeking community involvement in waste.

5 Design in Waste Re-cycling & Re-Use

Design goals seeking to integrate formal and informal practices in MSW cannot hope to ignore the activities of re-cycling and re-use through the reduction of waste, which occur predominantly in the social - household and community - arena while reaping macro, socio-economic and environmental dividends. On the human capital plane, as we have seen, recycling has high potential for employment generation for the city's poor. For maximum effectiveness, however, all recycling programs need to be presupposed on segregation, even reduction and treatment of waste at source, i.e. the household. Ideally, not only should this improve the quantity and quality of resource recovery, but it should also make work conditions for the rag pickers less hazardous and less stigmatising, leading to a rise in their social and self-esteem. In reality, however, given deep-rooted cultural habits and prejudices in relation to the 'handling' of waste, segregation at source has not achieved much success in the Indian community and household. Equally, one can predict that the moment the resource value of waste is enhanced, it's benefits will certainly not accrue to the lowly waste-picker. Either the urban household or the private corporation will siphon off profits before the rag picker even gets to access the waste.

The existence traditionally of a separate, degraded section of Indian society, 'specialising' in waste and waste services has led to a stigma being attached even to household members handling kitchen refuse. It is the domestic servant whether live-in or working part-time who is left to perform this task. At the public, street or municipal level, it is predominantly the Dalits (the erstwhile Untouchables of the Hindu social order who were considered polluting and dangerous to mix with, not only clinically but ritually, as well), who continue to perform waste activities. Indeed, the state policy during colonial rule, to introduce municipal scavenging as a 'caste-based' quota created an Untouchable monopoly over the job (which now carried a salary), while removing their existing right to its commercial benefits through the sale of waste (Prasad 1998).

Even after Independence, these official positions remained highly politicised along caste lines and fetched a great deal of money for the middle-man responsible for distributing jobs without any concern for improving Dalit living conditions or indeed their conditions of work. This inverse sense

of monopoly over a degraded task also acted as a strong disincentive for the de-centralisation of waste services. Segregation at source and the involvement of the informal sector in community recycling activities is today often violently opposed by the exploited Dalits who want to prevent 'outsiders,' whether the urban middle-class or the urban poor, from taking on work they see as their employment guarantee. Even within the municipality, waste services seen as *sarkari* and secure, are attracting higher caste people to the job, never mind the traditional stigma. This has also threatened the *safai karamcharis*. Indeed, the increase in market earnings possible now, through the illegal pilfering and sale of municipal waste, has made the opposition to outside involvement often turn violent.

6 Waste, Cultural Perception & Education

Many NGO or non-governmental initiatives in the field run awareness–raising programs in order to break the vicious cycle between what are essentially two opposed and ranked cultural perceptions of waste. One, largely shared by the urban middle-class that sees waste as not their concern, and the other almost exclusively prevalent amongst stigmatised sections of the population, which sees it as their historical monopoly. The changing of deep-seated prejudices and habits in this regard is an effort located at present in the non-governmental sector primarily (Soumitri 2002; Prasad 1998). But there is room and need for a commitment on the part of the design community as well, which in India, for historical reasons, has for too long supported industrial solutions alone.

The premiere design education institution in the country, the National Institute of Design was consciously created in the sixties, under the charge of the Ministry of Industry and not the HRD Ministry, nor indeed the UGC. This set the trend for design education to be seen as serving the larger national goal of industrial training and development. The craft sector was certainly picked up for particular scrutiny, given the freedom movement's historical association with khadi and the existence of a large number of institutions focused around village development. The training of students in marketing and designing for the handicraft sector, particularly for the textiles industry and the SME's certainly brought in a component of social development and documentation into NID's formal curricula. But isolation from the multidisciplinary context of a university education left the latter politically naïve and theoretically bereft in research methodologies needed to give factual support to the institution's voiced commitment to social and economic change.

In industrialized countries, it is important to note, solutions to the design 'problem' of MSW improved only when they were established as a top political and educational priority, based on the recognition by all involved, the ordinary citizen included, of the health and environmental hazards of improper handling of waste. This has not happened in India where the socio-cultural features of waste services, as also the quantity and quality of services traditionally available, have militated against large-scale formal, civic, educational and political involvement. All efforts in recycling have consequently been largely unplanned community efforts, uninformed by professional expertise. They are not trained or equipped to take stock of local knowledge and action and to motivate citizens who though well aware of the ill-effects of poor waste practices feel helpless to do anything about it. The difference in density, moisture content and size-distribution of waste material in India has of course involved the designer to train in the adaptation to local conditions of industrial technologies, largely developed in the west. But this paper is more concerned with examining the social knowledge gaps in design pedagogy, in the sectors particularly of waste collection, segregation and storage. Given below is a brief overview of these activities, which can help highlight the research needs of community-recycling for a socially aware, professional design education.

6.1 Collection

Collection is lifting of waste from different collection points like dustbins, household, community *dhalaos* (open bins), open dumps etc. Officially littering is prohibited, but in India it has becomes the responsibility of the waste generator to ensure proper collection of garbage from the household, commercial enterprises, industries, and hotels for disposal. Everywhere, collection of waste from

door-to-door is primarily done by the informal sector. Scavengers or waste pickers as they are preferably called, fall at the bottom of the economic activity pyramid. Many of them, whether men or women, belong exclusively to the lower castes and marginalized categories of society. These people do even the cartage of waste to local community collection points and segregation of waste. Sometimes the municipalities or Resident Welfare Associations provide hand driven carts or other small vehicles for this purpose.

Itinerant waste buyers '*kabariwallas*' also aid in the collection and segregation of waste by buying from the household or other waste generators. They are fewer in number than the waste pickers, usually male, and move around on bicycles. Contrary to popular belief, waste-pickers and buyers have specific beats, much like policemen. They establish 'territorial rights' over bins, dumping sites and neighbourhoods. Squabbles over infringement of these 'rights' are not uncommon but entry continues to remain fairly open (Chikermane and Narayan, 2000). The collection frequency for municipal solid waste in densely populated Indian cities is often every day or every other day, because of the hot climate combined with limited storage space (in homes or in neighbourhoods) and the high putrescible content of waste. Equally, average particle size of the solid waste in India tends to be significantly smaller than in industrialized countries, making many modern methods for resource recovery, which rely on size reduction as a preliminary step, often inappropriate. Given that informal services in collection are already available, there is no need for hi-tech alternatives in India with their high energy and raw material costs. The involvement of the private, corporate sector though miniscule, is becoming more common in the activity of collection. But it is unfortunate that it does not choose to organise the existing service sector better and instead sets up a parallel workforce.

6.2 Segregation

Municipal solid waste in India falls into certain broad categories in which the commonly separated items are:

1 Glass and porcelain: Bottles (both whole and broken), window and door glasses, porcelain crockery, and glass.
2 Papers and paper products: Newspapers, magazine, books, writing papers, paperboards, and cardboard boxes.
3 Plastic products: Containers for oils, toilet products and cosmetics; plastic bags; sheet plastic; pipes; toilet seats; and cement bags.
4 Metals: Iron and steel, aluminium, copper, and tin containers (whole and damaged).
5 Textiles: Curtains, clothes and tapestries, and textile mill wastes.
6 Rubber and leather items: Tires and shoes.
7 Bones: Dead animal carcasses, slaughterhouse waste, and hotel and restaurant wastes.
8 Woods: Broken furniture and garden waste.
9 Other organic waste: Kitchen wastes, vegetable wastes, and garden trimming wastes.
10 Construction debris: Brick and concrete rubble, iron and timbers (UN Centre for Human Settlement (Habitat), 1994:3-6)

Biomedical waste is not mixed with Municipal waste. Only treated biomedical waste, e.g. autoclaved and shredded plastic, can be handled with municipal waste. Segregation into organic waste and recyclables is done primarily at four levels – at source, at communal bins, at transport vehicle and at dumping sites. And though it should ideally start from the household for a successful and effective waste management plan, at present it remains for the reasons outlined above, an innovative and unacceptable idea for most Indians. The efficiency of door-to-door waste collection consequently is not too good. Besides, the work conditions of scavengers/waste-pickers who rummage for hours in the community garbage collection areas, is appalling, with great risk to their health. A certain amount of 'pilfering' of waste also occurs by municipal workers from official storage areas or transport vehicles, which is then sold illicitly to augment their low wages. It is over this area of privilege that most violence occurs against the itinerant rag pickers, at the hands of the municipal staff and the

local policemen. Given the huge loss in transport vehicle time and in working hours, this illicit activity entails a huge loss of revenue for the authorities, over and above the resource itself.

Itinerant buyers of the waste or kabariwallas also assist in the segregation of waste. The scraps they collect are usually of better quality and market value than that collected by waste pickers. The scrap is sold by weight to retail traders, usually having their premises in slum areas. None of these establishments come under the organised sector. It is further sorted and graded as it moves progressively through various trade channels till it reaches the re-processor or the end user. Value addition takes place with each successive transaction.

6.3 Storage

Households in India rarely store waste because of cultural taboos and also because of the price, different kinds of waste fetch in the market. The itinerant *kabariwallas* buy the waste, separate it and supply to the retailers and stockists. Many unauthorized colonies and 'slums' reflect the activity of unofficial segregation and storage of waste spatially. Scrap trade being completely unregulated, scrap stores operate from encroached space in slums but only very large establishments are licensed under the Shop and Establishment Act. However, no receipts are issued for cash transactions with scrap collectors and it is doubtful whether any tax is being paid. The scrap market is subject to seasonal price fluctuations. The dumping of scrap and import from developed countries also influences it. The larger traders very often purchase directly from industry, institutions and commercial establishments.

Technically, any valuable waste left or stored in the space provided by the municipality belongs to them and cannot be vandalized. The reality, however, is that unofficial and/or illicit recycling activity has already removed most of the commercially significant waste by this time. The rest is scavenged at great risk by the lowest rung of waste pickers at municipal collection centres and at landfill sites. For the most, it is only biodegradable and 'value-less' waste (for the ordinary citizen) that finally finds its ways out of the municipal storage area. Indeed, for these very reasons the municipal authority does the entire transportation of waste from local bin to storage area and then onwards for treatment.

The responsibility of clearing waste not wanted by anyone else commercially, invests the municipal sanitary worker with a major source of power over the local population. Dirty streets and uncleared bins become potent means of pressurizing local governments as also the public, by an official strata forced to live on the edge of respectable society but given political 'protection'. Since the supervisory and higher staff is often from the educated middle-class, municipalities are often at the mercy of their own workforce. Storage areas are not cleared on time and are often surrounded by dumped garbage because the facility does not take into account quantity of waste generated in the area, population density and ease of access.

7 Conclusion

The recycling of solid waste by the informal sector is already going on in most Indian cities. However, the national and local government and the community are not deriving the full benefit of recycling and reuse that are available. The obvious constraints to full realization of the benefits are:

1 Lack of incentives to households to separate recyclables at source. In cities of developing countries in Asia, charges for waste management services costs are mostly subsidized. This is one of the reasons why waste management services and community responsibility operate at a very low level. Separation at source is the most important factor for achieving full recovery of recyclable waste and economic recycling. The cultural factors hindering this activity also need to be considered in economic calculations.

2 Reluctance of municipalities to work in partnership with the informal sector engaged in solid waste recycling. (Often the authorities consider that the activities of scavengers spread litter, create a nuisance of odour and interfere with their operations and therefore they believe that the informal sector should be discouraged).

3 Inadequate support from Local authorities or RWA's to scavengers and itinerant waste buyers, for upgrading their working conditions.

4 Inadequate public or design education campaigns working closely with NGO's and municipalities or indeed even the public.

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Cloth(ing) Practice in India: The Left Threads in Design Education

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Institutionalized design curricula, while paying discreet reverence to handcrafted products and practices, view craft only as an adjunct to the formal western pedagogic model of design instruction. This paper asserts that, while there are a number of arenas of cloth(ing) practice and dissemination outside the conventional classroom and textbook, the community context of artisanal practice offers a model of cultural transmission that is indeed the "left thread" in design education today.

This paper explicates craft practice in the weaving household and professional community context among the Padma Saliyars in Tamil Nadu to urge the recognition of craft and design practice as a conscious cultural option, rather than a mere fulfilment of the exigencies of life. It examines the case of technical and design-training interventions that took place in the early part of the twentieth century in the context of a specific artisanal product – the famed korvai sari of Tamil Nadu to highlight the roots of present day official and voluntary initiatives. A detailed examination of the training process in weaving and the organization of production of the sari in Tamil Nadu, in this paper, underscores the need for a fresh look into the distinctiveness of artisanal modes of work. The complex dialectic between hand/body skill, technology, society and ethics in craft practice lends a new meaning to the distinction between manual labour and conscious work. An analysis such as this it is hoped will offer a fresh perspective on craft "training", "documentation" and "exposure" programmes of governmental and non-governmental organizations and educational institutions.

Bringing together diverse strands of cloth(ing) practice in India under the rubric of work and education, it is hoped would widen our own understanding of the special conditions surrounding cloth(ing) practice in India today. Not only will this perspective enrich formal curricula of design, it will also, and most importantly, invest greater respect to the thread of design education that has remained unacknowledged and, quite simply, "left out" from the mainstream.

Keywords: *conscious cultural option, artisanal product, complex dialectic, cultural transmission*

1 Introduction

This paper[1] traverses the ethnographic terrain of cloth and clothing practice in India and focuses on the artisanal household and community organizational network to articulate what I believe are the "left threads" in design education today. In the present scenario, transmission of knowledge and skills takes place in a variety of contexts that range from the artisanal household and self help groups' common facilities centre at the village level to the professional community network, privately owned factory sheds or *karkhanas*, governmental and non governmental bodies like the weaver's cooperative, weaver's service centre, weaver's cluster, handloom technology institute and sub-national museum at the regional level, and finally the design institute and private design studio at the national level.

Whereas learning occurs in each of these contexts within the overall paradigm of work, the ideologies that guide the mode of transmission within each differ. These may broadly be classified as reformist, advocating inputs and training from above, or revivalist emphasizing the 'traditional' appeal of the product and its handcrafted mode of production. Both, however, seek viable solutions to improving the conditions of weavers and the quality of their products through key managerial and training interventions. By setting these efforts against the backdrop of the colonial discourse around artisanal production in the early part of the last century, and viewing it in the light of the revival of the hand woven silk *korvai* sari and its production context among the Padma Saliyar community in Tamil Nadu, this paper underscores the need for a fresh perspective on artisanal modes of work and education. Such an approach, I believe, is all the more relevant at a time when the design profession is in overt recognition of the cultural, epistemological and ecological implications of its practice (Papaneck 1972).

I now go on to demonstrate how the imperial discourse on handloom weavers during the nineteenth and early twentieth century[2] , guided by concepts derived from European textile history, in fact misinterpreted the artisanal context of work in India. Official policies at the time offered "modern" solutions that encouraged a separation and hierarchy between "manual" work and "mind" work, which continue to steer governmental and non-governmental models of clothing practice to the present day.

2 The Intellectual Background

The organization of handloom cloth production in India was organized around caste groups specializing in the weaving and trade of cloth, membership to which was restricted by birth. Weaving communities were likened to the medieval guilds in that production trade and training were thought to be closed and restrictive. Guilds were characterized by a centralization of production and trade under a single "master" specialized in the teaching of a particular craft to a fixed number of apprentices and journeymen specifically in an urban context.

Similarly, some weavers and merchants in the south Indian situation were likened to "merchant-manufacturers" of the "putting-out" system because of the role of merchant capital in organizing production outside the factory mode. In this system of pre-capitalist production in Europe, the merchant clothier advanced ("put-out") raw materials to the weaver in his domestic workshop, paid him piecework wages and exclusively owned the products of his labour. These misrepresentations highlighted the unequal and dependent nature of the relationship between financiers and actual weavers and resulted in the portrayal of the Indian system as exploitative.

The imperial government's vision for the re-vitalization of the handloom industry was, therefore, based on elimination of the "master weaver" who apparently owned and controlled the weavers' looms, labour and output. By re-organizing the productive organization on the lines of small factories and cooperatives administered by a group of efficient managers, the reformists believed that weavers could be freed to offer their labour to whosoever they wished. Since most of the weavers were unfamiliar with modern techniques of profitable management of resources, they were thought best to concentrate solely on weaving - the overall supervision of production placed in the charge of government officials from non-weaving backgrounds.

By adopting the organizational model of the factory and the cooperative, reformists segregated members of weaving communities into those who owned the means of production and those who merely possessed the inclination or ability to weave. Handloom weaving was by now an officially recognized "de-centralized" sector of the textile industry, its labour population defined in opposition to the centralized mill sector. The revivalist perspective on the other hand, while denouncing the standardization and mass production of cloth, highlighted the uniqueness of only those products that were anyway patronized by the upper castes – cloths of pure silk and mixed silk and cotton using gold wire or zari work. The weaving population was now re-classified according to those who wove the finer fabrics and those who wove only coarse cotton cloth[3] .

By focusing on a particular product of the handloom in Madras – the *korvai* sari– I go on to show how the reformist stance opted for increased productivity through the introduction of time and labour saving technologies like the fly-shuttle loom at one level, and at another, indirectly discouraged handloom weavers from the specialized skill of weaving the *korvai* sari. The revivalist intervention, on the other hand, recommended the preservation of the sari, even if accomplished artificially by providing appropriate training in "design" and "quality" to select "master" weavers re-located from their homes and community context for the specific purpose.

Technical Training: The Fly-Shuttle

Training interventions in handloom weaving were made by the imperial government on the basis of a series of Technical Monographs that not only allowed them to assess the level of technological sophistication among local weavers but also in making plans to revise the same. Thus began the active propagation of "improved" technologies in the form of labour and time saving devices both in the preparation of yarn as well as in the actual weaving of cloth. Madras weavers, under the then Textile Advisor to the government, Alfred Chatterton, were familiarized with these technologies through the setting up of training schools, technical institutes, competitions and aggressive propaganda. The fly-shuttle was one such device that was the focus of training and indoctrination to ameliorate the condition of weavers.

Chatterton proposed to rid the country loom of its technical inefficiency - not only would the fly-shuttle be more cost-effective (the setting up of the shuttle box and the slay frame could be simply attached to the existing loom), but it would also enable handloom weavers to "survive" the onslaught of competition from power-looms and mills. The fly-shuttle loom[4] was aggressively popularised through peripatetic weaving parties that brought the technology to the weaver's doorstep across the state.

Chatterton and others worked hard at transforming the "native" weaver's technology despite complaints - of frequent snapping of threads; the fear of oversupply; competition from mills and power-looms; the special requirements of garments with borders which could not be woven on these looms. The fly-shuttle required long warps, a feature particularly unsuitable for sari weaving which was woven in batches of three or six per warp. In fact its aggressive indoctrination was an indirect onslaught on the throw-shuttle loom which was required for the production of solid-bordered saris employing three-shuttles[5] . The continued preference and revival in demand for such saris, known as the *korvai* sari[6], as we shall see in the following section, contributed greatly to its survival despite technical reforms and training contrary to it.

Purification of Design: *Kalakshetra*

The persistence of the korvai sari in Tamil Nadu despite the coming in of the fly-shuttle was on account of the efforts of Rukmini Devi Arundale who strongly recommended its preservation, even artificially. The *korvai* sari was renewed as the dance costume of the artist at Kalakshetra - the international academy for arts training set up in 1936 in Madras. *Kala* meaning "art" and *kshetra* meaning "holy place" or "field" the Centre, was aimed at inculcating high standards in the arts and positioned as an `international' Academy of Arts under the aegis of the Theosophical Society in Madras.

Kalakshetra was expressly set up for the revival of the dance form practised by members of the Devadasi community, already in disrepute on charges of prostitution and child rape (Srinivasan 1985). The re-birth of the Devadasi dance form on stage necessitated a "new" dance costume whose design and wearing style would appeal to the aesthetic and social sensibilities both of the dancers and those attending the performance[7] . Whereas the Devadasis wore saris in ordinary cloths with simple borders, often one that allowed her rather ornate and loud blouse and striped trousers[8] to show through, the saris at Kalakshetra were thick in texture with ornate gold thread embellishments. The original dance dress (in its new *korvai avatar*) was "purified" of all associations with the Devadasi[9] by identifying its "traditional" (upper caste) idiom through old samples collected from elite households, temples, palaces and museums.

A weaving unit was thus set up in Kalakshetra in 1937 as an essential craft wing to complement the resurgence in art and beauty in all spheres of life. Within a year six pit looms were installed, which were worked upon by skilled silk weavers[10] and their families re-located from Kanchipuram with the express order to produce carefully "designed" dance costumes. Silk was brought in from Bangalore and twisted in the three-ply *charkha* twist yielding a texture characteristic of the Kanchipuram saris already used as elite wear. The dyeing of the yarn, carried out at the centre, was in deep contrasting colours and in uniform application, the German chemical dyes avoided in the nationalist spirit. Saris worn by Rukminidevi's own mother and those from other elite Brahmin households were brought in as samples for their traditional motifs at the borders — the *rudraksha, mayilkannu, pavun, vanki, neli, mangai, tharzhmpu, pilliayar muggu* — in colored silk and gold thread. These were motifs - particularly the *rudraksha* (the sacred seed of Shiva), and the *mayil kannu* (peacocock's eye after which Mylapore, the Brahmin dominated area in Madras city is named) that were also found in the borders of men's cloths worn by the upper castes during ritual occasions.

The borders of saris woven at Kalakshetra were broad - akin to those of saris generally adopted by the upper castes in Madras. They consisted of two parallel lines of motifs six to seven inches apart as in the Brahmin saris or in contrasting colours woven in the three-shuttle *korvai* technique commonly used for upper caste men's wear and in saris worn by the high non-Brahman Nattukottai Chettiars. Often the borders were very broad and divided the entire sari into three equal parts along its length as was common in the dress of the Chettiars. In fact members of the royal household at Chettinadu Palace, located in Madras, contributed many a design for saris at Kalakshetra.

The middle portion of the sari was treated in checks and stripes, in the manner of the elite wear already current. There was the *kottadi* or check with a matting effect in gold thread, *muthu-seer* (lines composed of dashes), and *oosi-vanam* (pin-stripe) quite common in the Brahmin wedding sari. The *paalum-parzhamum* ('milk and fruits') was a variegated check composed by the combination of lines in different sizes, was common to the silk-mixed cotton saris of Kornadu (also called the *visiri* or fan check) favoured particularly by the Madhava Brahmins in Mysore. Another check, popularly woven at Kalakshetra was the large sandal and black alternating checks described earlier on by Thurston in his industrial tour in 1887 as the 'High Court Papli' on account of its resemblance to the black and white tiles of the Madras High Court. These were greatly favoured by the Chettiars and old saris of similar description can be found even today in their households.

The end-piece of the saris to be worn for the dance performance, were modelled after the elaborate gold wire brocades of Benaras and the courts of Mysore and Tanjore. Among these were the saris called *simhaasana* (throne) saris and often featured the emblem of the Mysore maharaja - the double-headed eagle. Other figurative end-piece patterns included the horse, the lion, the peacock and the sacred *shombu* or water vessel. Upper class women could now place orders for such saris at Kalakshetra well known for its reproductions of "traditional" designs, colours and textures. The saris were woven strictly in accordance to Rukminidevi's instructions and could not be deviated from even if the client so wished[11] . The *korvai* sari was thus artificially revived at Kalakshetra through training in an elite design sensibility redefined and purified as the artistic idiom of the Indian "classical tradition".

By examining the technical and design-training interventions that took place in the early part of the twentieth century in the context of the *korvai* sari I have drawn attention to the roots of present day reformist and revivalist initiatives in craft practice. I now go on to a detailed examination of the training process in weaving and the organization of production of the sari among the Padma Saliyars to underscore the need for a fresh look into the distinctiveness of artisanal modes of work.

3 The Weaving Household

Unlike the medieval European system of handicraft manufacture described by Marx in the nineteenth century, handloom weaving in the context of the artisan household involves a division of labour but not a specialization of partial processes. Moreover, unlike modern factory production with machines, women and children are not sought for their "manual" labour, but as apprentices who will eventually

become skilled enough to work independently. The weaving household, therefore, is not merely the arena of operation of a rational system of commodity production in the informal sector but, as we will see in the case of the Padma Saliyar weaver's household in Tamil Nadu, the most vital learning context in cloth(ing) practice in India today. Indeed it is through the household's unique mode of cultural transmission that the public domain of work takes on a familial character and equally the domestic hearth assumes a professional role[12] .

All the various stages in weaving – from the stage of preparing the warp and weft yarn, to drawing-in of the warp on the loom, to the actual weaving of both simple and complex designs – must, in principle, be learnt by all members of the household, regardless of their age and gender identity[13].

For the Padma Saliyars, weaving on the loom implies the taking on of degrees of responsibility appropriate to the individual's preparedness and skill in the weaving process. The entire weaving process is learnt not through formal instruction on the basis of conceptual principles but by watching and imitating those who are skilled in the task over a period of time. Moreover, the various work processes are fragmented not according to exigencies of production time but follow the natural rhythms of the household and its members. In weaving there is no such thing as a retirement. One stops weaving only if one's body is impaired. Thus if a weaver's eyes, hands, or legs are unable to function normally then he will not be able to sit at the loom and weave. He will, however continue to perform some weaving related task, be it designing, marketing or finance. Women are equally involved in weaving activities as the men folk. There is no specialization on the part of male weavers and women can perform all the processes, from preparing the yarn to its actual weaving on the loom. All tasks are viewed as important tasks. Once a young child is adept at a certain task, he is in a position to take it over from an adult who in turn can be free to take on another task. Indeed, in a weaving household, work continues, and must continue, in the interest of the entire household.

The actual training goes hand in hand with life-passage, from a pre-pubescent child to a full-grown teenager, and coincides with the stage of proficiency in weaving. Learning is not strictly formal. "Just as a small fish learns how to swim our children learn how to weave." Initiation into weaving begins with the grasping of simpler techniques and by assisting parents and other adults in the weaving household. Yet, the young are expected to be more than just familiar with the various weaving processes and techniques. Youngsters, including females, are encouraged to take to weaving independently by the time they are sixteen years of age as will be amply clear from different stages outlined below:

Sensory Training

At the ages of five years a child is an informal learner, as one desirous to imitate the activities of elders. He or she is allowed to get a 'feel' of the loom, often by being made to casually sit by the loom, by being given the yarn and implements for processing it to touch and handle, and by watching other members performing the various stages in the weaving process. The idea is to familiarize and accustom the child with the loom apparatus and with the minute strands of thread.

Hands and Finger Training

Roughly by ten years of age the child is well habituated to the movement and control of the hand thrown shuttle (*naada podarathu*). Thus he or she has learnt to insert the shuttle in the warp shed as an assistant weaver (*sigadaa*), without using foot treadles, as his legs are yet to reach the treadles in the pit below. He or she is also, by now, allowed to help with the winding of the yarn from a bamboo horse onto the *parivattam* (also known as the *thiruvattam*) or spindle, for preparing the tiny, finger length weft pirns for placement in the shuttle (*taar sutharathu*)

Bodily Coordination

From fifteen years onward, the height, arm span and bodily capacity of the trainee is adequately developed to handle the various parts of the loom and its processes. His or her legs are now ready

to reach and press the treadles placed in the pit (*paavu meedikai*). The arms are also long enough to independently wind the weft yarn into pirns from the *parivattam* and to enable steady movement of the shuttle, from end to end, across the width of the loom. The eyes and hands are also sufficiently sensitised in order to locate and repair broken threads, draw-in and twist the new warp onto the old (*pinnaithal*). The overall body coordination on the loom the simultaneous opening of the warp with the feet and the throwing of the shuttle within it by hand is now practised along with an initiation into the intricacies of the various design devices.

Weaving

By the time the trainee is 18 years of age, weaving is largely done independently without supervision. He or she is well versed with the loom apparatus, the setting up of the new warp, and removal of a finished warp and the folding of the sari (*tari pati murraigal*). It is at this stage that the weaver's mental and physical capacities are employed to full potential. Crucially, they are necessary for judging the correct alignment of the warp to effect smooth weaving; maintenance of even tension on the loom through out the weaving process; and assessment of the yarn and its appropriate handling for defect-free weaving.

I now take up the community context of "learning by example" or leadership through an analysis of the organization of silk sari weaving among the Padma Saliyars in Tamil Nadu.

4 The Professional Weaving Community

The specialization of communities as professional groupings, in which the various requirements of occupation are fulfilled from within the group itself, has been shown by Srinivasan (1985) in her work on the Devadasis where the guru or specialist is recruited from the community, as are the dancers and the musician. The criterion of recruitment in such artisan communities is based upon the individual's proven proficiency and accomplishments in the specialized sphere of work undertaken by them. Leadership in the organization of handloom sari production among the Padma Saliyars therefore, does not automatically ascribe functions and positions of power to individuals in the manner of bureaucratic "career advancements". Nor is leadership inherited from the traditional authority of an office. Instead, among the Padma Saliyars, it must be achieved through recognized skill in one's specific sphere of work. It is the community's culturally valued ideal of mastery and success in their profession, which alone establishes an individual's reputation as *yokkiyamaana* (`worthy of respect') and forms the basis of the bestowal of honour (*mariyaathai*) by the wider community.

Silk leaders or big-men (Sahlins 1963) in Tamil Nadu are, crucially, not impersonal producers, suppliers or distributors in a productive chain, thereby lending the apparently public arena of work a uniquely private expression. Leadership within a professional community, as the following section will show, provides the model of the exemplary "way of life". It not only nurtures ways of thinking and acquired skills for the general pursuit of well-being, but most importantly, informs civic behaviour by imbuing it with shared meaning and value.

Leadership as a way of life among the Padma Saliyars is evidenced at three spatial levels within the context of the community - micro, middle and macro levels - corresponding to the household, town and large city respectively. At the micro level there is the weaving household engaged in weaving silk saris on one or more loom (usually between two to four). In towns like Kanchipuram and Kumbakonam, several middle level producers control the organization of production and wholesale trade of silk saris. The number of looms weaving for them varies from fifty to five hundred looms upwards and the looms are usually located in weaving villages forming a cluster around a 30 km. radius. At the macro level there are the very large and dominant regional businesses, with outlets in major cities in the country as well as abroad, associated with a few key big-men. Retailers at this level procure their goods from middle producers of silk saris in a number of small towns across the state and, over time, gain control of over a thousand looms that regularly supply them with fresh stock.

Big-men at all three levels have an in depth knowledge of weaving, not only because they belong to Padma Saliyar families known to have specialized in weaving but also, because they either weave themselves or have once woven. This fact is crucial for the present analysis because it points to flexibility in the social relations of production otherwise believed to be unequal and rigid. As the biographies of one such big-man will reveal, the transition from being a weaver of silk saris to being responsible for their sale in expansive markets is a prospect not restricted to a select few. As a means of social mobility, it is potentially available to anyone in the community who wishes to take it. The relations within each level are characterized by competition within an overall cooperation, which furnishes the community-based production system with in-built checks and balances[14] .

By focusing on the activities of the elected President of the state level Padma Saliyar caste association - K.G. Ramaswami Chetti (KGR) of Kumbakonam, Thanjavur district, this section of the paper attempts to point to the professional nature of leadership in the community context of work related to wholesale production of silk saris.

Social Mobility and Loom Control

KGR grew up in a silk weaving Padma Saliyar household in T. Pallur, in Tiruchirappalli district. There were five looms in their house and together with the products of looms in their own households. KGR's uncles (KGR's father died early) managed a small silk sari business. Even before he was twenty KGR, along with his older brother, also joined the family business. Bundles of saris woven in their own homes as well as those procured from other households in T.Pallur, were taken by bus to Kumbakonam, about 20km. away, where they were sold to a rapidly growing clientele.

In 1950, KGR and his entire family including the families of his uncles, moved to Kumbakonam where by now they had developed a steady business. They set up residence in Gandhi Adigal Street, Here the family expanded their establishment but their main source of production continued to be their native village, where weavers known to them persisted to weave saris for them. In 1955, KGR married his sister to the son of Narayanaswami Chetti who owned ten looms in Swamimalai. KGR and his brother-in-law soon became partners in business and KGR slowly gained the control of virtually all the looms in Padma Saliyar households in Swamimalai.

After the death of Narayanaswami Chetti in 1972, the partnership between his son and KGR also broke up and the looms under their control had to be divided. KGR's share included looms in his own village, whereas those in Swamimalai had to be given up as they were in his brother-in-law's native village. KGR lost all control of production in Swamimalai because of the dissolution of the partnership with him. Today, nearly twenty years later, KGR is a large and independent producer of silk saris with a loom base of over five hundred looms in close to twenty surrounding villages (except Swamimalai) that supply saris to him.

Autonomy in Spheres of Action

As organizers of wholesale sari production, big-men like KGR prefer to process raw silk yarn before giving it to the weavers. Not only does this guarantee quality standards, it also reduces costs of preparing the yarn outside. Moreover, stocking pre-dyed yarn hanks enables them to tide over fluctuating silk prices ensuring a stable supply of raw materials and continuous work to weavers through out the year.

Except for the actual weaving of the sari, the procurement and preparation of the yarn, the execution of the designs - the colour combinations and motifs in borders and pallavs of individual saris - to their final folding and packaging, is done entirely in KGR's own home under the management and supervision of members of his own family. The premises are large enough to house a number of hand *charkhas* (wheels) for twisting the raw silk and for dyeing it in vats. There is also a separate area for drying the dyed hanks, storing the ready warps in steel cupboards, as well as a front room for dealings with weavers (weighing the yarn and gold thread before it is disbursed, computing

wages and advances from individual weavers' note-books). The examining of saris for weaving defects and for re-folding and packing them for sale to macro level big men is also done in the same space.

The funds for the whole-sale production of saris is also managed by KGR who is a member of credit societies that organize capital for purchase of raw silk and for giving advances to weavers. He is also a financier in his own right and owns a number of such societies.

Arenas of Influence

When he first moved to Kumbakonam in the early fifties, KGR remembers that the competition between silk sari producers in Kumbakonam was so fierce that it had resulted in steep price fluctuations in the market and losses for the entire trade. In 1957, KGR initiated the setting up of the Kumbakonam Handloom Silk Cloth Producer's Association (KHSCPA), a body that encouraged active cooperation among wholesale producers who would jointly settle profit margins and sale prices as well as negotiate wages with weavers without undercutting one another.

KGR's reputation in the credit market is impressive. According to the Manager of the local Karnataka Silk Marketing Board (a government body for supplying wholesale raw silk) under KGR's guidance, silk cloth producers in Kumbakonam have always repaid their loans on time and their credit worthiness is never in question.

Over the years KGR has been successful in winning the trust of a number of weavers in neighbouring villages around Kumbakonam. KGR has thus established for himself the reputation of being a successful arbitrator. He has single-handedly settled mutually beneficial negotiations between weavers and merchants on the issue of wages. This is a major accomplishment as, under normal circumstances, amity between owners of capital and those who weave is unthinkable without outside, often governmental, mediation.

KGR has been singularly responsible for activating the state level Padma Saliyar caste association and donated large sums of money for the upliftment of Padma Saliyars in Tamil Nadu. As the elected President of the state level Padma Saliyar caste association, KGR has arranged mass marriages including contributing the marriage pendant and wedding saris for the brides, provided textbooks for children, set up schools, instituted scholarships, hosted caste association conferences[15] , built temples and community marriage halls, and represented his community before the government for granting the Padma Saliyar community the 'most backward class' or MBC status. KGR's reputation as one who will not undercut his competitors (KGR continues to be highly esteemed in Swamimalai, yet he chooses not to campaign against his rival, and brother in law who belongs to Swamimalai as well as one responsive to weavers' needs, has granted him the unequivocal status of a big-man in Kumbakonam.

The work ethic (*thorzil dharma*) encoded in the professional community context as seen among the Padma Saliyars, points to the fact that a value such as this can only be imparted through the figure of an exemplary leader. It also points to the significance of "learning through work" as a balancing of private aspirations and public service within the overall context of shared codes of conduct and modes of thought.

In conclusion it must be emphasized that whereas the household and professional community, as described among the Padma Saliyars, present weaving as praxis – one that unites in work the opposed domains of the public and the private through conscious (cultural) practice and its transmission – models of work and learning outside this context invariably disassociate the two. Setting present day cloth(ing) practice against the backdrop of reformist and revivalist efforts of the past it is hoped would not only highlight the limitations of such contexts of learning but also the urgency to review the same.

The detailed examination of an artisanal model of learning in this paper further stresses the significance of the distinction between manual labour and conscious work for education. An analysis such as this it is hoped will offer a fresh perspective on craft "training", "documentation" and "exposure" programs of governmental and non-governmental organizations and institutions. Urging the recognition of craft *and* design practice as a conscious cultural option, rather than a mere fulfilment of the exigencies of life this paper has attempted to draw attention to training and ethics within a wider social ecology of designed products. Not only will this perspective enrich formal curricula of design, it will also, and most importantly, invest greater respect to the thread of design education that has remained unacknowledged and, quite simply, "left out" from the mainstream.

Notes

1 The ethnographic data for this paper draws upon my research among the Padma Saliyars, a silk sari weaving community of Tamil Nadu during the period 1993 to 1996.

2 For a detailed discussion on the discourse in the Madras Presidency, see chapter 2, of my dissertation, Kawlra (1998).

3 This was also the time when Gandhi's nationalist agenda of spinning on the charkha urged handloom weavers to use only hand spun yarn for weaving coarse khadi cloth.

4 In the Indian pit loom the warp is placed horizontally and the weft is inserted into a shed (split) in the warp with the help of a hand thrown shuttle. The width of the fabric was thus limited by the span of the weaver's stretched arms. In the fly-shuttle loom, however, even though the driving force was still the human body, the shuttle now did not require to be hand-thrown. It was fitted to a slay which, when pulled adequately, flung the shuttle right across the warp. Broader cloths could now be woven with the fly-shuttle and the time required to weave them was also considerably reduced.

5 In weaving with the fly-shuttle, the weft yarn forms the single unbroken thread passing from edge to edge at right angles to the warp. In three-shuttle weaving, however, the weft is discontinuous during a single shedding interval, as each border has to be woven separately but also, at the same time, united with the main warp.

6 In Tamil Nadu korvai refers to the technique of "joining" a contrasting border to the main body of the sari using a three-shuttle weave. The technique requires an assistant, usually an apprentice weaver.

7 Srinivasan (1985) has already shown how the Devadasi herself was systematically divorced from the practice of her dance. The new dancers were recruited from among elite urban, western educated women as they are indeed even today - the very section of society that had been attracted to Theosophy in the first place.

8 These were stitched in fabrics woven by the admixture of silk and cotton yarn in stripes (referred to as kuthini), also used to make pillow and cushions and were commonly worn by the Muslims and other non Brahmin sections of the society.

9 The Anti-Nautch (dance) agitation of the late nineteenth and early twentieth century had called for a ban of the dance of the Devadasi from temples and peoples homes on moral grounds (Srinivasan 1985).

10 Members of famed silk weaving communities, like the Padma Saliyars and Saurashtras were hand-picked for their skill which they any way possessed on account of the silk cloths they wove for the elite.

11 Rukminidevi was extremely particular not only about what she herself wore, but also of what was being woven at Kalakshetra. Members of the Kalakshetra family remember her expressing such displeasure upon finding a discordant color or a motif being woven, that she would have the sari immediately removed from the loom. The Weaving Center in fact had to keep swatches of old saris for clients to choose from. Rukminidevi's private collection, still preserved in Kalakshetra, is testimony of her taste in bright colors, broad borders, checks and stripes and traditional motifs of the upper caste dress repertoire.

12 The household as the professional training ground for the Devadasi or the temple dancer community in Tamil Nadu has been established by Srinivasan 1996.

13 This division of labor is contrasted to that in the Muslim Ansari household in U.P. where, as Mehta (1997) points out, only male children above six years of age are formally initiated into weaving. As adults too it is only the men who are engaged in the actual weaving, women's work being primarily that of quilt making:

"Children, both male and female, below the age of 6, do not engage in any of the weaving stages, nor is there any pedagogical transmission of the craft to them. At the age of 7, the male child is initiated into the community of weavers through a ceremony… He comes of age as far as weaving concerned when he stops sleeping in the zanana. He learns the work of the first three stages of weaving in his MB's dwelling. In contrast, after the age of 6, the female child is not formally initiated into the community of weavers. Sometime in her 6th year she begins to work on the first three stages of weaving. She is never formally taught how to weave. With every year, until she is 15, she provides her services in quilt making and is formally taught how to make them… From the age of 13 she begins to wear the veil whenever she moves out from her village. This corresponds to the period when she stops providing her services for the third stage of the weaving process" (1997:83).

14 Transactions therefore occur in a context of overall cooperation, of a code of conduct and ethic that sees conflict and competition as being within it rather than outside of it. This is in contrast with Banaras where there is a tradition of katauti or illegal and arbitrary deductions made on the overall price by middlemen belonging to other communities (Kumar 1988:44).

15 In August of 1995, KGR organized the largest state-level Padma Saliyar conference to coincide with his sixtieth birthday or shashtiapthipoorthi function. The expenses for this meeting were entirely borne by him; more than five thousand Padma Saliyars from all over the state including some leaders from Andhra Pradesh and Karnataka attended it.

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Design & Artefacts: Extending Culture in Textile Design

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As a Fashion and Textile lecturer at Massey University, Wellington, New Zealand, the author has developed an interest in cross cultural creative issues. Her recent PhD Design from Artefacts: Issues in aesthetics, collecting, education, making and marketing in J & P Coats' Needlework Development Scheme: 1934-1962, at Glasgow School of Art, analysed and interpreted the use of artefacts in design, making recommendations for future use. These ideas are advanced in this paper.

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Recently a growing discourse questioning theory and its relationship, relevance and importance to practice has emerged. There is a very real need to argue for material culture research methods and understandings of knowledge as they relate to the process of practice, particularly in the case of textile design. The objectives of this paper include understanding how artefact research contributes to the development of creative design, and the perceived problem of the relationship between the object, the word and the design.

Material culture is an appropriate model for thinking about knowledge as a cultural process in the field of both textile and fashion design. It is increasingly relevant to consider research as a cultural process; there is a need for students to extend their own culture and appropriate interpretations of other cultures in design. Shared knowledge through this research of artefacts imbued with context and meaning, presents students with socio cultural and historical knowledge of artefacts.

Conceptual thinking and analysis allows an awareness of other cultures to develop, incorporating a sense of their history, culture and society. This allows interpretation and engenders individual responses, empowering students to develop their individual design identity into their conceptual development and design solutions.

The project section of this paper outlines the work of second year Textile History Design students at Massey University, Wellington. This centres on the transformation of historical and socio-cultural knowledge into contemporary design solutions. The students are encouraged to interpret designs from all cultures in a sensitive way, fusing museology and academic material culture approaches.

Keywords: *artefact, appropriation, culture, design, identity*

Introduction

Throughout history artefacts have played a vital role in some design processes. Underpinning this paper is my recent research examining the impact of J & P Coats' Needlework Development Scheme (NDS) on design in Britain. Coats, the Glasgow thread makers, anonymously funded the scheme established as a marketing ploy. The scheme circulated and re-circulated over three thousand textiles to art, secondary, and primary schools, as well as numerous amateur groups for almost twenty years. The embroidery designs were infused through the education networks into both rural and metropolitan Britain, achieving an important influence on textile design from 1930-60s and beyond. Market forces played a role in shaping the design of these textiles as an ethnic aesthetic evolved.

Throughout Europe, during the era of the Scheme, industry failed to recognise the role of the designer. In Coats commercial activities designs were regularly copied and the adoption of this appropriation into the design process of the NDS led to perceptions of embroidery as craft rather than art. The scheme impacted on creative interpretation as a capitulation to copying developed. The value of textile design declined as designers adopted appropriation methods encouraged and utilised by industry, developed for both profits and amateur artists. Indeed the influence continues today in Britain.

The issue of appropriation in design was the theme at a conference titled 'All Ornament is a Crime?' at the RMIT, Melbourne in 2004. It examined cultural debates around decoration, techniques and fashion. Comment was invited on issues behind decoration, the ethics and morality of ornament and the trafficking of meaning in decoration; also, issues around ownership, power relations, cultural sensitivity and interrogation of the visual vocabulary of pattern and design (RMIT 2003). The conference call for papers opened the debate stating 'Designers often assume that techniques and styles are theirs for the taking. Trends affirm this. Makers lavishly pile cultural reference upon cultural reference with little regard for sources or context' (RMIT 2003).

Earlier this year the role of the artefact as an end product in design was questioned at a research into practice conference at the University of Hertfordshire. The call for papers raised the following questions: Can an artefact do more than simply illustrate a concept? Do artefacts merely stimulate linguistic reasoning? Are there special conditions for achieving synergy between artefacts and texts (University of Hertfordshire 2003)? Equally, these questions could apply to the role of the artefact initiating the design process.

The NDS collection includes many examples, which profile appropriation in design. A 'Spanish' cushion design in the Dundee University collection has evolved from the Bourbon lily motif, originally used in Orient as a symbol of purity and chastity. A later nineteenth century lily design, from Mezõség, Transylvania, was used on a pillowcase, most probably from a printed design, inspired by seventeenth century Central European designs (Fozy 2004). The same motif appeared in a 1940s New Zealand Army Education Welfare booklet described as Rumanian (by then Transylvania was in Romania). In the late 1940s-50s copies of the lily design most probably made at Coats' NDS Glasgow workrooms, were circulated throughout schools and amateur groups in Britain as 'Spanish'. Made in Glasgow the design accreditation moved from its source to 'Spanish'.

During the NDS, industry, fine art, and craft philosophies influenced embroidery design in an era when design was emerging as a discipline. These practices encouraged appropriation methods, as design subordinated to industry and Scandinavian craft approaches, which eliminated interpretation in creative embroidery design solutions. An acceptance of pillaging of textile design developed as Britain colonised the Orient competing with France. Edward Said, a Palestinian academic, in *Orientalism: Western Conceptions of the Orient*, writes:

> Throughout history Britain had a privileged place in the Orient as Britain colonised the Orient. Exploitative practices driven by trade were established (Said 1978 246).

Said poses an important question: How do ideas acquire authority (Said 1978 326)? More recently, Colin Gale and Jasbir Kaur, Birmingham academics, in *The Textile Book* make a significant point that the appropriation of textiles has occurred throughout time and each successive cultural input enhances it:

> It is almost a contradiction in terms to speak of national textile traditions. Given the complex origin of many of the world's textile styles. Textile traditions are neither static nor geographically fixed, and they have constantly changed in response to interactions from different cultures. This is a great strength of textiles and a major part of the way it has contributed to the world's cultural heritage (Gale and Kaur 2002 101).

The copying of a design without interpretation or abstraction cannot culturally enhance a design. Recently, in the report *All Our Futures: Creativity, Culture, and Education*, Dame Tamsyn Imison appealed for an understanding of other cultures to be developed in education: "If you only understand one culture it is like seeing with one eye only, but if you add the dimension of other cultures, you become binocular and things can be seen in perspective. It allows you to appreciate much more (Imison in Robinson 1999 50)." An opportunity exists to consider students as individuals and empower them to develop their individual design identity, as recognised by the Scottish Consultative Council on the Curriculum: 'There is no such thing as a single general intelligence, which we all possess to a greater or lesser degree. We all have a unique combination of different kinds of abilities, which can and do change throughout our lives (Scottish CCC in Robinson 1999 35)'. The student's individual

identity should naturally be encouraged and developed in the design process. As the Scottish report stated, learning involves grappling with the issues to interpret them and find your own idea: "Learning involves going beyond simply acquiring new information and adding it to our existing knowledge. It involves us in making a sense of new information by using our existing knowledge and modifying, updating and rethinking our own ideas in the light of this new information (Scottish CCC in Robinson 1999 92)."

Moira Fraser Steele, Director of Education and Research, the Design Council, UK, supports the call for creativity and conceptual thinking:

> A core aim of our education system must be to enable all [students] to develop their creativity and unlock their creative potential…if the innovative and creative minds of tomorrow are to be nurtured and inspired, teaching has to be developed in a way which appeals to the creative and emotional and which encourages conceptual thinking (Fraser Steele in Robinson 1999 64).

Conceptual thinking and analysis allows an awareness of other cultures to develop, incorporating a sense of their history, culture and society. In settler cultures such as New Zealand, where Pakehas live alongside Maori in a bi-cultural manner, more ethical approaches to art and design continue to develop. Auckland designer Doris de Pont, inspired by the designs of John Pule introduced her 2003 *let's gather here* fashion collection thus: 'In a place where all races, cultures and genders mix with the freedom to celebrate their individuality and respect diversity'(de Pont 2003). De Pont, a New Zealander of Dutch descent, with a degree in cultural anthropology, explores the synergy between art, wear ability, and making art accessible. She collaborated with Pule, a Niuean/New Zealander, to design original fabric for her collections. Pule, initially surprised by De Pont's approach, enthusiastically embraced the idea. He appreciated the potential for extending the exposure of his work stating:

> Showing your work in New Zealand it becomes almost regional if it stays here. So I'm quite interested in having my work on garments in the context of taking it to the world. I'm interested in that side of talking with the world through imagery. A lot of people see this part of the world as something out of a travel brochure. But if they look a bit further at the story and actually come to New Zealand they see we have a really interactive, creative way of doing things. Maori, Pakeha, Pacific Island and now Asian artists are all in the same place working with each other (Pule in de Pont 2004).

De Pont furthers her desire to create original garments distinct from those made from mass-market fabrics. The designs reflect a 'European take on Pacific influences, in a non-literal way, both looking at the things immigrants have brought here and celebrating the cross-pollination of ideas' (de Pont 2003). These creative designs highlight the value of designs extending culture.

Designing From Artefacts: Student Project

How do we encourage development of a student's individual identity and interpretations of other cultures in textile history design education? A student can interpret artefacts and integrate his or her own identity into their conceptual development and design solutions. The socio-cultural and historical knowledge of artefacts allows interpretation and engenders individual responses. In settler cultures a minimal interpretation of the ideas of others, is considered to be inappropriate. In this context an appropriate way of using artefacts in contemporary design should involve theoretical interpretation to achieve appreciation and a developed aesthetic response.

The year two Massey University Textile Design History prescription stipulates the requisite of social, cultural, political and technological histories of textile design. In this way it is an ideal subject for a study of artefacts imbued with context and meaning. To initiate the study the students were provided with an essay brief, which comprised an eighty percent theory and twenty percent practice component: a twenty-nine by twenty-nine centimetre croquis in a maximum of three colours for a fashion or interiors fabric. The learning outcomes included: applying knowledge and skills in interpreting

theoretical art and design information, and the application of library skills. Analysis, organisation, and writing of critical arguments based on historical data were incorporated.

Commencing the study twenty students visited the Museum of New Zealand Te Papa Tongarewa, and viewed a range of textile and dress artefacts. Included were: *Flora* an Arts and Crafts Movement Burne-Jones designed tapestry stitched by Lady Cory, Bianchini-Férier swatch books, Raoul Dufy designs, nineteenth century Berlin wool work slipper patterns, a 1780s embroidered velvet waistcoat, a nineteenth century Lyon silk hussif, and Charlotte Kemp's 1760s Rococo dress, unpicked into twenty-six pieces to ensure economical storage for its seaward voyage to New Zealand.

In a valuable opportunity to collaborate with a museum, Angela Lassig, museum history curator and specialist in dress and textiles, informatively presented the textiles, generously sharing her knowledge. Following the selection of artefacts students continued their observations, documentation, and research. A model developed for material culture research based on an archaeology model developed by Susan Pearce was provided to encourage analysis, interpretation and structure in their written submissions (Table. 1) (Pearce 1994 129). The museum's textile condition reports, including expert descriptions of the objects and their known histories were available. Following library and on-line research the historical, socio-cultural and aesthetic context of the artefact was developed in the essay. Most students also developed design workbooks, recording their process. Accompanying the essay submission the students presented their contemporary design for a fashion or interior fabric, drawing on issues interpreted from the artefact study and their personal socio-cultural influences.

Table 1.
Model for Object-based Research

Textile Artefact: Material, History & Significance

Material: construction and ornament	Physical description & relevant records
Material: design of itself & ornament	Comparison with other textiles to create typology sets & design theme
Material: characterisation Provenance	Comparison with other textiles and samples
History: Own history & subsequent history Practical function in its own time	Dating etc. Relevant documentary research
Significance	What did it represent to owner & society? What role did it play in the formation of individual & social identity?
Interpretation: role of artefact in social organisation	Socio-cultural analyses: concerns & events of the period

Student Designs

Kelly-Rose Murphy initiated her design process by drawing from memory an anonymous Bianchini-Férier silk sample. She captured the essence of design features noting 'flying rocks moving diagonally across silk fabric grain with stylised lines implying momentum and fast heavy movement' (Murphy 2004). She commented on the abstract form of the design and the influence of the Cubist style of

drawing objects from multiple angles, and identifies the design was uncharacteristic for the period. In her essay Murphy recognised the influence of Japonism, and drew a comparison with the Japanese depiction of extreme moments in nature using stylised abstract design, and the functional rather than excessive decoration Art Deco style.

Drawing from the aesthetics and design tensions she developed her views on today's globalisation of society, including technical communication, transportation, and the rise in social and cultural integration issues in the twenty-first century. Key to her conceptual development was the polarisation in debates on these issues. In her design the lines are faint against the background relating to hazy, unclear answers to controversial situations presented by media and governments.

Ngahuia Damerall selected the Berlin wool work slipper patterns for her research. She emphasised both the role of the 1851 Great Exhibition increasing the popularity of Berlin wool work patterns and scientific progress with the invention of aniline dyes increasing the colouration of the designs. The slipper patterns also provided an opportunity for Damerall to discuss the role of needlework in social organisation. Convention at the time and indeed the male perception considered it was ideal for middle and upper class woman to appear busy stitching. Men designed the slipper patterns for women to stitch, and then later gift to their husbands. Discussing the design she included aesthetic advice from the 1851 *Art Journal,* recommending woman not to adorn the slippers with a fox's head, as when worn it would peep out from under trousers, appearing as though it was about to advance on a visitor (Damerall 2004). Her final analysis suggested the slipper patterns represented to the colonial immigrant all that was good about the life left behind. In her design process Damerall explored the use of native New Zealand plants, such as ferns, and Huia feathers. From her definition of Ngahuia as 'precious gift' and the role of Huia feathers in earlier Maori society as sacred, used as a special gift, she developed several designs.

Rachel Higham researched the Burne-Jones *Flora* tapestry stitched by Lady Cory, and gifted to the colonial museum after it was no longer required in England. Within her socio-cultural examination she acknowledged the contradiction of the proponents of the Arts and Crafts Movement, who, opposed to mass production, produced patterns requiring a minimum of interpretation skill for middle and upper class women to stitch. She challenged the notion by discussing the typology of the Burne-Jones design and the many copies. In conclusion she wrote that his cartoon-like patterns allowed woman creativity solely in the form of choice for colour shading (Higham 2004). In this way she hinted at the negative influence of the Arts and Crafts Movement on women's design. In her design development Higham chose to exploit the essence of the Burne-Jones design *Flora* tapestry, in particular the outline design style and natural subdued colours. Choosing tulips for their 'classic yet contemporary feel' drawings and design were developed digitally.

The floral imagery of the artefacts was inspirational for several students, for example Rebekah Harman analysed the flowing floral Rococo patterns, inspired by seventeenth and eighteenth century Indian chintz, in the Kemp dress. She discussed the political influence on both Spitalfields and Lyon silks, stressing the lack of government support for design tuition led to copying of textile designs (Harman 2004). For her design inspiration she drew on her childhood memories of the Kowhai flower: her fascination with the extended stigma and bright yellow seeds, which burst from the brown seed pod.

Sarah Spence delved into the eighteenth century French waistcoat, which featured a rich colourful rose and poppy design. She was attracted to the fluidity of the design and the manner by which the motifs appeared to float upwards as if defying gravity. In her own design she explored her Australian heritage choosing Waratah and Golden Wattle to substitute for the Rococo florals. Drawing on Aboriginal artwork Spence used the intense red of the Waratah as a base, but subdued the yellow and other reds consistent with the Rococo design. She successfully exploits the idea of objects floating upwards as well as filling in the negative space with a structured repeat of the stylised Wattle (pale yellow circles) reminiscent of the voided lozenge patterned velvet of the waistcoat (Spence 2004).

Findings

This project provided students with the opportunity to acquire the essence of a material culture research approach. Taking into account the second year status of this subject, the intention was to avoid encumbering students with terminology, encouraging a hands-on approach to research method learning. Students were empowered to translate theory into practice. They developed the context and meaning of the museum's objects, engaging with theory to develop contemporary concepts. Individual responses from their own identity, cultural heritage and other cultural interpretations were integrated in their designs.

Mostly, these textile design students integrated their own identity and other cultural interpretations into creative design solutions, in an ethical way, without appropriation. However a few students who exhibited an inconsistent attendance at tutorials and lectures, distracted by the need to undertake paid employment, failed to grasp the concept. A minor problem was the change in the museum's photography policy during the project resulting in a limiting influence on the amount and accuracy of typology research achievable by the group. Also photographs that were taken initially were lost due to a technical problem.

Discussion

The practice component of the essay was developed so that students could develop a synergy between the theory and practice. There was likelihood this would be the only opportunity for this lecturer to work with these students, hence the inclusion of the practice. Ideally in such a project students would receive studio tuition to assist the translation of theoretical concepts into practice or preferably complete a practice brief as a development of the essay brief. Within a design process the concept may be understood as the generation of a personal idea illustrated by analogues, diagrams, sketches etc. that guide the progression of ideas, help to make coherent decisions by the designers, and can be communicated and discussed in an early stage of a project.

Jennifer Moon, in her influential book *Learning Journals: a handbook for academics, students and professional development*, writes of the value of journals or as we more commonly call them in design, workbooks or visual diaries (Moon 1999). Student workbooks can describe creative process as graphic, creative ideas and reflective notes are recorded. Indeed the workbook itself can generate creative ideas and prove to be a sourcebook for creative projects. Students can use workbooks to clarify and define their attitudes, values, and sense of personal and cultural identity. Another use of the workbook is in assessment of the creative process rather than placing too much emphasis on the outcome of student art or design work (Davies in Moon 1999 57). Today, digital technology allows the appropriation/misappropriation of images, copied in multiples, with astounding speed as the development and use of it increases. However, as Dorothy Bosomworth, Dundee University, alluding to the increase in appropriation, suggests designers could use technology to record their sketches, designs, photographs, and notes on workshop practice to strengthen their design process (Bosomworth 2003 10).

Concepts are ideas formed by the process of abstraction and provide categories for storing interpretations and experience. Skill development empowers students to translate the theory into practice, including interpretation in the design process. Observational, analytical, and developmental drawing skills along-with design synectics can allow conceptual development of theoretical issues to flourish, while incorporating an awareness of an ethical design process.[1] Students could be encouraged to use symbolic representation of larger issues such as sex, death, power, politics, and economics in aesthetically pleasing ways, using processes such as visual paradox, symbolism and surrealistic perceptions

Conclusion

Theoretical engagement with artefacts exploring socio-cultural issues can be translated into practical design solutions that elevate textile design to art status, and engender respect for the medium. Skill development empowers students to translate the theory into practice, including interpretation in the design process.

Clearly this research, highlighting the vital role of interpretation of artefacts in design, offers interesting new perspectives to the debates. The students have made significant progress in their material culture research, in a hands–on approach. In subsequent years the potential exists for them to develop this further by including archive and / or oral history practice where appropriate, and further skill development. The value of textiles and their perceived position in society can be improved both in the textile education system, developing from the curriculum that underpins it. Students do not appropriate or copy for its own sake, but interpret and make use of historical and theoretical studies for the purpose of understanding. The ideas gain authority ethically, and designs are culturally enhanced. Artefacts can be a magic key for textile design students, not only can they open the mind of the learner, they then reveal a vast cornucopia of endless delight, challenge and opportunity.

Note

1 The term synectics is from the Greek word *synectikos,* which means 'bringing forth together' or 'bringing different things into unified connection.' Nicholas Roukes explains its relevance to creativity:

Since creativity involves the coordination of things into new structures, every creative thought or action draws on synectic thinking Roukes, N. 1989. *Design Synectics: Stimulating Creativity in Design*. Worcester, Massachusetts, Davis Publications.

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Designing the Past

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This paper contends that contemporary design has a fundamental role to play in maintaining traditional culture, a role that can lead to economic and cultural benefits and may result in a more globalized and secure world.

The research project it describes addresses the needs of Khmer puppetry through which legends and social traditions are preserved and involves the design of new puppets which represent traditional characters; it will develop new construction techniques and materials which will preserve the puppets and make them more durable and less subject to the effects of transport and climate. It seeks to design new theatres, easily portable and more practical for transport over long distances. Sets will also be redesigned, extending the visual effect of the performances, exploring a new range of expressive elements which relate to contemporary society, bridging the gap between past and present, while preserving the relevance of traditional culture to both. Eventually the new developments will be used as the basis of a training programme for a new generation of performers, aware of Khmer traditions, but employing contemporary resources to communicate them. The project is part of a broader programme aimed at restoring the art forms of the 'Living Treasures' of Cambodia, the cultural figures whose status and practice was destroyed under the Khmer Rouge regime and which Cambodian artists are now trying to restore.

This project employs a design sensibility in the regeneration of cultural traditions. It puts design into the immediate service of society, addressing the fundamental human needs of cultural identity and self respect, while providing a basis from which economic and social benefits can grow. It is hoped the project when completed will have contributed to the financial, social, cultural and personal well being of the nation as well as providing the world with an art form which at present scarcely survives.

Keywords: *tradition, culture, preservation*

1 Introduction

This paper contends that contemporary design has a fundamental role to play in maintaining traditional culture, a role that can lead to economic and cultural benefits and may result in a more globalized and secure world.

Some years ago a community of sculptors working in Burkina Faso had become impoverished, without access to a foundry to exercise the traditional bronze techniques they employed; as a result they were artistically alienated and economically destitute. A project was undertaken by the International Association of Art to design a small-scale foundry that enabled these bronze castors to use their lost wax casting techniques to express their personal, social and cultural needs, develop their traditional art forms and to project these into the contemporary art context. A promotional video was also designed and produced to explain and advertise what they were doing; (this gave them a promotional tool to develop interest in their art beyond their normal audience as well as nationally and internationally). The result was spectacular; not only were the artists able to earn a living, but they did so by strengthening the bonds of their cultural heritage, expressing the legends

of their past; their work became better known through promotion and the community of which they were part of, grew both in cultural identity and prosperity.

In the early 1990s an exhibition was held in Teheran to give identity to Iranian women artists. The exhibition was organized to highlight the cultural contribution made by women artists, which was often ignored by the broader art world and received limited attention in any context. The Iran art world had been dominated by male artists and the Teheran Museum of Contemporary Art developed a project to address the imbalance. The exhibition was designed to create an opportunity for women to raise the profile of what they were doing and to integrate them into the broader art world. Iranian women artists had seldom received recognition outside the country except when they had chosen to live and work abroad. This event attracted ex patriot artists giving extra attention to the considerable role of female artists generally and especially the significant role their work made to Iranian culture. A major publication accompanied the exhibition, which catalogued the scope and style of the work.

In 1988 an exhibition of photographs from Romania was held in various parts of Europe. The photographs had been smuggled out of Bucharest and showed the systematic removal of traditional Romanian villages under the Ceausescu regime. The destruction was total, including dwellings, public buildings, medieval churches, historic frescoes and art works, in an attempt to obliterate aspects of the past. The story told by former residents was that about three weeks before the event was to take place, villages were informed they should collect their possessions including animals and move their families elsewhere by a designated day. When the day arrived, large bulldozers came to the village, scooped out a huge pit on one side and progressively pushed the entire village into the hole. Everything disappeared from sight except the large mound of filler, which was spread over the pit hiding the remnants of centuries from public view. The exhibition was small, but deeply moving, bringing information on events inside a closed and repressive society, from which it was difficult to gain information, to a then divided Europe. The exhibition caused massive concern throughout the intellectual community and support against the destruction was garnisheered through the division of Art & Cultural Life in UNESCO. This exhibition was a mechanism through which public awareness was raised and was a contributing aspect to the fall of the Ceausescu regime in 1989. The exhibition was made possible by the design of a portable, light and easily assembled display unit, which facilitated an exhibition being mounted in any location, without dependence on formal exhibition spaces or galleries.

These examples consider how fairly minor design developments have had a huge impact on the preservation and conservation of traditional societies and produced an impact disproportionately large in cultural terms.

The following paper discusses a project in which the Faculty of Art and Design at Monash University is involved as a partner with World Education, a non profit organization dedicated to projects for economic and social development. The project was arranged through the Australian Youth Ambassadors for Development Program (AYAD). It is part of a broader program aimed at restoring the status and art forms of the 'Living Treasures' of Cambodia, the cultural figures whose status and practice was destroyed under the Khmer Rouge regime and which Cambodian artists are now trying to restore. The program is reasserting traditional Khmer culture, reinforcing its forms and values and communicating these to a national and international audience. The Cambodian artists involved see this as an important reawakening of the historic identity of the nation. It links a new generation with their cultural foundations and recognizes the worth of the past, re-establishing the knowledge and prestige of Khmer culture both nationally and internationally. The Monash partner project works with traditional puppet performers, redeveloping the traditions of the puppet theatre as integral to Khmer cultural expression and providing ways it can access a broader Cambodian audience as well as take the theatre internationally. A senior Monash Art and Design student has been involved for about 12 months with this activity as a Project Advisor, bringing a broader creative and design perspective, and she will be continuing to work in Cambodia in 2005. The project, in part, provides administrative and technical support for the theatre, helping with promotion and day-to-day activities, to ensure it becomes re-established. However it is at a broader level that the project has the most impact.

2 Context and Resources

The main aspect of the activity is to preserve traditions while redesigning the processes by which they are communicated. The project involves the design of new puppets, which represent traditional characters; this will develop new construction techniques and materials, which will preserve the puppets and make them more durable and less subject to the effects of transport and climate. It seeks to design new theatres, easily portable and more practical for transport over long distances. Sets will also be redesigned, extending the visual effect of the performances, exploring a new range of expressive elements which relate to contemporary society, bridging the gap between past and present, while preserving the relevance of traditional culture to both. An integral part of the project is the designing of new festivals, growing from past forms but broadening their references with contemporary contexts. Eventually the new developments will be used as the basis of a training program integrating them with the past through a new generation of performers, aware of Khmer traditions, but employing contemporary resources to communicate them.

To maximize the impact of projects aimed at social or cultural regeneration and support, it is necessary to identify activities that can be feasibly addressed over a relatively short period, using resources that are available. The partnership, which AYAD has established with World Education, provides a program of action that individuals and institutions can work on bringing knowledge, experiences and expertise to specific tasks where there are discernible economic and social outcomes and realizable expectations.

This project creates an opportunity for the domain of design to contribute to the broader World Education objectives of improving the lives of the poor through its programs. These provide training and technical assistance in non-formal education for adults and children, with special emphasis on income generation, small enterprise development, literacy, education for the workplace, environmental education, reproductive health, maternal and child health, HIV/AIDS education and refugee orientation. Projects are designed to contribute to individual growth as well as community and national development. In this particular project it works through Silapak Khmer Amatak (SKA) ('Cambodian Living Arts'). 'SKA' was initiated in 1998 by Arn Chorn-Pond and a group of Cambodian-Americans and other US based supporters who wanted to restore dignity to Cambodia's "living treasures" who had suffered greatly during the Khmer Rouge era. In addition to its core project to support surviving masters and teach students, the organization is now sponsoring nearly 20 additional projects and initiatives, including a high quality sound and video studio, a rare music forms project, and international arts exchanges. SKA aims not only to revive traditional forms but also to inspire a cultural renaissance to make the arts Cambodia's international signature by the year 2020.

SKA works both to directly teach and sponsor performances, and also as a facilitator to strengthen the Cambodian arts environment. It works closely with Amrita Performing Arts Association, the Royal University of Fine Arts, The Phnom Penh Arts Roundtable, and many other formal and informal organizations.

The focus of the puppet project is the Phnom Penh based Sovanna Phum Theatre, started in 1994. The Theatre and its Association were created in order to give Khmer artists the opportunity to make a living from their art, and to bring Khmer culture to a wider audience in Cambodia and abroad. In recent years, the Association has developed into an international focal point for training, learning and exchange of Khmer performing arts, allowing the possibility of sharing experiences between foreign artists and promoting artistic creativity. The Association collaborates with United Nations Non-Government Organizations and other institutions in disseminating social, educational, and health messages, often doing provincial tours. Today, Sovanna Phum employs a group of 80 artists.

The projects draw on established resources where they still exist one being the Buddhist Temple Wat Rajabo, (colloquially know as 'Wat Bo') which has traditionally been an institutional patron of the arts. Located in Siem Reap, Wat Bo facilitates training in classical dance, shadow puppets (large and small), and different forms of music.

In post-conflict countries such as Cambodia, the revival and support of traditional and contemporary arts is a vital aspect of both social and cultural development. SKA has been successful in re-discovering many lost masters in traditional arts and providing them with the support necessary for their re-establishment as respected performers and teachers. Despite their high-level skill and cultural significance, indeed because of it, master artists were relocated physically, separating them from their art forms, their students and their cultural role. Often they were forced into menial work in an attempt to demean their skills and devalue their knowledge of traditional Khmer culture. It is important that these masters re-establish bonds with their students and that they are able to continue in their artistic endeavours in an ongoing, sustainable manner. Only in this way will the richness and diversity of Khmer culture be regenerated and perpetuated for the future. What is required in the context of this project, is the establishment of increased performance opportunities both at home and abroad and the development of the broadest audience possible. Electronic technology will be used to develop publicity. It is expected that mass media will provide a crucial resource for the fostering and nurturing of an audience base.

Sovanna Phum has become the leading locally based performing arts venue, a successful community arts centre that attracts Khmer, expatriate, and tourist audience to regular performances by resident artists and visiting performers. They are in a phase of transition, from the initial years of development as a small association into a new phase of increased activity and expansion. Additional assistance in the areas of design, publicity and administration will be beneficial in order to capitalize upon their current successes.

3 Project Role

Having already established a familiarity with the contemporary Khmer context, the Project Advisor will continue the production of a collaborative show at Sovanna Phum, while assessing the venue's current capacity and future needs. The Advisor would also assist in administrative and office work at Sovanna Phum and attend regular Phnom Penh Arts Roundtable meetings; this will assist SKA in networking with the growing number of arts organizations in Phnom Penh. A major part of her work will be research, extracting as much detail as can be found from the limited remaining archives on the puppet theatre and its functioning; this will assist her in providing a fresh, but informed outlook to re-conceptualise and redesign the performance process as might be necessary.

After six months of work in Phnom Penh, the Advisor will move to Siem Reap to utilize her skills there. Siem Reap is a smaller city, the former capitol of the Angkorean Empire (980-1440 AD). The area is developing quickly due to the rapid growth of the Angkor Wat archaeological park. Despite the significance of Siem Reap in Khmer history, there are few legitimate performing opportunities for authentic Cambodian performing arts. Most performances are uninspired repetitions of traditional dance sponsored by hotels for tourist audiences. The setting and pay are both demeaning to artists and are actually causing deterioration in quality of performance.

In Siem Reap, SKA partners with the Buddhist Temple Wat Bo in reviving traditions. It sponsors music classes, an annual cultural festival and the rare puppet/dance form of large shadow puppets, 'Sbaek Thom'. (The Sbaek Thom form has recently been declared a protected form of Khmer heritage by UNESCO).

The Sbaek Thom troupe has regularly performed for both rural villagers and tourist audiences, and is receiving greater attention with the advent of this project and the UNESCO listing. There are office and administration facilities at Wat Bo, but the arts teachers and staff have little experience in running a professional performing troupe.

SKA has built a small stage inside Wat Bo, and a theatre for rehearsals and performance adjacent to the temple grounds. Due to high demand for performances in Siem Reap and the growing number of performing artists working in the area, SKA is trying to help Wat Bo develop a community theatre based on the Sovanna Phum model, but does not have staffing to generate this. It does have a

sponsor interested in helping finance the development of a community theatre once a plan is devised by the Project Advisor. The project is hopeful of attracting funds from expatriate Cambodians, many of whom have prospered abroad.

In coordination with the teachers and students at Wat Bo, the Project Advisor will assist in the development of performance opportunities in Siem Reap. This will involve assisting and observing performances of the Sbaek Thom and music classes, helping with administration and coordination of the annual cultural festival, and liasing with local arts groups and patrons of the arts. It is intended that this will help build an understanding between different groups of artists and the community perception of their function.

The Advisor will build on the performance infrastructure of the Wat Bo theatre by presenting the collaborative show developed with Sovanna Phum, with the assistance of Sovanna Phum and Wat Bo performers. This will provide a key link between centres and artists, as well as support personnel from the respective venues, via a joint production; it will highlight cooperation and collaboration as well as the Wat Bo Theatre performance space. Depending on the Advisor's assessment of the Wat Bo Theatre's capacity and the time necessary to develop the performance, this could be done at the beginning or the end of the period spent in Siem Reap.

4 Designing the Past to Shape the Future

The project advisor will fulfil the following specific roles:

1 Provide administrative as well as technical and creative expertise in the areas of shadow puppetry specifically and community based theatre in general.
2 Prepare development plan and designs for Cultural Centre in Siem Reap, including consideration of needs of local communities, financial sustainability, cultural importance and technical requirements.
3 With SKA staff create a plan for the form of the Cultural Centre and prepare preliminary designs.
4 Identify needs of local communities in relation to the development of a portable theatre based in the Cultural Centre at Wat Bo, Siem Reap.
5 Stage collaborative shows in Phnom Penh and Siem Reap.
6 Assist Sovanna Phum in exploration and development of new approaches to designs, techniques and materials to be used in conjunction with traditional approaches.
7 Train local staff in these areas via the development of collaborative puppet shows.
8 Identify and implement strategies for developing and promoting local performers in an ongoing capacity.
9 Establish and develop relationships between local performers and relevant in country organizations toward increasing local employment opportunities.
10. Establish and develop relationships between local performers and relevant Australian or other international organizations, for ongoing inter cultural opportunities.
11 Foster the development of technical and creative expertise in Sovanna Phum and Siem Reap.
12 Build administrative and financial sustainability at Sovanna Phum and Wat Bo.
13 Assist in the organization and design publicity for an annual cultural festival held at Wat Bo.
14 Increase opportunities for performance in Phnom Penh and Siem Reap.
15 Develop expertise in the use of electronic technology for publicity.
16 Explore the use of multimedia techniques to reach a broader audience.
17 Provide recommendations for future planning.

5 Conclusion

This project employs a design sensibility in the regeneration of cultural traditions. It puts design into the immediate service of society, addressing the fundamental human needs of cultural identity and self-respect, while providing a basis from which economic and social benefits can grow. It is hoped

the project, when completed, will have contributed to the financial, social, cultural and personal well being of the nation as well as providing the world with an art form which at present scarcely survives.

This example recognizes the crucial importance of design in the preservation and development of tradition — a role that will be increasingly important as the divide between industrialized and agrarian communities becomes more extreme. Valuable work is already being undertaken in this area. I note that in recent years Design Plus has referred to several projects as part of the National Institute of Design's 'Outreach' program, which employs modern design concepts in the preservation of tradition. Workshops in the design of paper craft at Jamnagar, the workshop on design awareness as part of a project to revitalize the famous hand block printing at Kalamkari and the design development project for handloom products at Warangal are all examples of the application of design to activities which aim at improving economic returns and strengthening traditional culture.

In concluding, it is important to make the observation that the problems addressed by the World Education programs in Cambodia result from a reign of terror; the cultural instability and economic destruction that resulted from political oppression. Parallels exist in the levels of insecurity resulting from modern day terrorism. Although it will not be developed here, there are contentions already found in policy, which argue that true security can only result from a multidimensional approach to strategy where emphasis is placed on cultural and economic stability along with defence and armament. Design supporting tradition builds security of culture and mediates the move from past to contemporary values. As a result, global change and social transition do not confront, nor are they irreconcilable with the past, rather they can be integrated with it to perpetuate traditional activities, products and sensibilities, for a new world.

In designing the past we can shape the future.

Blue Collar Design Theory: Promoting Community Health Through a Partnership Between an Art School and Academic Health Centre

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Bernard J Canniffe, Graphic Design Co–Chair at The Maryland Institute College of Art, has had work featured in the Graphis design annual and HOW magazine. Three of his posters were included - This is for Real: War and the Contemporary Audience exhibition at Stony Brook University. He has made presentations on his "Blue Collar Design Theory" at Willem de Kooning Academie in Rotterdam, Lees McRae College in North Carolina, and at the P&D Design Conference in Brazil. He has made presentations on the role of the graphic designer as a social responder at medical, design and academic conferences. Professor Canniffe is a regular presenter at Johns Hopkins Bloomberg School for Public Health.

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Four years ago, the Maryland Institute College of Art (MICA) began a partnership with the Johns Hopkins Bloomberg School of Public Health (JHSPH) to develop creative public health information. Members of the JHSPH faculty and staff were concerned that their research was not being conveyed to the population that could benefit from it – the very people that lived in the JHSPH's backyard. It was determined, at this initial meeting, that the graphic design department would have the appropriate resources to be able to translate these messages, and Bernard J Canniffe, department Co-Chair was asked to act as its coordinator.

The partnership is creating a new model of service learning with enormous potential for design/health partnerships across the country. MICA students have an opportunity to understand the power and limits of graphic design, and have to learn to communicate not only to members of an at-risk urban community but to doctors and researchers. In this partnership the students transform scientific messages into culturally appropriate materials for the local community to apply to their own lives.

The initial challenge was to develop and promote a new course that would appeal to the MICA graphic design student body. The course, titled MICA/JHSPH Design Coalition, was offered, for the first time, in the fall 2002 semester. The course strengths would be that students could actually get their projects published. This course would provide real-world experience with real clients, real projects and a tangible outcome.

Keywords: *graphic design, cultural, community, health, partnership, urban*

1 Introduction

East Baltimore is poverty–stricken, predominantly African American, urban neighbourhood that begins a few miles from the MICA campus and surrounds the JHSPH campus. The vast majority of MICA students have never experienced conditions like those existing in this community. The neighbourhood has one of the highest infant mortality rates in the U.S. and disproportionately high syphilis and heroin indices. East Baltimore is second in the nation as the most violent place to live, has a plethora of single parent homes, and a high rate of unemployment – the average income is less than $11,000 per year. Less than half the children in East Baltimore graduate from high school and one quarter of the East Baltimore households fall below the federal poverty level reflecting that one in three children in the community live in poverty. In addition, the lead poisoning statistics in Baltimore City (much of which is concentrated in East Baltimore) have been consistently high for generations. The citizens of East Baltimore are prone to hypertension, obesity, and diabetes. Because the challenges of daily life within East Baltimore are so intense, people have difficulty prioritising long-term health issues[1].

This statistical information determined that to best communicate with this hard–to–reach community, messages must be delivered in a clear manner decipherable by those with an average reading level of below the sixth grade.

Graphic Design education has always been fraught with pedagogical dilemmas. These problems are, in part, due to the divide between student desires and instructors' educational experience through project delivery. Students seek a realistic and professional educational experience, which are not only important to their education, but also necessary for acquiring the appropriate skill sets to enter the competitive work place. Graphic Design instructors are faced with the complicated task of giving students both technical and theoretical skills in a discipline that needs to be segmented and structured. The introduction of the computer into Graphic Design has further complicated this educational structure as it has added another layer of instruction onto the demands of both student and instructor. The result has trial and error in the delivery of tried and tested 'artificial' projects with unrestricted parameters and unlimited time constraints. If instructors attempt to implement real-world projects they struggle with first finding an appropriate client and project, second a workable budget, and third a willing client committed to enriching the educational experience of the students. The result has been the implementation of various identity design projects because they fit neatly into the above concerns yet the professional benefits for students are weak at best because they don't get experience in client management, access to a community and multiple delivery vehicles.

It is hoped that this paper will illustrate how professional practice can be sustainable within the framework of education, and give educators an appropriate model to be implemented at their academic institutions. This paper will also address a new area of design education that partners with other academic institutions and community organizations.

2 Course History and Course Outline

The MICA/JHSPH Design Coalition is offered as an elective course where enrolment is open to the entire student population. The graphic design department anticipated that this approach would allow students to self-select the course, reflecting their level of motivation in being involved and committed to the social aspect of the MICA/JHSPH course description. It was hoped that students in other majors would also enrol in the course because of the uncertainty that graphic design would always be the appropriate delivery vehicle when trying to assess the needs of the client and the community. Students from other majors might also bring other methods of problem solving to the class and provide the course alternative project solutions. The hope was to always have a diverse student population and a socially responsible partnership between the three communities involved in the projects, viz: JHSPH, MICA and East Baltimore. The initial student enrolment was different from what was expected. The course attracted students heavily from graphic design (ten students) and only one student (illustration) from another major. However, in subsequent semesters the student population has become more diverse which is consistent with the original course intent. This semester, an undergraduate student from Johns Hopkins University, majoring in social work, enrolled, and many graduate graphic design students have also retaken the course. One graduate graphic design student devoted her thesis to a specific community-based research project partnering with JHSPH and the East Baltimore community. A key asset of this course was the impact it made on students who could potentially get their work published. In fact students expressed the primary reason for taking the course was to engage with the client and interact with the community. Of course they still want to get their design solution accepted by both parties, but this is a secondary consideration.

On the first day of class, as students are introduced to the course, they are instructed on how to define design solutions in a realistic and effective way. Students are asked to see the JHSPH research teams as the client and the East Baltimore community as the target audience. The students must value building a crucial connection between the target audience and the project results, allowing community members to share in the programs success, in order to inspire an actual change of behaviour, leading to an improvement in their quality of life. Despite diverse academic backgrounds, the students are encouraged to draw from their knowledge of the graphic design vocabulary and understanding of the industry-process and the complications involved in working with actual clients and target audiences.

Later that day, students meet with the JHSPH research teams who present their research projects and discuss their goals for disseminating results. After the JHSPH teams present, MICA students initially went on a driving tour of the East Baltimore community. Although this mode of transportation proved convenient, students were given an insulated and therefore diluted experience of what life in East Baltimore is like. For this reason, later courses adopted a walking tour of the community instead. These walking tours are lead by East Baltimore community leaders who are familiar with the community and its members. The walking tour strategy proved mutually beneficial, as the community awareness of the MICA/JHSPH partnership increased and the students now demonstrate a tangible understanding of community life in East Baltimore.

For the second class, students are asked to research background information regarding the JHSPH presentations and the target audience. The students then present their findings to the individual JHSPH research teams (on the fourth class) to ensure that the students' understanding of the nature of the project was in line with JHSPH goals. The students do not show creative strategies at this stage. This approach has proved beneficial to both JHSPH researchers and MICA students, and an effective example of how this student/client presentation works can be seen from one of the initial research projects for the DASH diet study that will be discussed later in this paper.

The JHSPH team had researched dietary control of hypertension and named it "Dietary Approach to Stop Hypertension–DASH Diet." Students addressed the potential confusion that could result from using the term "DASH" as the Baltimore Transit Authority was about to launch an advertising campaign and livery signage for the Downtown Area Shuttle (DASH). The students and the research team decided that the diet's name should be changed to avoid any confusion. The JHSPH teams also advised focusing on looking for general solutions rather than concerning themselves with every area of the research projects.

As a result of this second meeting, the instructor and the students devised a three–part strategy:

1 Concentrate on making the complicated research results easy to understand
2 Increase the self–esteem of the community
3 Promote positive aspects of the JHSPH

Within these strategies, it was recognized that the community should be involved at each stage of the process. Furthermore, the project should utilize the already existing community organizations as "community gateways" (discussed below) for testing possible design solutions and for disseminating information.

Throughout the 16–week semester, JHSPH researchers periodically presented to the class with the goal of further clarifying the research results, increasing sensitivity to the community, and responding to specific research-related questions. Specific presentations from JHSPH include: how to target the message to the appropriate reading level, effective use of language and cultural illustrations to an African American community, and the social-economic realities of the target community. The MICA course instructor provided guidance about design strategies, and how to target a design message to a specific audience. Impromptu community meetings were held in East Baltimore, and the JHSPH research teams coordinated planned focus groups.

3 Community Gateways and Social Design

Early on, the JHSPH research teams explained that the East Baltimore community had built up resentment and hostility toward the Johns Hopkins community. Recognizing that bridges must be built to connect the parties, or messages from the partnership would fall on deaf ears, a strategy to reach the East Baltimore community was developed. This became an essential focus of the partnership and was spearheaded by MICA in order to minimize the resistance. This additional goal was essential in implementing the primary goal of gaining acceptance of the health message within East Baltimore.

Community Gateways are defined as entities that have already earned the respect and trust of the community. MICA, with the assistance of JHSPH personnel, would build upon and strengthen these

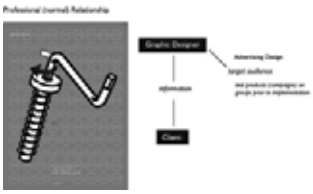

Figure 1: Graphic Designer/Client Relationship

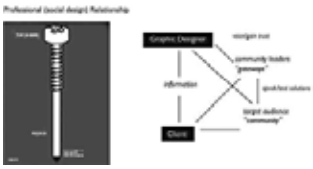

Figure 2: Graphic (Social) Designer/ Client Relationship

Figure 3: MICA/JHSPH Course Relationship

relationships. The Gateways would be engaged in focus groups and meetings to test potential design solutions and served as a resource to students seeking information about the community.

It was realized that a new strategy to graphic design education was needed for this course to allow students to both navigate and understand the complex relationships between community gateways and client. The normal paradigm of graphic design/client relationship (as shown in Fig. 1) did not apply to this course.

We can see the industrial relationship between the graphic designer and client in Figure 1. Information flows from one group to another through a series of meetings and presentations where mutual needs are met and the project is implemented. The graphic designer responds to the clients needs and establishes the appropriate visual language and delivery vehicle. This framework has become the accepted model of graphic design education where the instructor acts as client and student as designer. In some graphic design companies, and in most advertising agencies, project strategies are tested, prior to implementation, on a specific audience. It is important to note that even when the project is tested on this group, information still primarily flows between client and designer.

This figure shows how the graphic designer relates within the framework of social design. In this situation the graphic designer is able to respond to the needs of both client and community, and becomes a social responder by placing themselves between both communities. The dynamics of the matrix become far more complicated where information not only passes from client to graphic designer, but also from graphic designer to community leader (who acts as the gateway to the community), and community leader to client. The graphic designer has to acquire similar skill sets as a social worker as well as act as a mediator and designer.

This final figure shows how the MICA graphic design student is placed in the middle of the client and community. It can be seen that the framework is quite complex where information passes between the three major constituents. Students acquire important communication and problem–solving skills when they interact with these groups. These skills are essential in the development of the students' educational experience and industrial practice.

The relationship between graphic design and social responsibility is not new. This was addressed in the "First Things First" manifesto, written by Ken Garland in London in 1964, where 22 visual communicators signed the call for their skills to be put to worthwhile use. The manifesto was rewritten in 1999 and launched in Adbusters as well as in Émigré and the AIGA journal in North America, Eye and Blueprint in the United Kingdom. Afterwards, there was a slew of unprecedented letters either attacking or supporting the manifesto without little substantive views on how this could be applied to either industrial or educational practice.

The world–renowned graphic designer, Tibor Kalman, added to the role of the graphic designer as a social responder when he was interviewed in the Advertising Institute of America (AIA) journal about social responsibility. Mr. Kalman explained his feelings on how advertising makes companies and products look stylish without addressing their core values. He wanted to focus on the fact that graphic designers should use their skills to change the organization's infrastructures as well as making them look good. But again his remarks did little to encourage the student population on how they should develop the necessary skill sets in order to apply them in both their education and industrial careers.

It is clear that there is a desire and need for designers to become involved in social responsive work and the MICA/JHSPH Coalition course addresses both the social and pragmatic areas of design education. Students are instructed on how to use their skills to better society and to learn how to deal with both clients and community in a constructive and creative way.

The author has written and published his Blue Collar Design Theory that supports the role of the graphic designer becoming a social engager. This theory goes further than the First Things First manifesto's obvious pitfalls because it focuses on the positive aspects of design as it formulates a language, and approach, to be used as a template by designers, educators and students[2].

4 Case Studies

Below are two case studies highlighted to define the MICA/JHSPH Design Coalition experience.

During the first course, the students focused on two projects:

1 Dietary Approach to Stop Hypertension–DASH Diet Study
2 African American Male Hypertension Study

The partnership selected the Middle East Community Organization (MECO) as the primary Gateway for the DASH Diet Study, and The Men's Center for the primary Gateway for the African American Male Hypertension study. JHSPH researchers met with community leaders, prior to the class's first meeting with the community organizations, to ensure acceptance of the program and a smooth transition between the JHSPH research teams and the MICA class.

African American Male Hypertension

As an established organization whose mission was to foster healthy relationships and lifestyles for males in the East Baltimore community, The Men's Center proved to be an effective Gateway for the hypertension project because some of their members participated in the ongoing African American Male Hypertension Study conducted by JHSPH. MICA had direct access to both the intended target audience and to actual participants in the study.

Thirty African American males, who were involved with the study at some point, served as part of the focus group. They were initially asked a series of questions relating to dealing with hypertension. Priority was given to developing strategies that were perceived to be important in dealing with hypertension. This information became the basis for the students' creative design strategies.

The results of the Focus Group Questionnaire given at The Men's Center during the fall of 2002 are highlighted below. The men listed their concerns as follows:

1 Many of the men were also dealing with drug addiction
2 All were dealing with acute hypertension
3 All expressed difficulty in remembering when to take their medication
4 All perceived the importance of informing other men about getting their blood pressure checked
5 Many felt that taking part in the hypertension study was important
6 All expressed an apparent and deep-rooted mistrust of Johns Hopkins University
7 Prior to study, the focus group participants all believed in many of the preventative hypertension myths (see below)

There were several prevalent myths about the treatment of hypertension reported by the respondents:

1 Drinking vinegar would prevent hypertension
2 Drinking water would prevent hypertension
3 Headaches were the only sign of hypertension
4 Taking both blood pressure medication and illegal drugs would cause harm

The Men's Center staff also shared information about existing services they offered and what their perceived role in the community was. Mr. Leon Purnell, Executive Director, led this meeting and used the Center's existing marketing materials as the basis of his presentation. Through this process, it also became apparent that The Men's Center organization could benefit from a professional identity. A recognizable identity would communicate The Men's Center's role within the community and strengthen the relationship between MICA, JHSPH, and the community.

The Men's Center also provided a weekly food bank where fresh produce was freely distributed to the community. The food bank then provided another obvious gateway for the DASH diet study.

Six students presented identity solutions to both the Center staff and to a focus group at the Center. The final selection was a monogram consisting of an M and C based on African symbols, which are also used in The Men's Center's "Rites of Passage" program. The new identity was applied to letterheads, business cards, and envelopes and to all future health campaigns.

The Men's Center identity would:

1 Prove that JHSPH was committed to helping the community by financing the printing of the identity system
2 Financing the Men's Center identity system would also begin to dispel negative views about JHSPH because they invest in the community
3 Promote hypertension messages through this new identity would link The Men's Center to JHSPH's health message
4 The health messages would be accepted by the community
5 The Men's Center, in effect, would act as a brand ambassador for health message and JHSPH

Hypertension Campaigns

Several weeks later the JHSPH and focus group members met at The Men's Center to select the final hypertension prevention campaigns.

Two campaigns were selected:

Campaign One
The first campaign was a series of colour illustrated posters and T–Shirts with the heading "Whatever's…" The illustrations showed humorous depictions of medication placement that would enable people to remember to take their medication. The illustrative style was light, colourful, and not confrontational or condescending. The containers were placed inside shoes, jacket hoods and on toothbrushes. This strategy was adopted, in part, based on the focus group's response regarding forgetting to take medication. The "Whatever's…" heading suggested to do whatever was needed to remember to take your medication and to create a light-hearted approach to encourage participation by all family members to unite the community in a common goal.

Here we see an example of one poster that was part of a series. You can see the effective use of The Men's Center identity.

Campaign Two
The second campaign selected was a series of photographic posters containing people in the community who were dealing with hypertension. The posters focused on different people/situations in various stages of the condition. The purpose was to show identifiable individuals within the community. In effect, The Men's Center was trusted and therefore Johns Hopkins could be trusted.

The new professional identity of The Men's Center was applied to both campaigns to direct the community to seek hypertension information from a trusted member of the community.

DASH Diet
A different strategy from that of The Men's Center was employed at the MECO focus group. Participants were first asked to read information explaining the DASH diet. The information, edited by JHSPH researchers, contained a brief explanation of the diet's goals and a series of menus that could be adopted. The reading session lasted for thirty minutes after which, a series of conversation topics were explored. JHSPH researchers made sure that community participants attended the focus group meeting who knew about hypertension through their own experience or the experiences of a family member or friend. The JHSPH researches did not attend the actual focus group meeting so that an unrestrained and candid discussion could take place between MICA students and East Baltimore

community. The group's ages were between 35 and 70 years and were split evenly between male and female. Specific questions addressed the name of the diet, the experience of following the regime, and the importance of dealing with hypertension in relation to other problems that they faced.

The MECO focus group results revealed that participants:

1 Did not identify with DASH name because the name was too obscure
2 Found the use of name 'diet' to be too confrontational and negative
3 Found information difficult to understand and therefore apply to their own lives
4 Found that suggested meals were expensive
5 Found that many of the meals were difficult to purchase and prepare
6 Considered that suggested menus were not culturally appropriate for the African American diet
7 Resisted changing their current meal plans
8 Did not like the food groups offered in the supplementary material
9 Distrusted Johns Hopkins

5 Creative Process

The students determined that they needed to change the name of the diet and produce a new image to make the diet more appealing to the target audience. Supported by both student research and the focus group information, the name was changed, and various typographic treatments and colours were applied. These images were tested in both the JHSPH team and the community focus group. To encourage community ownership and ideals of partnership, the community was asked to take an active role in the selection of the identity.

The students presented the following names as alternatives to the DASH diet:

1 NO–HYPE
2 FRESH GROOVE
3 NUMBERS
4 ALIVE

Results

The focus group felt that "No–Hype," although alluding to "no hypertension," was both negative and confusing. Drug dealers and addicts in East Baltimore referred to hypodermic needles using the term "hype." The community rejected the Numbers and Alive solutions because they did not clearly identify the desired outcomes of the diet. Both groups (JHSPH and community groups) overwhelmingly selected "Fresh Groove" as the most effective name. "Fresh Groove" reflected the fresh nature of the food groups, and groove reflected the importance of following the daily/weekly schedule. Groove was a familiar term to the community, conveying fun, music, and dance.

Campaigns

The last stage in the development of "Fresh Groove" was the production of an awareness campaign for the name and the food groups. Several students went on the diet for two weeks to better understand the experience. These students exclusively purchased food from stores in the East Baltimore community, and either walked or used public transportation from East Baltimore on their shopping trips, to gain an understanding of the dieter's experience. These students found it difficult to obtain fresh food in the East Baltimore community and also found that following the daily intake allowances resulted in hunger between meals. The students were concerned that certain members of the target audience who might be engaged in physical labour would need larger portions. Students were also concerned that if adding extra portions would affect the health of the community. JHSPH researchers instructed students that eating extra portions would not cause any harm to the community. They also instructed students that the primary message of the campaigns should be to eat healthily.

Results

Six students presented at MECO to both JHSPH researchers and to the focus group. Both groups were asked to select the most effective strategy for implementation.

The selected campaign was a series of coloured numbers, placed within circular fields, with Fresh Groove applied on promotional posters, T–Shirts and advertisements that would be available for distribution throughout the community. The numbers were colour coded to represent specific food groups, and the numbers reflected the recommended daily servings. The circular fields and numbers were as follows:

8	Brown	=	Grains
5	Green	=	Vegetables
5	Orange	=	Fruits
2	Red	=	Protein
2	White	=	Dairy

The series of posters contained one or all of the numbers with a brief explanation of the food group, the serving amount, and the importance of healthy eating to prevent hypertension. An African American cookbook was produced which contained recipes using the foods promoted by the diet. The cookbook listed the locations within East Baltimore where the community could purchase reasonably priced food that complied with the diet and readers were directed to the food bank at The Men's Center.

5 Outcomes and Challenges

The development of the MICA/JHSPH Design Coalition course and partnership with JHSPH and East Baltimore community has created educational and social benefits. MICA has developed strong links with both JHSPH and the East Baltimore community. More importantly, the East Baltimore community has now increased their exposure to the significant research carried out at the JHSPH that will positively impact their lives. This partnership has also helped to dispel the many negative myths associated with the institution. The JHSPH faculty and staff have provided services and assistance that have proved crucial to the course development. They have also helped to create Community Gateways and provide future research projects.

In March 2003 The Men's Center identity and both hypertension campaigns have been implemented. Time will tell whether the campaigns will prove sustainable and actually help residents of East Baltimore by a change in behaviours. It is intended that both MICA and JHSPH researchers will evaluate these projects to measure their effectiveness at a later date.

The Fresh Groove campaign has been withheld until funding can be obtained for mass production. After the first year of the program we identified several areas for improvement. The JHSPH groups did not budget for print costs, an oversight problematic to both students and the community as a whole. The students felt disillusioned because they believed that one of the reasons for taking the course was the possibility of getting work printed. Also by not printing the campaign JHSPH inadvertently alienated the community that participated in the development process who never saw the results of their efforts. This added to the discord between Johns Hopkins and the East Baltimore community. This experience taught us to either budget for print production in the initial grant proposal or ensure that the necessary funds are available prior to engaging the partnership in subsequent efforts.

Since the development of this new partnership, the Maryland Institute College of Art's graphic design program has been inundated with requests from the East Baltimore community to produce graphic design projects. The MICA/JHSPH Design Coalition has produced design solutions for Type Two Diabetes, Child Injuries Through Gun Violence, Infant Lead Poisoning, Kidney Donation and a Mobile Safety Center (CareS), research projects that have all been implemented. MICA has recently developed an eighteen month course tentatively titled "Urban Studio" which is due to begin in the Spring 2005 semester. This institutionalised course will establish partners with other academic

institutions, (the Baltimore Contemporary Museum, Baltimore City Planning Department, and many other private companies) who will provide both financial and professional support to allow for larger community concerns, such as refurbishing buildings and providing employment opportunities.

It was initially thought that students would learn more about the relationship between graphic designer and client, and understand the dynamics of the community. In fact students have expressed that they find out more about themselves from the community and client. Students have taken the course two and three times with some students deciding to seek employment with design companies who have a similar client base or work as graphic designers in publication departments of the health field. Many graphic design companies have contacted the MICA graphic design department expressing the reason they employed students was, in part, because of the work they had produced in the MICA/JHSPH Design Coalition course.

There continues to be a commitment to strengthen the partnership between MICA, JHSPH, and the East Baltimore community and to see this partnership as a positive model embraced by other academic institutions to improve community well being.

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2 **Blue Collar Design Theory**

blue[1] (bloo) a. **1.** of the colour between green and violet in the spectrum, coloured like the clear sky or deep sea. **~collar worker**, manual or industrial (opp. to office) worker.

The understanding of Graphic Design has always been relegated to the sidelines of the applied arts community. There are a plethora of general interest magazines that showcase architecture, the decorative arts, product and fashion design with little, if any, mention of the role of the graphic designers who help mould and respond to the world around them. This is, in part, due to the graphic designers' self-absorbed approach to their chosen discipline, clients and the general public.

The role of the graphic designer is that of a social responder and we must begin to effectively communicate this to both the design community and the world.

The Blue Collar Theory will help eliminate myths, dispel fears and educate all to a new language and approach for everyone to rejoice in and understand. The Blue Collar Theory places graphic design at the front of the design dialogue.

Blue Collar explores the relationship between the client and designer, explains projects that exemplify this new approach, and more importantly focuses on role of the graphic designer in society.

Blue Collar is the language of the machine shed, the skilled labourer, the printer, the farmer, the factory floor and it is liberty.

Initiating Design

Gunnar Spellmeyer Fachhochschule Hanover
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Born in Osnabrück in 1964, Gunnar Spellmeyer studied industrial design under Professor Gerhard Strehl at FH Hanover (Hanover University of Applied Sciences and Arts) from 1983-90. The year 1987 saw the establishment of the Formfürsorge design office commissions in the fields of design consultancy, and industrial and graphic design. Then came the participation in exhibitions or solo exhibitions in Hanover, Berlin, Hamburg, Düsseldorf, Cologne, Offenbach, Stuttgart, Bremen, Milan, Shanghai etc. The work included in the collections of private and state museums, e.g. Museum für Kunst u. Gewerbe, Hamburg; Stedelijk Museum, Amsterdam. Gunnar has won awards won in recognised competitions; teaching positions in Hanover, Gotha and Cologne. In 1999 he was appointed Professor of Industrial Design in the Department of Design and Media, Hanover University of Applied Sciences and Arts, in 2001 as Honorary Professor at the United University of Hefei, Anhui, China, and in 2003, as orga-niser and board member of the ICSID 2nd Educational Conference Hanover.

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Born in Berlin, in 1961, Birgit studied architecture and design at Kunsthochschule Berlin Weissensee between 1980 – 85 and graduated as Industrial Designer. Between 1985-90 she was Designer at LEW / AEG Rail Vehicles, Hennigsdorf (including design of trains for the Shanghai Metro and Berlin S-Bahn). From 1990-94 she held a teaching position at the School of Advertising and Design, Berlin. Since 1990, she has been running her own design office commissions in the fields of exhibition design, design consul-tancy, and industrial and graphic design. In 1994, she was appointed Professor of Industrial Design in the Department of Design and Media, Hanover University of Applied Sciences and Arts. In 2000 she became a member of mixxd, a corporate communication network. She has held various teaching positions and lecturing activities in Germany and abroad. She is also a board member of Internationales Design Zentrum Berlin. In 2003 she was an organizer and board member of the ICSID 2nd Educational Conference Hanover.

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Initiating design amongst small and medium-sized enterprises (SMEs) as well as global players is a concept intended to encourage business to exploit the potential offered by institutions of higher education. Fachhochschule Hanover, as a university of applied sciences and arts, has been able to gather broad experience in this field. Its courses are conceived in such a way today as to provide sound basic instruction followed by project-based work.

However, cooperation projects between the Fachhochschule and its professional partners proceed according to specific rules. Business is not only unaware of the true potential of such an alliance, it frequently fails to utilize the visionary capital of further education institutions or seek a critical discourse with professors and students in order, for example, to define more precisely or to reformulate its own objectives. Despite this, design transfer is still seen as an extremely economical way of buying in design. Although such a concept of design transfer is promoted by official business promotion bodies, it is in fact counterproductive. Designers and design companies are right to be critical of this type of state-subsidised competition.

This contribution explains the conditions under which design transfer takes place, and its prospects and potential. Attention is drawn to opportunities for educational institutions and business, especially as public purses become even emptier. In addition, a list of demands is presented for new legal provisions in the fields of copyright and intellectual property. The paper shows different case studies involving professional partnerships.

Keywords: improving design practice in industry, design case studies

1 Introduction

The potential offered by designers still remains obscure, and the use of design for industrial purposes also still remains unclear. Small and medium-sized enterprises (SME) in particular do not yet harness the numerous opportunities opened up by design. And some global players have only so far used design in a restricted way as a cosmetic measure but not as a key broad-based instrument of innovation. Co-operation projects with design universities can make an important contribution here

to highlight the significance of design and boost economic efficiency. This involves adherence to certain conditions.

2 Design Services Spectrum

Let us remind ourselves here of the origin and original significance of the term design: to work out the structure or form of (something), as by making a sketch, outline, pattern or plans; to plan to make (something) artistically or skilfully; the arrangement or pattern of elements or features of an artistic or decorative work; a finished artistic or decorative creation.

This makes it perfectly clear that anyone can be a designer and that everyone should be a designer. Our professions are first defined more precisely by specifying the term Product Design or Communications Design or Fashion Design etc. New specifications such as Integrated Design refer to broad-based and wide-ranging design closely integrated with strategic corporate processes. Integrated Design encompasses a multi-disciplinary design repertoire. However, multi-disciplinary work only functions if strongly specialised design disciplines are available and can be strengthened. Terms like integrated design run the risk of additionally diluting the still hazy definition of design amongst the general public.

The service spectrum of product design includes three main aspects:

- product design as a classic design process
- product design as a media-based instrument
- product design as a strategic innovation process.

Product design as a classic design process was around at the beginning of the historic development of design as a professional discipline. Product design only became significant in the Eighties as a result of media attention. The corporate value of product design as a strategic innovation process has been increasing since the Nineties. These three main aspects, with their various weightings, are an integral part of the efficiency of product design today. This categorisation enables "initiating design" to be communicated to companies.

Product design as a classic design process

This includes all of the activities involved in developing a product as well as services to achieve optimal results in the following areas:

- design quality – appropriate and harmonious aesthetic and physical lifetime, winning concept, logical structure
- degree of innovation – technical and formal independence
- functionality – practical, functional
- finishing, material selection – in line with the product concept, appropriate expenditure re. product/environment
- environmental compatibility – energy-saving and resource-saving, low waste, recyclable
- ergonomics – ergonomic optimisation, easy to use
- use visualisation – regarding sense and operation
- safety – adequate safety in accordance with relevant standards
- brand value / branding – emotionally binding, promoting identification.

The effectiveness of an idea and an innovation only bears fruit through efficient realisation. Success is achieved by the satisfactory integration of each of the solutions at these levels. The results of an intensive development process then come together in the most favourable circumstances in a product that is very successful in the market for several years.

These criteria were used by üstra, the Hannovarian public transport operator when the designer Herbert Lindinger developed their own trams – a highly complex product — in the early Eighties. At that time, the brand value aspects were not given the priority that they would have today. Nevertheless, the friendly green colour of the trams was a strong signal that the system was being run by a forward-looking transport operator.

Figure 1: üstra tram, design: Herbert Lindinger

Figure 2: üstra / bus stop / design: Allessandro Mendini

Figure 3: üstra / TW2000 tram / design: Jasper Morrison, Herbert Lindinger

Product design as a media instrument

Although not nearly as important, the PR use of product design is still a significant aspect. There is also a positive side to the headline grabbing and sensationally biased presentation of design by the media. One has to accept their public nature and use the media skilfully to enable unusual ideas to be discussed publicly. Carmakers – already an exemplary sector when it comes to the exploitation of design – have been doing this for a long time with their concept cars. SMEs can also harness this principle for their benefit: it enables the future to be showcased today without any major investments – publicity for the avant-garde paves the way for marketable products. This aspect can also be seen as an important element in the establishment of a corporate image. As an effective PR instrument, product design also owes its effectiveness to efficient realisation: lower costs and greater distribution.

At the beginning of the Nineties, üstra launched a design campaign involving the engagement of famous designers to design bus stops for trams or busses. The campaign was backed up by exhibitions, a brochure and tours of each of the bus stops – which are still popular today.

Product design as a strategic innovation process

During the Nineties, üstra became aware that there was more to design than headlines in the press. In the run-up to Expo 2000 in Hannover, trams, buses, normal bus stops and ticket machines were all redesigned by designers. The transport operators used the potential of design at all levels. In addition to the classic specifications, design is also an important element in establishing the identity of a brand as well as making a significant contribution to public life. Design is a cultural contribution to a country's society.

Product design as a strategic development method provides critical external assistance and important stimuli for new products. This area is one of the most recent areas into which our profession has ventured, and combines the two above-mentioned areas.

The cross-sector integration of highly specialised expertise (marketing, technology, culture and design) brought together by product design now gives it the technical skills to work on very complex tasks and efficiently generate successful solutions. Product design can thus become an indispensable element in corporate projects: product designers are now unquestioned members of a project team alongside the specialists in other disciplines.

This involves:

- determining user needs and expectations, and implementing them in target-group-specific product concepts,
- developing products or processes which comply with the demands of consumers and producers, and bring alive the intrinsic qualities,
- strengthening market positions on the basis of high quality individual and long-term solutions,
- innovatively redesigning existing products or equipment with a special focus on improving user convenience and the overall image,
- developing new product ideas so that existing technologies can be used more effectively with the aim of creating new applications which activate unexploited market potential,
- defining precisely the different product qualities and their relationships, and highlighting these to consumers and producers.

Incorporating design at an early stage can therefore assist in:

- developing pro-environment products, product systems and services,
- designing more effective development processes and thus reducing costs and improving targeting,
- promoting optimal team work through jointly formulated targets.

3 Initiating design

In our opinion, a crucial factor in the training of product designers is university co-operation with scientific, industrial and cultural partners. As a university of applied sciences, we are particularly looking at the application side, the practical aspects. The product design course has gathered a great deal of experience in this context in recent years.

In addition to free and visionary project units within the course, it also makes sense to formulate topics that raise the awareness of design students of many of the practical aspects of product and process development. It is very important that today's designers are team-oriented, that they have a great deal of specialist knowledge, and are able to initiate innovation processes and provide the necessary support.

Companies are increasingly demanding that designers play a creative part in the whole product development process, and especially, that they act as moderators along the product development chain. Designers are thus increasingly becoming sought-after development partners and sources of external expertise. Students coming into contact with companies are able to demonstrate the value of their skills and knowledge before they have completed their studies. Teaching them these skills can only take place when there is continuous contact with industrial partners. Co-operation projects are the ideal framework for training the ability to innovate, the identification of problems, the dependence of solutions on overall contexts, as well as teamwork and the ability to act as an effective moderator.

Working as co-operation partners with universities enables SMEs and large companies to harness the fresh opinions and attitudes of young, independent students who have not yet been blinded by corporate dogma. The invigorating discussions held with professors and students often provide these practical projects with workable specifications for ultimate design developments.

Project partners can formulate their projects according to the aforementioned main aspects. Because several students usually work on the projects, the partners are provided with numerous, sometimes contradictory, solutions for "classic design process" projects. The students and partners are forced to formulate criteria for the decision-making and to assess them in a context-oriented way. We would like to highlight this aspect by presenting a few projects which were worked on under our supervision.

Figure 4: Volkswagen AG, visitor train / design: the students Böttcher, Hertel, Könecke, Ihlefeld / 2003

In 2003, Fachhochschule Hannover were given the opportunity to develop a visitor train intended to transport VIPs through the Volkswagen factory in Wolfsburg. The designers needed to take into consideration the automotive engineering aspects, design issues, and constructional, functional and safety aspects, not to mention the financial conditions: in other words: "a classic design task" for students, providing them with an enormous insight into commercial processes and production methods. All associated with the opportunity of realising their own designs. This was also the only way for Volkswagen AG to design, develop and build a vehicle of this type in only six months without exceeding the set budget. Inquiries made at the relevant design companies no doubt highlighted the realistic but non-realisable fees that would have been charged as well as the incompatible development times involved. This already touches on the fundamental problems of university co-operation versus design companies. Universities have to ensure that they do not pull the carpet from under the feet of the local design companies. Universities and their institutes must clearly restrict themselves to being door-openers for design contracts within the free market, and not set themselves up as competitors. The visitor train project was demonstrably unrealisable by design companies.

Figure 7: Kind Hörgeräte / design study on "hearing aids" / design: the student Tobias Stuntebeck

Figure 7: Wirtschaftsgemeinschaft zoologischer Fachbetriebe GmbH / design study for hamster cages: more space to run around, in cages with smaller footprints / sketch: student Ernst Köhler

Figure 8: Wilkhahn / ambassador design study: students taking a critical look at companies and their products / idea: saucer with cultural and business-relevant information as an advertising medium / by student Dorota Trycz

Establishing a name as design door-openers is achieved in a much more appropriate way be working on open development contracts. This is a framework within which the enormous innovative assets of students can be tapped and stimulated. Projects can then also fall within "product design as a media-based instrument" as well as being part of the "strategic innovation process."

By adopting courageous design solutions, companies have an opportunity of capturing the headlines or initiating a discussion on the basis of associated surveys and measures to provide them with valuable feedback for future developments.

This study on hearing aids had the objective of using the publicity and surveys carried out in association with the design process to provide useful feedback on the designs. Kind therefore profited from the input of our students, e.g. on the question of "unisex" devices, and identified the customer demand for smaller and "more attractive" hearing aids from the information acquired from the surveys. This development project was followed up by the engagement of a design company who developed a hearing aid on the basis of this information. During the course of the project, the work evolved from a pure media-oriented assignment to an undertaking of strategic corporate importance: up to this time, Kind had only been a major chain store operator – in other words, a retailer of such devices, and provider of services around these products, but not as a producer of such devices. This has now become an integral part of the strategic orientation of this very well known company.

Associations, lobbies and institutions in particular can harness this aspect for their own work, independent of tight production frameworks. Out-of-date market positions can be critically and publicly analysed in this way – slow innovation cycles can be stimulated to change gear, and the intrinsic position of all of those involved can be vividly highlighted (fig. 7).

Open questions involving a conceptual or strategic component are the most complex development tasks. Each project with a "strategic innovation process" background needs to be analysed to determine whether the assignment can be carried out in one or several phased projects. "Open search projects" can be used initially to identify deficits in areas such as corporate image, and document them (fig. 8).

Realisable projects can be initiated from the results of such a critical analysis. This involves both sides exchanging arguments for the development objectives, strategic actions and operative decisions. They support the precise formulation of corporate philosophy.

4 Professional partners

Not all companies are suitable for co-operative partnerships. Universities must carefully select the partners active in the cultural, scientific or industrial spheres. Original design demands total commitment of all participants as well as a culture of non-hierarchical communication.

Companies with design experience must be willing to provide intensive project support. Social organisations or companies with little design experience – "design first-contacts" are provided with an opportunity of assessing the effectiveness of design and appreciating its merits, and opening the doors to working with design companies on other projects. With the first contacts in particular, the priority is to demonstrate the aforementioned potential opened up by design but also to show the limits of such co-operation. University co-operation projects cannot guarantee the vital continuity required by corporate design projects, nor guarantee the necessary professionalism – students and trainees must also be allowed to make mistakes.

As a university, we deliberately try to support social and cultural organisations, and to serve research institutions, to make a socially effective contribution to improving the design quality of our environment, make technical innovations more marketable, and to raise public awareness of scientific achievements early on.

The early implementation of design in business processes does not necessarily require a professional partner. If "initiating design" is seen as a business promotion exercise, then there is no reason why this should not start with design students. Because of the shortage of companies in which innovation

Fig. 9: "Ding3000" – student entrepreneurs / Neon lights "Stuckleuchtendinger" / design: The students Carsten Schelling, Sven Rudolph / 2004

plays an important role, not to mention the continuously changing job market, it is becoming more common for graduates to start up their own companies. The product design course at Fachhochschule Hannover has, therefore, not only led to the establishment of successful design companies (fig. 9) but also e.g. a major manufacturer of bamboo parquet flooring. The wide-ranging skills of product designers are an ideal foundation for a start-up that earns technical support via appropriate "entrepreneurship" programmes. A regular phenomenon of start-up competitions in the recent past has been the sight of product designers amongst the winners. Start-ups are not so much launched on the basis of a convincing business case, but on substantial product or service concepts. If on top of this, the university also succeeds in training students to become competent designer personalities, then business promotion becomes a very intelligent investment against this background.

5 Conditions

The projects need to support the aims of training. Starting points can be extremely varied: new technical developments, technical innovation, changed social needs, cultural problems, conceptual tasks involving capital goods, consumer goods, transportation, packaging, services, interface or marketing etc. It is vital that the tasks are formulated jointly to ensure that they take into consideration the corporate objectives as well as ensure that they contain an appropriate scope and achieve the necessary didactic aims. The priority should be the formulation of tasks and not the design of specific products.

The degree of complexity is formulated in accordance with the project. We can provide co-operation projects during different phases of the project design course.

Projects at the end of the second year of the course are formulated so that in addition to a modest conceptual approach, they also train the abilities to design in three dimensions. During the main part of the course, there is an appropriate increase in complexity. Degree dissertations are comparable to professional assignments. We expressly support group activity.

Additional options are short-term projects lasting 5 to 10 days. These elaborate potential solutions and sketch design concepts – all carried out under a tight time schedule.

It is important for the success of a project that all partners can be relied on to be available during the whole of the project period for detailed discussions, advice and the exchange of ideas. Funding, non-cash support, and the provision of expertise are agreed beforehand. Tours of business premises, presentations and similar activities are a vital part of this fruitful transfer of knowledge.

6 Risks

Practical projects should also not be immune to controversial debate. When do co-operation projects provide benefits for all of those involved and when is the university only a cheap alternative and competitor to professional design companies?

We cannot and have no intention of being in competition with design companies. We only enter co-operation projects when the aforementioned aspects are observed.

We also prepare a financial estimate reflecting the size of the task and the company involved. Market prices are difficult to estimate because the bids made by designers can vary by up to 1000 %. The level of knowledge transfer must be agreed in detail in advance. The co-operation benefits from obligatory deadlines, briefings and reports detailing the results.

Unlike a professional design firm, however, we as a university are not able to guarantee delivery of the quality required within a particular deadline. Studying is a learning process and must accommodate mistakes. We turn down projects that allow no freedom to make mistakes and can obviously be done better by a design company. Unfortunately, this approach is not put into practice by universities as wholeheartedly as it should be. Agreements and discussions concerning the relationships between co-operation partners should therefore be put on the agenda as a matter of urgency.

Another question that still remains open is how industrial protection rights are treated. The involvement of universities in Germany in patents and copyrights has not been solved satisfactorily and urgently requires regulation. The current situation where students have to transfer all rights to the universities is not conducive to their motivation and their willingness to innovate. Models need to be elaborated here, which accord students rights as designers, as well as the university lecturers and the universities themselves that support this work with the relevant expertise.

7 Outlook

The product designing profession not only requires wide-ranging design abilities, but also confident personalities who can work at their own initiative, have specialised knowledge, are creative and inquisitive, demonstrate tenacity, commitment, as well as precision, enthusiasm and concentration. Interdisciplinarity and integrative thinking and actions are prerequisites for responsible design.

The complexity of the issues involved, and the multiple structure of the tasks themselves, requires knowledge to be transferred from organisations involved in the cultural, scientific and industrial fields.

Universities in Germany will continue to have to make do in the near future with limited funding. The expansion and replacement of equipment, the hiring of guest lecturers, organisation of workshops, excursions and research topics and visionary projects, not to mention factory and office tours and technical presentations, can all be realised on the basis of co-operation projects.

Each project only provides an insight into particular aspects. The knowledge of how to perform in the right way for a whole range of tasks can only be gained from a whole spectrum of activities carried out by students during their courses.

The lecturers also benefit from the close co-operation because this enables them to continuously review and revise the course content with the needs of industry, science and culture.

8 Conclusions

Without the diverse range of co-operation projects and the associated transfer of knowledge, we would not have been able to round off the training of our students to the extent that has been possible in recent years. It also enabled us to enjoy the presentations of well-known guest lecturers from the fields of design, industry, politics and culture, who only came because of their association with the projects. Exhibition projects and excursions have also been possible because of this co-operation. Most important of all though is the high quality of the designs throughout produced by the students in recent years – many of them being awarded prizes by international juries. And last but not the least, our graduates also do extremely well in this highly competitive market. All of this gives us confidence that we are charting the right course.

Industry regularly knocks at our door to discuss the possibilities of entering co-operation projects. The level of interest is just as high as the degree of ignorance about what design can achieve. Having tasted the fruits of this co-operation work, most of our professional partners move on to work with designers, who enable the partners to incorporate the products or ideas produced by our students in their own production processes, and thus establish them in markets.

More and more graduates are themselves successfully establishing themselves with their own start-ups – which represents another facet of initiating design, not so much involving SMEs, but the economy as a whole.

These successes demonstrate that the Fachhochschule Hannover is pursuing the right approach.

Co-design and Co-existence in Israel

Yair Engel **Kayama - Centre for sustainable design in Israel, Tel-Aviv, Israel**

Designer and design educator, Yair Engel is particularly involved with sustainable design as he believes "Designers have a decisive influence on products and on their environmental, economical and social impact. As such, we have the power to lead the way for a sustainable future". Yair Engel operates a design studio in Tel-Aviv, working with the industry on sustainable design scenarios and industrial designs projects and offering consulting services to government ministries and environmental organizations. As a design lecturer, Yair teaches sustainability and design in several academies.

Co-founder and director of Kayama – Centre for Sustainable Design in Israel, a registered NGO, local liaison for the O2 international network of sustainable designers, aiming to develop awareness and research on environmental, economic, ethical and social considerations in design and development through education, academic research, seminars, workshops, conferences, consultancy, design exhibitions and publications.

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Israel of 2005, in an environment of continued conflict, accompanied with social and ethnic cleavages, the question of the designer's role and responsibilities and its implications into design education reflects with all its importance and complexity.

Israel's flourishing hi-tech and bio-medical industry is reaching many export markets, designers are prized on international design exhibitions and competitions. Yet, local political and environmental issues are not properly addressed in design education and design practice.

The project presented in this paper is an actual onsite project, taking place in the Arab town of Umm Al-Fahm. Students and professional designers, architects, landscape architects and artists work with the inhabitants and authorities to design a better place to live. The project enables learning the meaning of design in a co-existence environment through joint work and co-development.

Keywords: *continued conflict, environmental issues, co-existence environment, design practice*

Introduction

Israel's flourishing hi-tech and bio-medical industry is reaching many export markets; designers are prized on international design exhibitions and competitions. Yet, local political and environmental issues are not properly addressed in design education and design practice.[1]

The project presented in this paper is an actual on-site project that is taking place in the Arab town of Umm Al-Fahm. Students and professional designers, architects, landscape architects and artists work with the inhabitants and authorities to design a better place to live. The project enables learning the meaning of design in a co-existence environment through joint work and co-development.

Umm Al-Fahm

Umm Al-Fahm urbanized from a rural village in 1948 to a current 50,000 residents town. After Nazareth it is the 2nd largest Arab enclave within Israel's pre-1967 borders. At the time of its establishment around the 13th century, Umm Al-Fahm (meaning "Mother of the Charcoals" in Arabic) was surrounded by natural forests that provided its main source of income – coal. The town contains the remains of some old and ancient building that were mostly built during the Ottomans period. During the 1948 war, Palestinian residents of different villages found refuge in Umm Al-Fahm and became its citizens. With the establishment of the state of Israel in 1948, the village counted 4,500 inhabitants, mostly farmers. Since then, Umm al-Fahm has transformed from a rural village to an urban settlement and in 1985 was granted the formal status of a city.

Umm Al-Fahm is located in the Eiron valley (Wadi Ara) on the Hadera – Afula main road and rests at the tip of a 520m mountain, the highest in its vicinity, with a panoramic view of the Jezreel valley

Figure 1: Map of Israel

and Mount Tabor, northern Samaria, the Mediterranean and the Carmel Mountains. Over ten water springs streams are active there even during summer.

The town urban development is affected by the political terms that dictate the planning and building regulations imposed on Arab towns and villages in Israel. The town centre is heavily crowded, built around narrow streets and alleys that encompass residency, commerce, business, and industry.

The Umm Al-Fahm Gallery

The project was initiated by The Umm Al-Fahm Gallery, the first contemporary art gallery in an Arab town in Israel. The gallery was established in 1996 on the initiative of local residents and artists who wanted to bring quality contemporary art to the city, and to exhibit original Arab and Palestinian art.

"The gallery's major aim has been to enable Arab and Jewish artists to express their cultures. This is a complex process, given the reality of the times. The gallery operates in a region whose identity is Arabic, and whose residents are citizens of the State of Israel. It struggles constantly with the need to maintain its secularism within religious surroundings, as well as the attention of a Jewish audience that has not yet faced up to the divided reality."[2]

The gallery currently promotes a curatorial and building plan with the purpose of founding an Arab Museum of Art that is planned to be designed by the well-known architect Zaha Hadid.

The Umm al-Fahm gallery has gained a reputation as the most important in the Arab sector, and is highly regarded in artistic circles and among the Israeli Jewish left. The gallery's artistic approach is to incorporate the town's residents in different curatorial projects.

The project was born in the wake of the "At Home" exhibit in Umm al-Fahm last year, which included visits to art shows created in local homes. The goal, beyond the artistic and communal aspect, was to bring back the Jewish art lovers who stopped coming to the gallery after the outbreak in September 2000 of the second "Intifada." This wave of violence linked to the uprising of the Palestinians against the Israeli occupation was accompanied by terrorist attacks against Israeli targets. In October 2000, Israeli Arabs mostly from the northern part of the country including Umm al-Fahm were involved in violent riots in solidarity with Palestinians from the West Bank and Gaza Strip and to protest Israel's pattern of prejudice and neglect towards the Arab minority. After the riots, the police was held responsible for the death of 13 Arab citizens.

"The commission hired to inquire the police responsibility said that insensitivity of the Israeli 'establishment' permitted widespread discrimination against Israeli Arabs and the build-up of a 'combustible atmosphere,' as it said, a politicised Islam began to radicalise the population.(…) For their part, Israel's Jews increasingly regard Arab compatriots as a potential fifth column after the convictions of a small number for aiding Palestinian terrorism."[3]

In this political climate, "Redesigning Umm al-Fahm" is seen as an important step in counteracting the image of Umm al-Fahm as a dangerous place and to bring together Arabs and Jews to work equally towards a mutual goal.

The Project

The project gathers more than 50 Arab and Jewish designers, architects, landscape architects and artists (from professional background, research and academy) and several groups of students to work with the town residents and municipality in their personal and urban environment. The project is named "Environment design in Umm al-Fahm" (also referred to as: "Redesigning Umm al-Fahm"). The goal is to promote dialogue and to come up with strategies to increase awareness of the town's environmental, cultural, tourism and business potential.

Ten different specific locations (defined as "spatial clusters"), mostly in the town's crowded centre, identified for their environmental, cultural or economic potential, or the capacity for stimulating

Figure 2: Umm al-Fahm view from the Art gallery

Figure 3: Ein Elsha'ara spring today

social interaction, were selected. Each cluster is made up of private homes, businesses or public institutions, gardens, streets, outdoor furniture, marketplaces, historical buildings, open areas, scenic lookouts, natural springs where the local communities congregate, etc.

Grassroots Community

A grassroots community refers to people working together to find solutions to problems in their communities. The project members include professionals, academics, educators (designers, architects, landscape architects and artists), local business entrepreneurs, residents (representatives of local institutions and associations, neighbourhood committees) as well as local authorities' representatives all banded together on a voluntary basis to promote this project under the belief that they have the ability to drive a sustainable change.

"While neither architects, town planners or landscape designers can replace politicians, local authority representatives or those acting on behalf of associations being the "civil society," they nevertheless have two major responsibilities: Firstly to propose forms, images and illustrations other than those that already exist of a city able to satisfy current needs, solve technical and political conflicts, and accommodate the land interests of various pressure groups. It is their capacity to imagine space, their savoir-faire and their knowledge that designate them for this task.

Secondly to provide conceptual tools, "ways" in which to think of the city and the space it occupies, to adapt their solutions to the requirements of a given moment to a specific political, geographical or historical situation."[4] Active participation of the inhabitants is the key to the success of the project since it capitalizes on personal capabilities and local knowledge and reinforces the social fabric and brings the people to actively endorse the project and care for its durability.

As defined by Ezio Manzini, "Every solution, especially sustainable solution, brings a complex system of relationships into play with new forms of collaboration between the various actors involved and/or interested. (…) In the face of this statement, one of the most important issues in the development of sustainable solutions is precisely that of co-operation and partnership: how can we bring a multiplicity of actors to focus on one objective? How can we facilitate the generation of shared visions? How can these visions actually trigger their energies? To answer these questions, the designer must put himself forward by generating and proposing possible scenarios and solutions."[5]

These possible scenarios are the basic structure of the "environment design in Umm al-Fahm" project. With the project advancement, the multiplicity of actors could even help achieving multiple goals. The key question will be how to preserve the continuity and consistency of the project.

The Clusters

The ten clusters around the town focussed on enhancing the urban qualities of the Arab old town centre, while giving a personal or artistic expression. The first phase of the project involved cultural exchange and the collaboration of professionals and residents in planning. The outcomes of the planning and first realization phase were presented in a highly advertised exhibition in the town. Given below is a brief description of the different clusters' ongoing work.

1 **Ein Elsha'ara: The cluster includes two different sites:**

- a public garden and a playground,
- a public garden and a panoramic viewpoint in the Ein Elsha'ara spring,

The project will make use of reused materials such as car tires, glass pieces and other waste materials in a concrete structure decorated with reused ceramic pieces and marble. The project will include street lighting.

Figure 4: Adnan alley

Figure 5: Akked Agbariyah model

Figure 6: Akked Agbariyah at work

2 **Adnan alley**

The cluster will include the following elements:

- A marble mosaic "carpet" on the road.
- A drinking trough close to the nearby mosque.
- A net for creepers on the walls.
- Ceramic walls featuring genealogical trees of the nearby families.
- Lighting piece inspired by the shape of a "Zabbar" cactus (which is used in arts, in everyday motives and in Hebrew slang to symbolizes the Israeli / oriental identity).
- The rebuilding of an old stone wall going down Adnan alley to create a border to a small traditional olive tree plantation and prevent mud slides.

Such properties, which are spread all over the town, will be part of the town trails during the olive harvest season. These trains will enlighten visitors about the history, tradition and myths around olive growing.

3 **Akked Agbariyah:**

This is the first step in renovating an ancient 200 years old Arab house that was used as an olive oil factory. The future plan is to build a museum for olive oil fabrication history and tradition. The first phase of the project is the reconstruction of the ancient arch and the opening of the private property to the public.

4 **The Umm al-Fahm Municipality:**

Five groups of benches made of ceramic tiles drawn by the inhabitants will be installed. The different streets will be redefined through colour treatment of the existing metal pieces of window sills, doors, banisters and window bars. The local daily market stands will be redesigned, the streets cleaned and a market lane will be opened between the buildings. A ceramic products day market will be opened once a week. On that day, the houses' entrances will become improvised stores.

5 **Bider Almahadjneh**

Different units of designed metal construction including plants containers with an integral irrigation system will be created. These constructions will be installed against the house walls along Bider Almahadjneh. The units will be made out of metallic nets. Some of the units will include sitting benches. Special engraved marble pieces will be placed in the construction and on the building walls.

6 **Sukk AlMidan (AlMidan market)**

In the AlMidan market, the Nabi spring is presently sealed. The project plans to unseal the spring and create a water canal along the road, which will fall down a mosaic wall as a drip fountain. For this purpose, the road turn will be amended and the middle road separation will be removed. Special benches with climbing plants will be created along the market road and the street corners.

7 **Sukk Mahadjneh (Mahadjneh market)**

The walls will be decorated with hand-made ceramic tiles manufactured by the community. Special patterns, words and sentences will be chosen and will be cast in a "hot shop" using reused coloured glass. Benches made from reused tires will be installed in the streets. These benches include irrigation systems, which will allow growing plants inside them.

8 **Ein Ibrahim**

This group is composed of Architecture and Urban Planning students as part of a dedicated design studio and workshop at the Tel-Aviv University. Based on large-scale field research, this group's work focuses on solutions and interpretations for the Wadi Ara main road (in the city entrance area) which splits the town in two.

Figure 7: Town centre conceptual sketch

Figure 8: Special engraved marble pieces

Figure 9: Pattern made of reused coloured glass

Figure 10: Abbu Kazam covered stairs road

9 Abbu Kazam

The building from this area will be marked with ceramic tiles featuring pictures of historical Umm al-Fahm sites and description of the town's history and special signage from different colors to mark different historic periods. Abbu Said's toasted sunflower seeds shop will be open to the public to show how the seeds are prepared. The place, which includes a traditional coffee shop, will become a meeting and resting place.

The stairs, which were covered with asphalt and became a steep and impossible road (no entrance both ways with cars going without permission), will be reconstituted. The stairs will be designed in a manner that they will include sitting places, which will allow for passers by to sit and watch the view.

10 Skandar

This is the highest point in Umm al-Fahm (200m above the city entrance level). Four concrete sitting circles including three full circles, one half circle and two quarter circles will be designed and built around the top of the mountain. Inhabitants, especially kids, will decorate the round benches with glass and ceramic reused pieces that will be incrusted into the benches. A signed circular pathway including landscape view point is planned.

Hamsa: A Project Inside a Project

One enlarged team was selected to coordinate the different clusters towards sustainable development and to set the basis for "local Agenda 21". Their first mission was to define the direction of the overall project into an experimental format of city trails.

Five priorities were identified: Economy, Society, Culture, Environment, and Education and were symbolically called: "Hamsa". The word "Hamsa" in Arabic (or Hamesh in Hebrew) means "five" and refers to the digits on the hand. This ancient symbol is still used as a protective amulet by both Jews and Muslims for magical protection from the envious or evil eye.

The Hamsa team includes art curator Ami Steinitz, local gallery director Said Abu Shakra (both initiators of the whole Umm al-Fahm project) Umm al-Fahm environmental department manager Muhamad Rabah, designer Yair Engel, architect Abed Badran, landscape architect Inbar Amedo, Umm al-Fahm resident & businessman Ahmed Mash'ur, Lawyer & bioclimatic planner Valentina Nelin.

The Hamsa project will serve as an inspiration for the publication of a book about Umm al-Fahm and other similar projects in the town or in the surroundings.

Environment – Local Agenda 21

By adopting a holistic sustainable design approach, the project can address environmental issues and contribute to the local economy.

Local Agenda for the 21th century is a program that provides a framework for implementing sustainable development at the local level. Local Agenda 21 aims to build upon existing local government strategies and resources to integrate environmental, economic and social goals in a better way.

Local Agenda 21 was first described in Agenda 21 - the global blueprint for sustainability that was agreed at the United Nations Conference on Environment and Development in 1992 (the Rio de Janeiro Earth Summit). Chapter 28 of Agenda 21 identifies local authorities as the sphere of governance closest to the people, and calls upon all local authorities to consult with their communities and develop and implement a local plan for sustainability - a 'Local Agenda 21'.

The Hamsa team is working towards setting the bases for the definition and the implementation of local Agenda 21 at the town's level. Though Local Agenda 21 is usually adopted with a top-down

Figure 11: Skandar

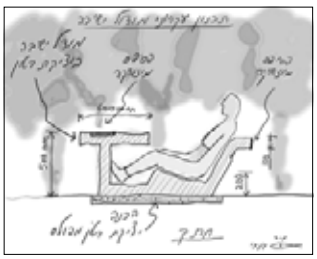

Figure 12: Skandar sitting modules sketches

Figure 13 - Umm al-Fahm map with first "Hamsa" trail

approach, in the case of Umm al-Fahm, the project aspires to drive the agenda from bottom to top. The 10 principles for a local sustainable authority as defined by the Israel Ministry of the Environment are as follow:[6]

- Rational management of urban natural resources (water and sewage, land and energy).
- Involvement of the public in the decision-making process and its implementation.
- Protection and enhancement of open spaces.
- Development of transport systems that are environmental and accessible to all.
- Minimization of the volume of municipal waste.
- Promotion of the local economy.
- Adoption of a policy of environmental and social justice.
- Advancement of environmental/social education and education for health.
- Environmental management of the Municipality and its institutions.
- Advancement of interurban and international partnerships to advance the environment.

The ten principles, accompanied by concrete suggestions for action, are meant to expedite the transition from vision to action. They are expected to be the first step in the transformation of the town into a sustainable local authority. Of course, such a transformation will only be successful if based on a consensus-building process in which all local stakeholders come together to formulate a joint vision and action plan.

Implementation of the ten principles may well lay the foundation for the comprehensive process that will pave the way toward local sustainability.

City Trails

Umm Al-Fahm suffers from a negative image in the minds of Israeli Jews and is often associated with violence and religious fundamentalism. Umm Al-Fahm has even been more isolated when, at the moment of the building of the separation fence, some Israeli right-wing radical politicians have suggested that as part of a peace agreement with the Palestinians, Umm al-Fahm as well as other Arab councils, should be handed over to the Palestinian Authority in exchange for West Bank settlements to be annexed to Israel.

Though the strength of the Islamic Movement has made Umm al-Fahm synonymous in recent years with anti-Israel radicalism, most residents – like the vast majority of Israel's 1.4 million Arab citizens (out of 6.8 million Israelis) – would rather be a minority in the Jewish state than a Palestinian Authority citizen.

Under these conditions, bringing Jewish visitors to the town is a real challenge. One of the ways to achieve it is to capitalize on the historical richness and the cultural specificities of the town.

"Tourism can capitalize on the economic potential of "local colour". The project participants have listed various traditions and aspects of lifestyle that were worth reviving and accentuating: the custom of sitting outside in the evenings, storytelling traditions passed down by the village elders, traditional foods and agriculture and local crafts such as pottery, ceramics, plaster engraving and carpet-weaving that have flourished since 1948." [7]

Other plans for local tourism will involve sport and outdoor activities such as mountain bike circuits and horseback riding in the town surroundings.

The Hamsa team is compiling all these different possibilities into city trails.

Umm al-Fahm is divided into four main districts, which correspond to the four main family clans to which belong most of the town's population: Mahadjne, Mahmid, Jabarine, Agabariyeh.

The first Umm al-Fahm trail: "Meeting of the ancient and the modern, the nature and the urban environment; the inner and outside landscape" should go through the following steps:

- Meeting place: City entrance - near the Wadi Ara main road
- Urban meeting between the Ancient and the Modern (one of the project's clusters)
- Landscape point of view of the Wadi Ara area
- Visit of the historical city centre
- Visit of Umm al-Fahm Art Gallery
- Natural water spring
- Observation of the recently built separation fence (the fence erected unilaterally by Israel along its border with the West Bank to prevent Palestinian terrorists from crossing into Israel – and which Israel regards as a potential border between Israel and a future Palestinian state).
- The Miramyiah Hill, herbal plants.
- Parking. Pick-nick tables.
- Ein Al Shaara district. Water source.
- Observation of the city centre.

As the project extends, the trails should become more specific and specialized.

- Visits of additional sites of the project's clusters
- Factory / workshops visits: Olive press, roasted sunflower seeds, soap manufacture, ceramic tiles and pottery)
- Landscape point of views, interesting sites (sources)
- Ancient and modern architecture
- Historical sites
- Souvenirs shops
- Gastronomy (restaurants and local specialties: traditional pastries (knafé), olives and olive oil, traditional cuisine, Arab coffee (regional mixtures), dried fruits delicatessens, sweets, waffles, pickled vegetables, fruit syrups).
- Natural resources: 15 water springs around the town, panoramic landscapes of the surrounding valleys, therapeutic herbs, culinary plants, grapes, trees (almond, olive, fig, carob, oak, citrus). In season, there is a possibility to organize almond or olive picking, or to offer home made salads and stuffed dishes from local leaves (Hubeza, loof), fresh carob or orange juices, herb teas (medicinal sage, zuta etc.)
- Storytelling traditions (festivals)

The development of the city trails will adopt some marketing insights. The Hamsa team will create a visual identity for the project and develop a coherent language. The branding can capitalize on the "local color" without limiting the town's image to its Middle Eastern clichés. It is a graphic design challenge that can bring people from the outside based on what they think they know about the town, and then make them stay because of what they discover.

The project is planned in cooperation with the "Sikkuy" association (Jewish-Arab Mayors Forum in Israel (JAMFI)) that is working towards building sustainable frameworks for municipal cooperation between Jewish and Arab communities in the Wadi Ara region. Despite the close proximity of many Jewish and Arab municipalities in the northern "Triangle" (Wadi Ara), the Galilee and the Negev, there is little cooperation between these entities on the local and regional level.

Sikkuy believes that cooperation between the Arab and Jewish municipalities for economic development, joint infrastructure expansion, tourism, shared land use etc. will benefit both Arab and Jewish citizens and create a positive dynamic for advancing civic equality and shared citizenship. Joint committees have been formed to work together on economic development and environmental issues.

Learning for Design Education

The project is taking place in parallel with the academic year, and most of the learning about design education should arise with the advancement of the project.

The expected learning benefits from the Umm Al-Fahm project are:

- The granting of an actual on-site experience by working directly with the end-users of the final project.
- Learning the meaning of design in co-existence environment through co- development (Arab and Jewish) of the project.
  Although Israel has more than ten public and private design schools offering design education in various design fields; none of these schools is located in an Arab town.
- Cultural exchange, respect for traditions and historical framework of the city. Integration of local craft traditions, combination of local materials, modern design and building techniques.
- Integration and implementation of sustainable development and design principles in design practice.
- Design for/with the under-privileged.
- Design and politics: working with local and national governmental authorities. Field confrontation with the government budget allocations and the political terms that dictate the planning and building regulations imposed on Arab towns and villages in Israel.
- Enables industrial design students and designers to communicate effectively with professionals from other disciplines: architects, landscape architects and artists. This will bring them to find ways to overcome the language barrier between people (Hebrew, Arabic and English) but also between professions.
- Design project that remains after year-end exhibition. Grant long-term thinking approach and enables the designers to see the impact of their work in the future.

Notes

1 The question of the ethical, social and environmental role of the designer in Israel was presented at the ICSID 2nd Education Conference in Hannover, September 5-7 2003 in a paper by Dr. Malka Ben-Peshat and Yair Engel "Dilemmas in Sustainable Design Education in Israel."

2 "Almantra Art Museum, Umm el-Fahem Program", Said Abu-Shakra, April 2004.

3 "Israel police faulted in 2000 riots", James Bennet, New York Times, September 2 2003.

4 Francoise-Helene Jourda "Sustainable Metamorphoses" The International Architecture Exhibition, Venise Biennale , Editions "le Moniteur", 2004.

5 Manzini, Ezio "Sustainable everyday – Scenarios of urban life", Edizioni Ambiente, 2003.

6 "Local Sustainability", Environmental E-Bulletin, Israel Ministry of the Environment, November 2003, Issue #4.

7 Zanberg, Esther, Capitalizing on 'local colour', Haaretz, January 2005.

Design Education for Latin America in the Digital Era

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From 1993 Jorge Meza has been working in several projects as a graphic artist and visual communicator in different areas such as advertising, etching, web & multi-media, strategic planning, research, education (professor) and design management.

In 1999 he did Graduate Studies in Graphic Art, Academy of Fine Arts, Cracow, Poland, and in 1997, Master in Visual Arts at the Academy of San Carlos U. N. A.M., Mexico.

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Today, the social responsibility of designers oscillates between generating ethical proposals of design that respond to human needs or follow marketing strategies that benefit big enterprises. This century is transforming all countries and all cultures. Nowadays In Latin America, the digital technologies are not accessible for everyone and in some contexts these are seen as a symbol of class or status and not as a powerful tool that can help society.

The new technologies, especially information technologies, do not guarantee to improve the way we live. Reality is more complicated and, therefore, although Cyber-Networks represent a digital revolution and a cultural transformation, nevertheless we know that their "benefits" will be perceived long-term in Latin America. "The production and use of new technologies" constitute a susceptible tool for a positive innovative utilization. The Network Society can be a bridge toward a better future or a barrier in third world countries. Universities should be conscious and "encourage" their students to face this digital revolution through an integral humanistic education, of advanced theoretical and technological knowledge, linked with social causes and problems.

In the classrooms exists the possibility, through new education strategies, to re-orient this "new emerging digital design", rethinking new technologies, in order to solve the specific needs of each community and of each user, respecting social values as history, language or culture.

Keywords: *digital era, new technologies and design education*

1 Introduction.

The digital world.

In this amazing epoch of fast changes and uncontrollable proliferation of digital information systems we face, as design professors, a big challenge: how to undertake, focus and conceptualize the new digital technologies in order to serve and respond to the contemporary demands and social needs.

The new digital media are developing complex networks that are creating "new social and cultural situations"[1]. "The digital culture is fast becoming one of the most powerful and exclusive elites in history"[2]. There is a *digital barrier*, between the people that have Internet access and the ones that do not.

Among them we could mention:

- The illiterate people in the world (1500 millions).
- The people that do not have electricity at home (2000 millions).
- The people that do not have access to a telephone line (3500 millions).

From the 6000 million people that live on the planet only 580 million have Net access[3]. The *digital barrier* is more significant for the people, who know that it exists, that for the ones who ignore it. This *digital racism* is only a mirror of the big social inequality that exists in the world.

Mexico, a country with a population of 102,797,200 people, has only 11,033,000 Internet users that mean a 9.8% penetration[4]. The Network society is barely emerging and it is in a very primitive phase, but it had already redefined the concepts of time and space; "it had changed the way we lived"[5] .

With the development of the Internet, the computer changed from an object used for arithmetic operations, calculation and text edition, to an essential communication tool, through which we can learn, work, talk, buy, study, travel and entertain ourselves in a free international virtual space "open" 24 hours of the day. The e-media have transformed and redefined familiar public structures as the post service (with the e-mail) or the telephone system (with the ICQ or the chats), renewing the way to relate and interact with people. Today, disconnected from the Net, any computer is a useless object.

This century is revolutionizing all cultures. Still in Latin America, in countries like Mexico, the technology itself will transform the society, and one day it will be accessible to all citizens, and not only a symbol of class or status of a certain social group as it is nowadays (Central America reported 12,191,600 Internet users last May, that means a 8.6 % penetration rate[6]).

We should be conscious and "encourage" our students to face this digital revolution through an integral humanistic education, of advanced theoretical and technological knowledge, which can reorient this "new emerging design" to solve the specific needs of each community and of each user.

Teaching e-Design at the University Iberoamericana.

"The University Iberoamericana is a private institution open to all faiths and nationalities. Its primary purpose is to form integrated, rather than solely informed, human beings through intellectual growth and self-realization. This implies creativity, the capacity to think critically, and the freedom to assert and establish one's own goals"[7].

The firsts studies of Design in Mexico started at the University Iberoamericana 50 years ago. At the beginning, the school adopted the functionalism tendencies about design with a strong emphasis on workshops and an interesting exploration of other fields such as craft design, tool design and electrical appliance design.

In 1989 the Design Department experienced the incorporation of the computer as a "necessary tool" for the materialization of objects and communications. The visual design extended its horizons to new medias of creation and production.

In 1994 the school restructured its curricula in order to bring new programs two years later. The digital revolution that was taking place in the first world countries barely showed some results or benefits in Mexico. The computer became an indispensable tool for the student's presentation of projects in different courses at the school. Our computer labs were renewed and the school increased the number of "Macs" from 15 to 45. Nevertheless inside the curricula there was not contemplated a teaching strategy inside new fields of digital interaction such as Web Design or Multimedia Design.

Today the Design Department is related to several productive sectors: visual applied communications, creative interactive media, multimedia, strategic thinking, society and culture, product innovation strategies, fashion and textiles and product design.

Our Bachelor in Interactive Design integrates information technology strategies, visual communication, programming, data analysis, networks and multimedia concepts. It prepares students to work with design for the digital media, the World Wide Web, computer interactive media, animation, and project management.

An interactive designer from the University Iberoamericana is a strategist who can analyse, diagnose and solve complex problems of visual communication, audio, video, computer systems, networks,

human-computer interaction and database concepts. He works in an interdisciplinary manner, understands the importance of new communication media within information society, is related to the audiences of his/her messages and above all, has a clear commitment to Mexico and Latin America.

2 Experimental

Developing teaching strategies for Digital Design courses through a compromise with Mexican society.

At our University we believe design is an important factor of social development and should become an integral part of the multicultural Mexico of today. Students must comprehend the importance of the design profession in the sustainable development of the country; it is necessary to broaden perspectives in order to visualize alternative forms of work that will allow designers to participate in the construction of a fairer Mexico.

Four years ago a web design course began at our school. The goal of this course is to link the Internet with social needs. Its emphasis is in generating appropriate solutions, through the visual codification of messages, to specific interactive communication problems from different society groups.

Students know that new technologies do not warrantee to improve the standard of living of people. The reality is more complicated and, although Internet represents a "technological revolution"[8], nevertheless its "penetrating effects" will be perceived long-term in Latin America.

The hypothesis that we raised at the Design Department was that if we wanted to educate professional designers who would be capable of prospecting solutions for Mexico's problems, we should give our students the opportunity to locate and understand themselves in the reality of a country of enormous complexity and contrasts, as part of a globalized world.

During the last several years we have developed a "teaching" strategy that joins professional education (in classrooms) with the society through a series of educative experiences called "***linked projects***." These projects give the students the opportunity to interact with people through the resolution of real specific problems, giving them a clearer conscience of the national context and the appropriate use of new technologies as well as the possibility of acquiring a more significant learning.

The work with real problems allows them to achieve newer levels of analysis and gives them a more consistent conception of the culture and the relations in the social world as well as a practical use of digital media.

Project:

Campaign of Information. Trash and Recycling in Mexico City.
January – May 2002.

"Before the imminent closing of Mexico's city sanitary trash backfill announced for 2004 by the office of the Secretary of Environment and Natural Resources, it is urgent to generate solutions," said Martha Thin, president of the Environmentalists Groups Union. "In Mexico City every month each family (comprising 5 members) produces a cubic meter of trash; that means, in terms of the entire city, three million cubic meters of trash.

In Mexico each citizen generates 865 grams of trash daily[9] and every day the country generates nearly 84,200 tons of trash. From the total of residues generated in the city, only the 53% of the trash is arranged in "*sanitary trash disposals*."

In 2002 the General Direction of Urban Services of the Government of Mexico City asked for our support and the participation of design students for conception and development of a series of campaigns oriented to create social consciousness on the serious problem that trash and residues represent to the city. The campaigns were expected to motivate a culture of recycling.

The campaigns was expected to target the following social sectors:

- Children
- Teenagers
- Undergraduate and Graduate Students
- Families
- Businessmen

In this project three groups of fifteen students each participated. The first approach to the problem initiated with a visit to a residues transfer station and to the sanitary trash deposit. This visit raised great interest among the students about the problem.

To achieve a positive effect for the campaigns in electronic and printed media, it was necessary to think and build new ethical approaches that could transfer the problem of solid trash residues to the population, and could present this serious social problem without any distortion of reality.

The design process was conducted in three main phases:

a Investigation and Analysis.
This phase involved several visits to the residues transfer station and to the sanitary trash to understand the magnitude of the problem. A deep study was conducted involving the use and recollection of a variety of materials, personal experiences, histories, texts, images and objects. Several experts came to the university and talked about why trash is creating serious problems for all and what happens when we have to get rid of it.

b Synthesis and Design.
In this phase students considered certain criteria to communicate their messages to the different audiences. These criteria were dictated by the functionality, the expression and the technologies of the campaign itself, focusing on the cultural and economic context and geographic location.

Students exposed their first ideas, concepts and sketches for the campaigns. Communication strategies were planned, thought and selected for the campaign (according to the different targets).

Students analysed the opportunities through web sites, for campaign's interaction. (During the whole design process they considered the difference of the web site from the traditional print media.) They developed a solid campaign strategy and a preliminary web site map.

Students designed, developed and refined the visual concept for their campaigns and sites. In the classroom all projects were reviewed and professors advised to refine design options. All campaigns were evaluated in terms of innovation, communication, accessibility and usability.

During the development of the project, the General Direction of Urban Services was committed to give feedback to the students at least three times – at the beginning of the project, through corrections at the middle, and at the final presentation, where complete feedback was given to the students on the strengths and weaknesses of the presented designs.

The Government of the city, with students and professors, decided and chose the most appropriate visual alternatives and the phrases in order to avoid any ambiguity or inadequate interpretations. The final designs and all the materials for the campaign including the web site were presented to the several authorities from Mexico's city Government and University Iberoamericana.

c Presentation and Implementation.
In this phase the obtained results were presented. Most of the works were implemented (produced) with satisfactory results.

Once the Government accepted the proposals for the different campaigns, the students and the General Direction of Urban Services proceeded to carry out a strategic presentation to some businessmen in order to seek sponsorship for implementation and production of the campaigns.

In general, businessmen considered that the proposals were clever and professional. Some of them commented that the presentation of "fresh ideas" was interesting for them since they could extend their perspectives on the trash problem.

3 Results

Academic results

The linked projects are very important for our academic interests since they enrich our students with a series of experiences that broadens their vision of the critical situation of Mexico and the rest of the world, as well as the responsibilities of digital design and the Network Society. Through them the students have shown self-development through a new process of learning, different from the one generated in the classroom, which is clearly related to a more global and less fragmentary vision of contemporary problems. These projects facilitate the synthesis of theoretical and practical concepts and connect them with new media and technologies.

During the project for Mexico City, the students generated web design solutions based on general concepts (of theory methodology, marketing, communication, technology, etc.) and, thanks to the connection with specific problems they understood in a clearer way if their concepts were pertinent and viable.

Professors considered that the final results (projects) were superior to the ones obtained with traditional methods; some commented that the "*digital linked projects*" were valuable experiences and should become a permanent academic strategy.

These web projects linked with the society allowed the students to visualize other type of knowledge and information that is usually not possible to access in the classroom. All participants comprehended the web design as a new and innovative means of engaging the audiences and creating interactive experiences that could not be duplicated in printed media.

The web design linked projects are permanent now. There is a greater consciousness between professors and students of their importance in the process of education of interactive designers at the University Iberoamericana.

Social Results

Manuel Castells affirms that, "Technology is a fundamental dimension of social change."[10] Our students know now that new communication media constitute a susceptible tool for a positive or negative utilization.

Howard Rheingold says that, "Beneficial uses of technologies will not automatically emerge just because people hope they will. Those who wish to have some influence on the outcome must first know what the dangers and opportunities are and how to act on them."[11] Our students are assuming the responsibility of the social, economical and political changes that come with the digital media; they must be capable of analysing and evaluating properly the context where a specific need is located so their proposals should be pertinent to the places and people, incorporating in them, a pertinent formal language and an effective use of technologies.

Neo-liberalism understood as: "A set of ideologies and practices, particularly at the level of national government policy, designated to facilitate or enforce the intensification and expansion of capitalist markets and trades"[12] has brought several doubts about its effectiveness to support regional sustainable development.

Our faculty has been questioning the capacity and potential of Neo-liberalism, in which we have been living in Mexico for the last 15 years and assumes that it is necessary to look for a different kind of prospecting knowledge that will provide a reorganization of educational structures and teaching strategies in order to alleviate the great problems of Latin America.

4 Discussion

- Are these experimental processes a more pertinent way to contextualize new media design?
- How can design and new technologies be more pertinent to places, people and circumstances?
- Is the conjunction of theory and practice helping students to rethink design from action?
- Should education be based on professional skills or on social needs?

5 Conclusion

Today the "*linked projects*" support the formal education of our students of Interactive Design and constitute a fundamental bridge to implementing functional schemes or programs in developing communities.

The "*linked projects*" have demonstrated the necessity to incorporate reflection in the action and the conjunction of theoretical, technological and practical concepts in the interactive design communication processes.

Students confront the enormous problems of urban and rural Mexico, assuming the social impact and economic implications of technologies and their professional activity as designers, when the growth of digital networks is a reality. They have realized that they have a great challenge: to humanize technology and to collaborate with Mexican social development.

The lack of analysis, criterion and conscience on design for new media can cause serious social disorders. In the "*linked projects*" students work with social needs, solving problems through an adequate use of new digital technologies and appropriate visual communications linked with audiences.

Notes

1 Escobar, Arturo. "Welcome to Cyberia". Notes on the Anthropology of Cyberculture. In *The Cybercultures Reader* Daniel Bell and Barbary Kennedy Eds. London: Routldge, 2000. p.56

2 Katz, Jon. "*Media Rants: Postpolitics in the Digital Nation*", San Francisco: Hardwired, 1997. Postpolitics section: p. 64

3 **Global Net population increases** http://www.nua.com/surveys/index.cgi?f=VS&art_id=905358729&rel=true Feb 25, 2003

4 http://www.internetworldstats.com/central.htm

5 Mitchell, William J. "*ME++: The Cyborg Self and the Networked City*". Cambridge: MA; MIT Press. 2003 p. 3

6 http://www.internetworldstats.com/central.htm

7 http://www.uia.mx/ibero/inter/default.html

8 Himanen, Peca. *"The Hacker Ethic".* Epilogue by Manuel Castells. New York: Random House, 2001. p.156

9 http://www.gaia.org.mx/informacion/boletin5.html

10 ib idem.

11 Rheingold, Howard. *"Smart Mobs: The Next Social Revolution".* Basic Books, 2002. p xxii

12 Hayden, Corey. *" When Nature goes public. The Making and Unmaking of Bioprospecting in Mexico".* Princeton: Princeton University Press. 2003. p. 48

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Design in the learning environment: interventions in public schools in Northeast Brazil

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The paper describes an intervention taking place at a local infant school, located in the city of Campina Grande, Paraíba State, northeastern Region of Brazil. It emerged from this experience that there is a crucial need for design interventions in public schools, particularly graphic, industrial and interior design specialists. The intervention revealed that the role of designers in this milieu should not be a passive one. It requires, from external agents, commitment, knowledge about community relationships and the recognition that the community has also much to teach. The involvement of teachers and students in an integrated way proved very successful and stimulated the learning environment.

Keywords: *graphic design, low-income communities, education, teaching materials*

1 Introduction

In developing countries many of the basic needs, which are taken for granted in industrialised countries, are not yet fulfilled. One of the most important is the need for education. The primary education level has been neglected for many years, causing considerable damage to millions of children and to the intellectual development of the nations. This is particularly true in Brazil.

In the North-eastern Region of Brazil, which consists of nine states with a combined population of over fifty million people, there is the highest level of illiteracy and school dropouts in the country. Campina Grande is the second largest city in Paraíba state, which, with a population of approximately three million people, is one of the poorest in Brazil. The Campina Grande Municipality encompasses more than one hundred primary schools in urban and rural areas. The conditions of these schools vary, but besides human resources, many lack basic hardware (Figure 1). One of their main problems is the lack of appropriate textbooks.

Figure 1. Many of schools lack basic hardware

The Ministry of Education distributes textbooks all over Brazil, through a special program (O Estado de São Paulo, 1993) Besides problems with the logistics of distribution such as delays in delivering, etc., these books do not take into consideration regional characteristics. Thus, important cultural, psychological and production aspects are not considered. The alternatives are books published and sold by the private sector. These are expensive and designed primarily for the South Eastern market, the wealthiest in the country. They also give priority to the region's cultural aspects. The quality of illustrations in both cases is generally weak. There is a considerable socio-economic disparity in the infant's literacy acquisition and development. Children from wealthier families are in a more advantageous position, having access to written material, books, magazines, newspapers etc. Poor children on the contrary, very rarely have any contact with this kind of material.

The present socio-economic situation has had particular effects on children. During the 1990s some programmes to stop school leaving at early age and child labour, were designed. Despite charges of corruption and inefficiency of results, programmes such as *Bolsa Escola* (School Scholarship) and *Erradicação do Trabalho Infantil* (Child Labour Eradication) have contributed to reduce high levels of school evasion. Poor children are compelled to work from an early age to help with the survival of the family, and the need to work marginalizes them from the educational system. One of the main reasons that children attend primary school in Brazil is to eat the free meal provided by the State. In the North-eastern Region, the poorest in the country, the situation is even more critical: it has the largest share of illiterates in the country.

There is a consensus today within the Brazilian educational system that education is one of the main tools for development and as such should be given high priority. Nevertheless, enormous difficulties face Brazilian educational system. This project tries to recover the North Eastern cultural patrimony and its local particularities. It uses oral history to search for references, which articulate the population's imagination, one of the motivations for learning, with the production of teaching materials. Local culture is recovered in two aspects, from the literary and iconographic perspectives.

The production of accessible books will not be the solution to all these problems but might help to minimise some of them at local level. The majority of these children will, for the first time, come into contact with the written language. The aim is to produce books with stories, which reflect their own reality, their own life experience. The children, together with their family and teachers, would be involved in the process of creating the story and constructing the books. It is our conviction that this close contact between parents and teachers, would help to improve community relations, bringing the parents closer to the problems of the school and vice-versa.

2 The Need for Design

The research carried out as a Masters of Art course academic requirement, has provided evidence of the important role that can be played by designers, particularly graphic designers in a developing country. The empirical evidence was collected during workshops in primary schools located in North-eastern Brazil and in England and revealed the need and the potential for designer's interventions in projects which involve the low-income population. Because of economic constraints in most developing countries, the majority of the population is marginalized from the benefits of development and have no access to the most basic products. In the case of education, designers of all specialities can intervene in a positive way. The graphic designer in a school, for example, can help develop effective displays, teaching aids, internal visual communication and the design and production of low cost printed materials. The experience described below is a small contribution to the process of democratising information and empowering the local community with the media to express their ideas. This experience is by no means finished; work is being carried on at the moment in local schools with the intention of developing the techniques further. Most recently teachers have been developing the concept of low cost printing and using it for other subjects than reading. They have also considered it important to design and construct individual books and are now producing some of these. Since the workshop took place in 1996 they have produced all the teaching aids, which previously was done by hand using a template and this has improved considerably the quality of the material.

2.1 The preliminary research

The experience described below was preceded by workshops, which contributed to integrate the protagonists of this process and to establish directives for the construction of teaching materials. The workshops revealed that the capacitating of teachers, students and parents for the production of alternative teaching materials was more relevant than the materials made.

The aims of the research were:

- To produce a series of low cost, educationally effective books;
- To educate the teachers, students and parents in how to make books and other printed materials, using both a handbook and through a training course;
- To utilise low-cost and simple techniques as effectively as possible;
- To improve the quality of the design and produce illustrations that take into consideration local cultural characteristics.

The idea was to use stories with a *predictable text* structure recovered from the oral culture of Paraíba State, maintaining as much as possible the original wording of the storyteller. These texts are called predictable texts because the characters appear in all subsequent scenes, allowing the reader to predict what is going to happen next, thus helping the child with the acquisition of literacy. According to Wade, rhyme, rhythm and repetition are important in the text as

"...The rhyme in its simple narrative progression provides a linked sequence of predictable units that have meaning and are worth repeating. Learning that language is predictable helps develop the anticipation which plays an important role in both reading and understanding narratives." (Wade, 1992)

Archer *et al*. also stress the importance of predictability in the text

"Beginning readers use all their previous knowledge of life to predict the likelihood of what the text will mean. They make informed guesses to come up with some possible words that would make sense. As they read on and find out more about the general meaning of the passage, they either confirm or reject their earlier ideas. So prediction is vital to the reading process." (Archer, 1991)

We also considered it important to involve the children in the conception of the story and in the actual construction of the books. This contributed to the development of their language skills, imagination, logical capabilities, observation, co-operation between themselves and the school, which could also develop their mental and manual dexterity.

Figure 2: The stamps had a very good visual effect

After a preliminary experience, it was decided to conduct more research and to experiment with some more printing techniques. Preliminary tests, using pieces of string glued to cardboard as a stamp, were made but the printing results were not very satisfactory, although the stamps had a very good visual effect (Figure 2).

In March 1994 a seventeen days workshop with primary teachers and students in state schools was conducted. The initial idea was to work with various groups of teachers from different state schools. The education expert involved in the project suggested that the work should be concentrated on one particular school, where she had previously been working with the teachers for some time. Her research involved training the teachers in using a new method based on constructivist ideas in education, elaborated by the psycholinguist Emília Ferreiro. Constructivism is not a method but a theory.

"According to it, the child constructs her own process of reading and writing. In this construction, which has an individual logic but interacts with the group, the child goes through stages, advancing and retreating, until gaining domain of the linguistic code." (Lagoa, 1991)

The overall results showed that the workshop was successful. It proved the feasibility of both printing techniques for the target group. There was no major problem for the teachers and the children in understanding the whole process, although, for some teachers, the collage technique proved to be

a little more difficult than the rubber stamp technique. They were not used to the collage technique and found it hard to grasp the concept of working from decomposed parts to make a whole. These teachers only helped and observed the children's session. After a brief explanation, the teachers got on with the work without any difficulty.

One of the most positive aspects of the workshop was that teachers gained the awareness of their own potential. In the beginning they were very reluctant to draw their own illustrations and were tempted to trace from existing books. After some encouragement, the more hesitant teachers decided to look at a selection of books and use them as reference for their own drawings. Once they started, confidence began to build up and gradually they overcame their difficulties. This boosted their morale and the subsequent stages of the workshop went smoothly.

3 Conclusion

The conclusion of this work can be divided into two main aspects: one related to human interaction and the relationships of the participants and the other to graphic design and printing.

In the first workshop, in the North East of Brazil, most of the participants were teachers on a low income who taught in a poor neighbourhood. In general, the methods used in the municipal education system are formal, using standardised textbooks and other materials, and the teachers are in an authoritarian position in relation to the pupils. This rigid relationship allows very little room for creative work. For example, the existing textbooks supplied by the Government, or those produced by private companies, allowed little intervention by either the teacher or the student. The exercises are mechanical, mainly copying from the book, and have little to do with creative thinking. This formal education does not take into consideration that each person brings into the classroom a particular knowledge and experience from the outside world.

The workshops provided evidence that using a participatory method in design, and in constructing teaching material, can bring positive results. During the seventeen days the teachers successfully worked together as a team, although this is not to say that everything went smoothly, and as in any work involving a community, some operational problems did occur. This was mainly to do with human relationships in the setting up and operation of the course. During the course there also occurred some minor problems in working as a team, mainly in relation to specific tasks and lack of communication between the participants. This is an important factor that can delay or even decrease the quality of the final work. After some discussion this problem was overcome and the work proceeded.

The workshop with the children did not present major problems, except that there were too many children for only one person to supervise and it was suggested that the work would be better if carried out by a smaller group of children or with one more adult supervisor. The children were very keen to work during all the sessions and even the difficult students appeared to calm down while doing the work, they were so excited that they even argued about who was going to be chosen to work next. We understand that working in this way was a healthy exercise and should be encouraged.

The results of both workshops demonstrated the feasibility of using these techniques to produce low cost books. The main advantages are: they use cheap materials, most of them free; are easy to cut and glue and, if worked in a creative way, produce good quality visual materials; and allow the printing of different media, from small publications to posters. The technique can be adapted and used almost anywhere in the world and has the advantage of producing one single book or a small batch production. Another advantage is that to produce the books one needs a relatively little space, an important aspect in many public schools.

The teachers were very satisfied with using these techniques and requested some sort of publication containing all the information from the course. A preliminary version of this publication was designed and tested at the school. This publication has been tested over a longer period, initially at José

Tavares Municipal School, and modified according to suggestion made by the teachers. By the end of December 2004 the results will be presented to the Municipal Secretary of Education.

In relation to the future applications of these techniques, we believe that there is considerable scope for their use by different disciplines such as maths and geography. For example, one of the teachers who participated in the workshop has developed a book to help in her physical education class. Teachers can also produce displays and other materials for the classroom. A further use would be in popular education by non-governmental and grass roots organisations and adult literacy classes. There are similar examples in other countries, which corroborates the results of the workshops. For example, a project carried out in Kenya in 1980, followed a similar line of thought. The project was designed to train teachers involved in adult education, to produce their own low cost teaching materials. There was a lack of books specially aimed at adult literacy and grown ups were using children books in the learning process. The project's main objective was to test the feasibility of reducing time and costs by making teaching materials locally and to train teachers in designing and producing learning media. The project proved so successful that it was implemented at a national basis (Kinyua, 1985).

It is our intention to expand these tests to all schools in the municipal network. From these trial tests in Campina Grande Municipality other trials are planned at state level. Local authorities in other states in the North Eastern Brazil will be contacted to investigate the possibility of spreading the tests. We believe that this technique can be used at national level in Brazil and other developing countries of Latin America.

The valorisation of experience of teaching materials construction localised in peripheral regions does not exclude the crucial role of public policies, which can reduce the existing educational system's extreme asymmetries. As these public policies do not fulfil satisfactorily the school's demands, teachers, in conjunction with the students, are developing a series of alternative procedures. The production of these didactic-pedagogic resources fulfils some gaps. However, it does not substitute wider programmes of production of such materials.

Finally, and most importantly, we consider that the process of making books using the techniques helped the community to gain confidence in their own potential and to demystify the idea that the printed media is something so sophisticated that low-income people have no control over it. It allowed them to understand the global process of manipulating information and dissemination of ideas and actually constructing the media where this information is propagated through the process of education. We believe that this is an important step in empowering people to change their own destinies.

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Product Analysis in Relation to the Socio-cultural Perspectives of Botswana

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This paper investigates the influence of culture on product design in Botswana, a topic on which there little previous research. It is argued that product innovation should be assimilated within the context of Botswana's own culture but it has been observed that designers have not yet been able to encode cultural phenomena to the same extent as physical ones. The basis of this paper is that there is little in-depth research that can assist designers to encode socio-cultural variables in their design practice.

An experimental approach was adopted to investigate the impact of socio-cultural variables in product design. This experiment was conducted in Botswana with design students to analyse the socio-cultural variables embedded in Botswana's products. The content analysis methodology was used to analyse the results from participants. The data collection methods comprised visual data (sketches, photographs and design models) and textual data (retrospective interviews and design reports). Textual and visual data were both analysed using ATLAS.ti. The results indicated that there are three major socio-cultural variables, that is, those related to material factors, the community and entertainment related variables. This challenges designers to encode these variables in designing everyday products.

The paper concludes by discussing how designers can integrate socio-cultural variables by 'design' rather than by 'accident' in product design. This will ultimately lead to the design of innovative, culturally sensitive, environmentally sound, pleasurable and user-friendly products.

Keywords: *culture, socio-cultural variables, design, Botswana*

1 Introduction

The aim of this study is to analyse products from a socio-cultural perspective of Botswana. In order to establish Botswana's socio-cultural perspectives, it is of paramount importance to draw on postcolonial theory views the country's culture from two perspectives — pre-colonial and post-colonial. Although Botswana was never colonised, it was governed the same way as the colonised neighbouring states and the aftermath of colonialism had a profound impact on the social and cultural fabric of the society. From this premise, this review investigates how socio-cultural variables can be analysed and made applicable to designing innovative products.

2 Botswana's Background

Botswana attained independence in 1966 from the British Protectorate. There are over fifteen ethnic groups, which together represent a rich and diverse cultural heritage of Botswana. The National Policy on Culture (2002) states that this valuable heritage must be preserved nurtured and developed to foster a strong sense of national identity, pride and unity. Botswana's economy is heavily reliant on minerals, with diamonds contributing 45 percent to the Gross Domestic Product. Agriculture and allied activities provide livelihood for more than 78 percent of the population. Rural life in Botswana is invariably tied to land and is manifested in agro-pastoralism. Beef exports to Europe contribute 5 percent to the Gross Domestic Product and it is the third largest income generator. Tourism is seen as the next pillar of the economy as it contributes 15.9 percent to the Gross Domestic Product (Central Statistics Office, 2003). Botswana is in the quest of diversifying its economy from over-reliance on natural resources.

A possible area for economic diversification is through product design. Though the profession is new in Botswana, it has its roots in the field of the arts and crafts. The introduction of a degree programme in Industrial Design at the University of Botswana in 2003 stemmed from a long-felt need to offer career opportunities to young designers in Botswana and the Southern African region. School leavers who have taken a keen interest in Design and Technology at secondary level and did not want to be teachers by pursuing a Design and Technology Education programme now had a choice of opting for Industrial Design to take up careers as industrial designers and product designers in the world of work. Rapid industrialisation in Botswana through multinational organizations and individual entrepreneurial ventures can be sustained if local designers work hand in hand with engineers of different disciplines.

Bearing in mind this background, this study aims at analysing products from a socio-cultural perspective of Botswana. The study aims at (i) developing an approach to analysing socio-cultural factors that accurately represent Botswana's culture and (ii) developing a set of core values applicable to making product design in Botswana more human-centred. Human-centred design is based on the premise that design is meaningful only when the focus of its activities and outcomes accommodates the largest possible number of people with all their diversity. The approach goes beyond design's traditional focus on the physical and cognitive needs of users and encompasses cultural, social and emotional human factors. The study has been based on this foundation in order to develop a Botswana socio-cultural product analysis approach that will assist designers in designing culturally sensitive products.

In order to establish socio-cultural factors, it was useful to draw on post-colonial theory which points to the importance of viewing Botswana's culture from two perspectives, that is, pre-colonial and post-colonial culture. Post-colonial theory recognises the importance of exploring the interaction

between the colonising, colonised and the decolonising cultures, and the factors involved in the production of hybrid cultural identities. Botswana's culture has been shaped by colonialism and it has started to decolonise but the process has not yet gone very far. The country needs to decolonise its education, values, language, religion, technology and social organisations, which are heavily influenced by colonialism. For example, in design education, Botswana needs a different approach to design from the current system that is so predominantly based on Western values that tend to be detached from the needs of some of Botswana's social groups. However, decolonisation is a continuous process long after formal political independence is achieved. Bhabha (1994) pointed out that decolonisation requires not the restoration of a historically continuous and allegedly 'pure' pre-colonial heritage, but an imaginative creation of a new form of consciousness and way of life. Post-colonialism involves the idea of the coming together of two or more cultures as a result of colonialism and produces new hybrid cultural identities characteristically distinct from the cultures that merged (Hall, 1996). In the process, old habits give way to new attitudes, values and modes of action. Botswana's contemporary variables are a result of this hybridisation. Chinweizu (1975) emphasises that valuable continuities with our pre-colonial culture should be maintained, at the same time welcoming vitalising contributions from other cultures in making a healthy and unique synthesis from them all. The understanding of Botswana's socio-cultural framework developed in this paper will be based on the foundation outlined by Chinweizu.

3 Socio-cultural Variables

Social and cultural variables influence all aspects of user behaviour. Roberts (2001) argued that cultural values in design are often taken for granted or even viewed as being incontestable. Cultural and social variables become important to designers when they develop product characteristics, functionality, interaction and form, especially for a particular user group (Roberts, 2001). But recognising these issues in the first place is a basic problem. Socio-cultural variables can be so innate, so assumed, that even when they are articulated, one may fail to grasp their uniqueness. According to Kotler (1997) socio-cultural variables include reference groups, family, roles and status. Social class and social factors are clearly influenced by cultural factors. This means that designers must factor socio-cultural considerations into their work — the subtle, hard to describe but critical issues surrounding the identity and behaviour of any particular user group.

One might argue that the socio-cultural human factors research should begin with the assumption that products succeed when they resonate with user's values and behaviours. Alben (1996), Roberts (2001) argued that when a product appeals to an individual, it does so relative to that individual's cultural framework, worldview and experience of daily life. This means, designers must work with knowledge derived from their experiences of the world around them. These experiences shape the conception and perception of their environment. At a social level, designers interpret their experiences as they compare those to societal norms and at a conscious level; they express deeply assumed values and perceptions specific to their own cultures. However, Alben (1996), Roberts (2001) were unable to explain that cultural constructs place general parameters around design ideas, indicating ways in which products will be positioned within value system and identifying how quickly users' worldviews may need to change for the acceptance of new products to be accepted. Socio-cultural variables are deeply ingrained, but they are also constantly changing. As a result, products that openly conflict with socio-cultural variables may either secure strong counter-cultural users or no users at all.

The aim of this study was to develop a product analysis socio-cultural approach that relates more adequately to the needs of Botswana contemporary product design than emulating Western design form and substance that do not reflect the culture and needs of local people. The approach was developed by analysing locally designed products by two groups of third year and fifth year students of the Bachelor of Design [Design and Technology Education] at the University of Botswana.

4 Methodology

A teaching experiment was conducted at the University of Botswana with forty undergraduates design students. The participants were composed of seventeen fifth year students and twenty-three third year students. All these students participated in the study to fulfil their course requirements. Participants were presented with the following products to analyse the socio-cultural variables associated with them: porridge stirring device, mortar and pestle, wooden spoon, thumb piano, human sculpture, clay pots, necklace and baskets. At the end of the experiment, participants were asked to write a report on which product they analysed, its description, the socio-cultural variables identified and the product features that represent these variables.

After this exercise, participants were divided into focus groups, each having an average of four members. The purpose of this session was for participants to share their findings and critic the work of their fellow members. This approach also assisted in triangulating the data and in building a measure of reliability. All focus groups sessions were tape-recorded.

5 Data Analysis

The data from focus groups and reports were analysed by content analysis methodology. Atlas.ti (a qualitative software application) was used in the coding and data analysis. Socio-cultural variables were divided into two themes of material and non-material variables. The results from the content analysis of participants' reports are illustrated in Figure 1.

6 Results

Figure 1 shows that there is more emphasis on non-material than material variables. Perhaps, this suggests that Batswana (people of Botswana) are not materialistic.

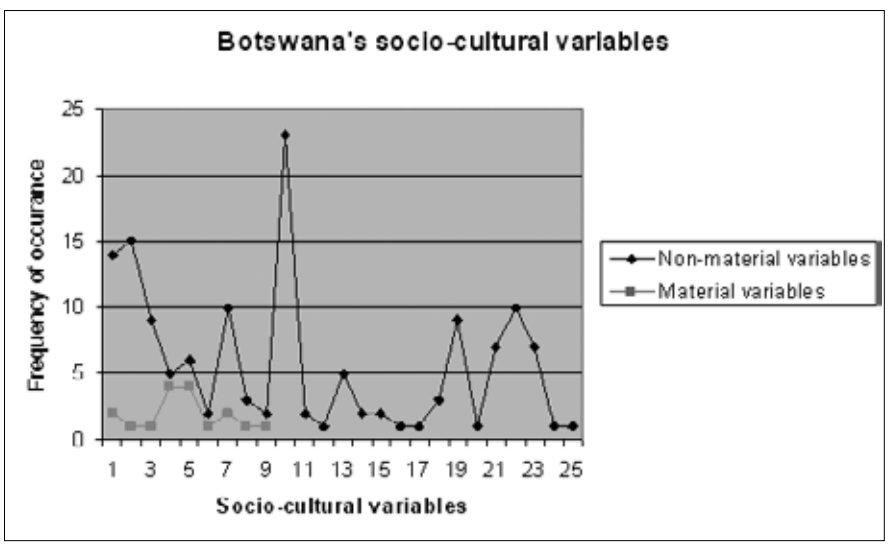

Figure 1: Botswana's socio-cultural variables (After Moalosi et al, 2004)

Key Non-material variables

1	Peace and harmony	10	Beauty	19	Spirit of sharing
2	Mutual respect	11	Storytelling	20	Kindness
3	Spiritualism	12	Sitting around the fire	21	Consultation
4	Entertainment	13	Love	22	Community spirit
5	Music and dance	14	Carving	23	Pride
6	Social gathering	15	Pleasure	24	Joy
7	Friendliness	16	Fun	25	Unity
8	Satisfaction	17	Excitement		
9	Family	18	Assistance		

Material Variables

1	Owning cattle	4	Baskets	7	Necklace
2	Mortar and pestle	5	Clay pots	8	Wooden spoon
3	Porridge stirring device	6	Thumb piano	9	Sculpture

Figure 1 shows that the following socio-cultural variables are of paramount importance to Batswana due to the frequency of their occurrence — peace and harmony, mutual respect, friendliness, beauty, spirit of sharing, consultation, community spirit and pride. These non-material variables are valued because they teach principles of life and morality. Moreover, they provide patterns of problem solving for example, consultation, community spirit and assistance. Respect for authority, friendliness, peace and harmony give Batswana a sense of identity. In one way, these variables are a means of passing on the traditions and beliefs of the society from one generation to the other.

From the analysis, it follows that beauty has some significance to Batswana. Beauty has been associated with Botswana's fauna and flora. Most of the time designers make products looking at the environment around them. The style of the product is inspired by some cultural products like seeds of plants or fruits and even the colours of stones, rocks and patterns are inspired by nature.

There is a strong use of triangle motifs for aesthetic decoration of homes, pots, etc. Though participants did not elaborate why it is heavily used for aesthetic purposes, the reasons could be that a triangle is the simplest, most stable and rigid structure.

The above socio-cultural variables can be grouped into three categories due to their common characteristics as illustrated in Figure 2.

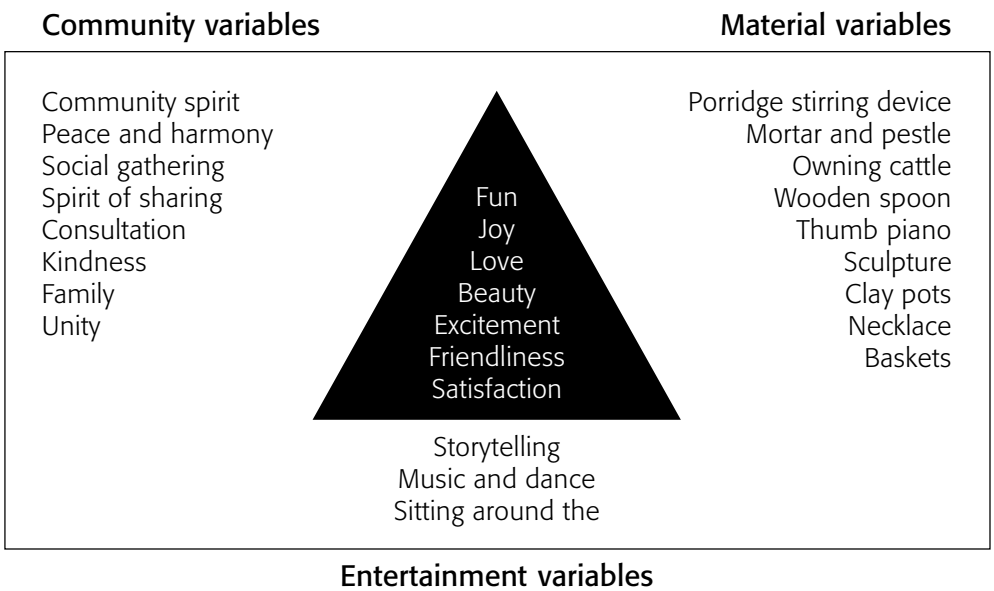

Figure 2: Categorisation of socio-cultural variables

All the three categories lead to the core socio-cultural variables related to pleasure — friendliness, excitement, satisfaction, beauty, love, joy and fun.

The pleasure variables can further be expanded (Table 1) into a model developed by Jordan (2000) of designing pleasurable products in human-centred design. This approach has been adopted because it goes beyond the products' functionality and usability to having pleasure with products. Jordan (2000) underscored that whilst the benefits of design for usability are not in dispute, usability-based approaches tend to encourage those involved in product creation to take a rather limited view of people. Functionality and usability approaches are more concerned with physical and cognitive human factors whilst this approach goes beyond these issues to include emotional, social and cultural human factors.

Table 1: Categorisation of pleasure variables

Physio-pleasure	Psycho-pleasure	Ideo-pleasure	Socio-pleasure
Carving	Music and dance	Beauty	Excitement
Beauty	Storytelling	Mutual respect	Community spirit
Excitement	Satisfaction	Consultation	Owning Cattle
Mortar and pestle	Mutual respect	Community spirit	Joy
Necklace	Entertainment	Kindness	Family
Porridge stirring device	Consultation	Spirit of sharing	Friendliness
Baskets	Community Spirit	Assistance	Social gathering
Clay pots	Kindness	Friendliness	Fun
Wooden spoon	Spirit of sharing	Peace and harmony	Love
Sculpture	Assistance	Baskets	Unity
Thumb piano	Friendliness	Necklace	Peace and harmony
		Sculpture	Spirit of sharing
		Thumb piano	Sitting around the fire
		Clay pots	

Physio-pleasure is concerned with pleasures derived from sensory organs such as touch, taste, smell as well as feelings of sensual pleasure. In products, it covers properties of tactile (touching during interaction) and olfactory (smell of new products). Examples of product participants analysed for physio-pleasure include thumb piano, porridge stirring device, necklace, mortar and pestle. Psycho-pleasure pertains to users' cognitive and emotional reactions (Jordan, 2000), i.e., avoiding unpleasant emotional responses such as annoyance, frustration or stress when using products. Ideo-pleasure consists of users' values for example, tastes, moral values, aesthetic values and personal aspirations. These values are important in defining how users would like to be portrayed. Socio-pleasure is derived from the relationship with others for example, friends, colleagues and the society at large. This pleasure facilitates social acceptance within the society and enables users to be comfortable in these relationships.

The above framework can be used as a means of structuring the pleasure issues associated with Botswana's culture. This might lead to designers designing culture sensitive products as the pinnacle of good product innovation.

Participants have demonstrated the use of fauna and flora in designing products. These have been used to link products with what is familiar to users. Users can then associate the products to their culture. On the other hand, integration of socio-cultural variables into product features should generate pleasure to users. This is why it is important to identify what kind of pleasure does one need to generate. Moreover, the pleasure categories should be seen as fluid, complex and dynamic and always in a state of flux. There are socio-cultural variables, which fall into more than one category. For example, beauty can contribute to physio-pleasure and ideo-pleasure. In other words, beauty can be felt by the sensory organ of touch and it can also be a visible aesthetic value.

How are socio-cultural variables relevant and applicable to product design? The next section will demonstrate how some sample variables can be made applicable to product design so that users can derive pleasure from using such products.

1 Beauty – "Products which are regarded as beautiful happen to have the right answers to questions users might ask. Beauty in products can be achieved by the use of appropriate use of traditional motifs, shape, weight, texture, colours, patterns and concinnity that evoke appropriate feelings within the cultural context. Concinnity is an instance of elegance, harmony of style, neatness and symmetry. It is the skilful and harmonious unity, aesthetic beauty, and rational arrangement of a design. The logic of beauty requires that a design 'make sense' to its viewers within the same social context and concinnity ensures that this objective is fulfilled" (Moalosi, et al, 2004).

2 Friendliness - This refers to design of user-friendly and sustainable products and can be achieved if users associate the products with their culture.

3 Sitting around the fire - This can be achieved by assessing and evaluating devices which are used during this activity. Designers can assess whether these devices are ergonomically, socially, emotionally, culturally and aesthetically satisfying people's needs. There might be a scope for product innovation (Moalosi et al, 2004)

4 Family - The decision-making in families is important because this will determine whether the product's benefits should appeal to the family or individual. "In a traditional Botswana set up, family decisions are predominately made by the male head of family. This depends on the level of education of the woman, the more educated the woman, the more influence she will have in the family decision making process" (Moalosi, et al, 2004). On one hand, this value calls for designers to actively work with their users in this case the family. The family should be actively participate in the design process from an early stage when the design concept is still fluid. This approach gives designers an opportunity to learn about the family's customs, norms, behaviour, beliefs, desires, aesthetic preferences and cultural concerns. Therefore, the products designed through this approach would be truly human-centred.

5 Music and dance – some of the traditional musical instruments used to accompany songs are old and need to be upgraded in order to produce quality sound. One such example is the thumb piano.

6 Satisfaction – products should satisfy users' needs in the most optical way by functioning well and being usable. This could be achieved by understanding users' needs, preferences and concerns. Users should be actively involved in such participatory design. The participation of end-users is the main strength of human-centred design as they will provide insight into the problem solved and this enhances acceptance of the end product (Maguire, 2000; Stoll, 1999).

7 Excitement, joy and fun – this could be achieved if designers use the bisociative attraction technique, i.e., the association of two known ideas which have not been connected previously. Bisociation of two unrelated ideas may collide in a way that jars our senses or interact to surprises our normal powers of association and give rise to humour and pleasure. This results in seminal innovation that establishes a new visual shape.

8 Owning cattle is important socially, culturally and economically to the lives of Batswana. Out of the nearly 500 people who perish every year in road accidents, 10 percent die in accidents caused by cattle roaming on the local roads. There is a scope for design intervention in this area. Devices can be conceived and designed to help curb livestock accidents on Botswana roads" (Moalosi et al, 2004).

7 Conclusion

The use of socio-cultural variables approach in analysing products provides a new way of assessing users needs, preferences and concerns. This approach aims at providing users with pleasurable products rather than merely functioning and usable products. The approach goes beyond physical and cognitive issues and encompasses emotional, social and cultural human factors. Product acceptance can be facilitated by this approach because it dwells on the users' culture being thoroughly analysed.

Finally, the study has examined how products can be analysed in relation to the socio-cultural perspective of Botswana. The contemporary Botswana socio-cultural variables have been influenced by the impact of colonialism and this resulted in the hybridisation of the traditional and Western values. The findings indicate that the core socio-cultural variables, i.e., fun, joy, love, beauty, friendliness, excitement and satisfaction, are influenced by other variables such as material, entertainment and community variables. The extracted socio-cultural variables lead to pleasure, which can be broadly divided into physio-pleasure, psycho-pleasure, ideo-pleasure and socio-pleasure. The study concludes by demonstrating how socio-cultural variables can be made relevant and applicable to product design.

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Indian Design Education: Redefining Paradigms

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After graduating in Applied Art from Patna University Anil moved to Baroda, Gujarat, where he did Post Graduation in Outdoor Publicity from Faculty of Fine Arts, M S University, Baroda in 1982. He then joined the National Institute of Design, Ahmedabad for the Faculty Training Programme and was inducted as Faculty of Communication Design. He also has an Executive Diploma in Human Resource Management and an Executive Diploma in Marketing Management from Nirma Institute of Management, Ahmedabad.

Since 1985 he has been actively involved with education at NID he has conducted various courses on subjects ranging from colour and composition to identity design and systems level projects. He has also been involved in client services, having handled professional projects on identity, branding, packaging, exhibition, trophy design, system development, etc. for several high profile clients. Most of the concepts for his design solutions are derived from Indian culture and he believes that culture designs the mind of the designer. Indian culture and aspects thereof have been the subject of his interest for several years.

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Born in 1978 in Mumbai, Maharashtra, Sahil did much of his schooling through the residential public school system in various parts of the country. He completed his graduation, as an Engineer in Pure Electronics, at Marathwada University, Aurangabad in 1999. He has also attended, until 2002, the post-graduate course in Industrial Design at the Industrial Design Center, Indian Institute of Technology, Mumbai. He has practiced as an independent designer in Mumbai until he moved to Ahmedabad in 2003 to take up a position at the National Institute of Design, Ahmedabad. As an Associate Designer at NID he has been involved, primarily, with systems level, multi-disciplinary professional projects for high profile clients.

Holistic, or systems-level design intervention has been an area of interest that he chooses to work in.

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The impact of modern technology on design education, globally, has adversely affected the long established teacher-taught relationship. Looking at the problem, critically, in the Indian environment, a probable solution may be found not far from home, in our own culture and way of life. If adopted, it might lead to the establishment of a new idiom of design education in the global context.

Keywords: *Indian tradition, Indian culture, Indian ethos*

Introduction

Generally speaking, for us Indians, design has been a way of life. It pervades and influences every facet of our lives – from food to festivals, customs and rituals. There is an element of design in what we do and how we do it. For example, the way food is served to us or we serve, everything laid out in a well-defined order. That which is consumed more falling easily to the eating hand while that consumed in less quantity, or less frequently, placed an optimum distance away. Pulses, cereal and vegetables are arranged in a convenient half-circle around the *roti* such that each is accessible to the eating hand. Salad, pickle and salt occupy a less busy space toward the upper-left of the plate, safely out of the way of activity, yet there, if needed. Traditionally in Indian homes the dominant custom is to eat straight with our hands, as opposed to the more recent trend where appropriate cutlery is used. Since most people eat with their right hands, water is usually placed to the left of the plate so that it is accessible to the clean left hand. This is very different from the practice of placing the glass on the right when cutlery is used. As Indian families, even today, largely eat together children observe these small things and learn. The curious few might ask questions about why a particular thing is served like this, or eaten like that. This gives them a chance to understand the significance of the little actions that are designed to make life easier and more meaningful.

There is certainly design in the way we dress and the accessories we use. Traditionally, clothes – their cut, drape and colour – have always been used to communicate the social status of the wearer

vis-à-vis religion, community, region and position in the social hierarchy. The sari is a traditional Indian garment but while most Indian women wear a 6-yard sari, in Maharashtra the custom is to wear a 9-yard sari and even that is draped very differently from the more popular version. While in most parts of the country the 'pallu' (the loose end of the sari that falls over the wearer's shoulder) falls over the left shoulder and is draped front-to-back, in Bengal the pallu falls on the right shoulder. In Gujarat, not only does it fall on the right shoulder but is also draped back-to-front. Throughout India red is the traditional colour for brides. It is a symbol for fertility and, arguably, the most attention drawing (or aggressive, if you will) colour of them all. The bride, therefore, wears red because she seeks to draw attention. She seeks to become the centre of attention on this, her wedding day. Conversely, a widow always wears white — a passive colour. It is this passiveness (or the lack of aggression in the colour) that suits very well the traditional social status of widows in India. Learning through social practices and customs is an important part of a child's practical education.

In the modern context, the ability of clothes to communicate hierarchy has been used, globally, in the corporate world with a very clear set of rules, albeit unwritten sometimes, as to what one may, or may not, wear to work. The power of clothes as agents of communication has been understood by the younger generation and serves the same purpose, though in a different form.

There is design even in the social customs that govern our interaction with members of our family, community or society. The traditional, agrarian way of life in India, for example, necessitated that women were married off early for more women at home meant more helping hands around the house while the men folk were out in the fields working. More often than not, the bride would be in her mid-teens while her husband would be much older, say in his early twenties, having spent much of his formative years learning the business of farming. By implication, the husband would actually be closer in age to his mother in law than his wife. Our society weaved elaborate customs, such as the one where a woman must always appear veiled in the presence of her son-in-law, to avoid situations that could potentially damage the fabric of community life.

Indian design tradition has developed as way of life that focused on need-based activity, where the maker and the user had a direct, one-on-one relationship. The products formed out of this relationship were customised specifically to the needs of that one user and were, therefore, more relevant to him. Take the ubiquitous *matka* for example. Primarily an earthen pot with an open mouth, one sees endless variations on the theme played out in different regions, each variation best suited to the needs of that region. The *matka* of the plains is round and voluminous with a large open mouth. The large mouth makes it very convenient to fill the matka from a flowing river and the round form sits comfortably on the hips of the woman who bears it to and from her house and the river, sometimes a distance of several kilometres. In the uneven terrain of the hills, however, the large mouth would ensure so much spillage as to render the pot almost useless. The *matka* of the hills, therefore, has evolved into a more oblong form with a very narrow mouth at the top. The narrow mouth minimises spillage and presents no problems when filled up from one of the numerous springs and cascades that are a feature of the hills. Likewise, in arid Rajasthan, women often have to walk many kilometres to gain access to a source of water, usually a community tube well or hand-pump. The *matka*, here, has evolved such that the mouth is neither too wide nor too narrow. It presents no problems in filling up from a hand-pump and also minimises spillage on the return journey home. The bottom-heavy form has also evolved so the *matka* can be carried easily on the head over vast stretches terrain. These endless variations have been made possible due to the tradition that allows the maker and the user to interact directly.

Modern design comes to us from the West and is a direct consequence of the Industrial Revolution. Design has come to be dictated, for the most part, by manufacturing constraints, sales briefs and price points, and designers have come to serve the industry directly, and the end-user in a slightly more abstruse way than before. Universal design as a concept, handed to us by the prominent schools of thought in the West has led to the one-size-fits-all paradigm. Mass manufacturing calls for churning out stupendous numbers of the same design in order to make the entire exercise profitable.

By necessity, one size must fit all. It may be impossible to customise each design to the specific needs of a region, community or an individual. But ours is a nation of diversity. While, as a nation, we have the numbers to justify a mass manufacturing approach, we, as a people, have carved ourselves little niches based on language, region and community. Personal taste and preference add even more complexity to the equation. Every region, a micro culture in itself, has its own peculiar needs and constraints. What works for one need not necessarily work for the other. In an urban world the *matka* may probably be obsolete. We may have switched to Aquaguard or bottled drinking water. But the ethos behind the *matka* remains. We are a diverse people and, by implication, so are our needs. Across the length and breadth of the country we may have to play subtle variations on the same theme in order to deliver designs that really work for everyone. This infinite variation, and the direct relationship between the maker and the user, is the ethos of the *matka*. That is the Indian design tradition.

Modern design philosophy does have much to teach us, especially about the needs of the market, the constraints of the production set-up and the interests of the financers. So does the Indian design tradition that enables us to understand our diversity as a people, our peculiar needs that arise out of this diversity, and teaches us to respect the users' way of life.

Today, we live in a society that has increasingly come to view technological advancement as progress. The acquisition of wealth as a means to acquire new, and more, technology that helps us do seemingly better work faster has become, more or less, our prime concern. Modern technology is, supposedly, convenient and fast. It has also opened up hitherto unknown avenues of information harvesting and knowledge sharing which have the potential of connecting us with a wider world more easily as compared to previous generations. With specific reference to education, it is this facet of technology that seems to be having the greatest impact. Students and faculty alike have greater, and more convenient, access to information than ever before. The Internet has completely changed the way students approach learning today.

Resource sites, online discussion forums and mailing lists have been very instrumental in exposing students to new ideas, approaches and thought processes. Earlier this had been the exclusive purview of the faculty as guide and instructor. That no longer holds true. Peers, professionals and academicians from across the globe are regular contributors on these forums and often it's much easier to discuss, debate and resolve issues in the environment of relative anonymity. Computers have become an integral part of the learning and designing processes today. In additional to the traditional hand skills, CAD tools have included themselves in the 'generation-now' skill set. CAD helps students create virtual simulations of their deliverables, which in turn aids and speeds up the visualising, manipulating and modifying processes. Most students today are more adept at using the now ubiquitous CAD tools than some of their faculty. And that is an indicator of yet another hitherto exclusive domain, of the faculty as guide and instructor, which no longer remains so. The design educator no longer remains the sole source of information today.

What, then, should the redefined role of a design educator be? What mantle must he assume to continue to be a guiding spirit for students when the context in which he must work has changed so much? Maybe the answer to that lies close enough to home, in our tradition, our culture and our way of life.

Our culture is a rich source of learning for design students and educators alike. As an all-encompassing term it teaches us to look beyond the narrow confines of industrial or communication design in the Western context, to the way of life that it is in ours. Design, as an activity that influences every aspect of our lives is more meaningful and provides a context to what is meant by Indian-ness in design when projected on a global scale. This context is very important for a student to truly understand the relevance of his/her work in the real world, above and beyond the domain of academics.

The design educator will probably have to remould himself to take on the new roles of mentor, facilitator and collaborator. He would have to take upon himself the onus of exposing students to

the idea of design as an all-encompassing activity. He must break through the western idiom and establish a decidedly Indian idiom in its place. An idiom that promotes a holistic approach to design problems and encourages students to come up with composite solutions that take into account the fact that problems rarely exist as isolated scenarios. He would have to facilitate the learning of the design process. Of how an Indian idiom translates to design practice. Of where to follow the book and where to depart. Of how to break out of an impasse, for even that is an integral part of the process. But most importantly, he would have to be an active collaborator in the process itself. He would have to contribute, as a collaborator, through experiences gained on professional projects. This, of course, would imply that the educator would have to be, by necessity, an active design professional and be adept at translating the experience of professional practice to a methodology of design education. Teaching, and as a consequence, learning through action would have to become part of the new repertoire of the design educator.

Looking back through history, one can draw parallels with the Gurukul system of learning, where the guru was responsible not just for the student's education but also for his overall development in life. The guru imparts knowledge but, in addition, also teaches by example philosophy, ethics and other 'softer' aspects that go into making a well-rounded learning. Maybe there is something to be adopted from there. The primary role of a design educator as an instructor does not become redundant, but once the student has grasped the basics it is essential that the educator must evolve into mentor and collaborator.

The very successful Foundation Programme at NID does follow just such a philosophy. As the students are put through their paces by educators acting as instructors and mentors, the concepts that go into learning design are rigorously instilled into them. Often students display faint glimmers of their potential to do good work in one discipline or another. The educator takes it upon himself to encourage and guide that student towards realising his true potential. At the post-graduate level, however, the approach at NID has been vastly different. The educator here assumes the role of collaborator. Through the initial stages of a design project the students work together as a team that includes the teachers. This allows them to learn from each other during the entire process that leads up to the proposal of a concept. Once there, though, the students are encouraged to come into their own so that the actual proposals they present are a distillation of the team-learning process.

It is thus possible to build a design education system that addresses the issues peculiar to our country and which, in the process, also establishes an Indian idiom of design education in the modern context.

Creating Indian Identity in Design Education and Practice

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Akhil Succena joined NID as a faculty member in Visual Communication Design in 1973. Since then, he has been instrumental in curriculum development, teaching project guidance in the area of Film & Video Communication, Sound Design, Film Making, etc. He headed the Film & Video Communication for several years. His experience in industry sponsored projects took him to an administrative responsibility as Vice Chairman of Design Consultancy Wing and then as Chairman of NID's Outreach activities for the craft and other needy sectors. At present, he is heading the educational programmes at NID as Activity Chairperson, Education.

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Tradition is what gives us an identity as a community. It gives us a unique identity as being 'Indian'. 'Design' as it is practised in India has a strong base in our culture and traditional way of doing things. Whether it is a woven tradition of Patolas or Ikat or the printed textiles of Block Printing or dyed variety of Bandhani. These age-old practices show no signs of aging and are going strong as ever. Similarly, the art of pottery or drawing various 'Alpanas' or motifs related to religious functions and ceremonies give our designers a rich 'mine' of ideas to build their concepts which can proudly claim an Indian identity.

Making our cultural pointers or elements understood in modern world of today and giving it the universal appeal is a designer's challenge. At NID, Design Education has this unique system of learning where students undergo training to work with craftsmen, practising in villages as well as dealing with complex problems of health and sanitation in urban scenario with same ease. 'Design' is all about bringing the old traditions to new contexts to make life a continuous celebration.

In India 'Design' is understood to have an additional role of making our craft sector, which has a large base in rural areas, self reliant so that they can produce and sell their goods to a wider and borderless universal market.

For this, There is a need to establish training institutions for artisans where craftsmen and their children can learn the skills and business of traditional crafts to make it relevant to the modern needs. NID has been working in these areas, helping various State Governments to set up Craft Development Institutes across the country. Some examples are Bamboo & Cane Development Institutes, Agartala, Craft Development Institute, Srinagar, Craft Development Institute, Uttaranchal, etc. We believe that if 'Design' has to survive, it is only through our rich traditions practised and tested over generations.

Keywords: *traditional design, gurukul system, design education, Indian identity, artisan*

1 Introduction

Tradition, as defined in Webster's Third New International Dictionary–1961, is 'an act of delivering or surrendering something to another, the process of handing down information, opinions, beliefs and customs by word of mouth or by example: transmission of knowledge and institutions through successive generations without written instructions; an inherited or established way of thinking, feeling or doing; a cultural feature preserved and evolved from the past.

Tradition is what gives us an identity as a community having a common denominator. We are fortunate to be born in India – a country full of vibrant traditions in art, craft, literature and theatre. As we often say India lives in many centuries simultaneously. Our heritage is a 'living tradition' that is still practised and provides livelihood to many over generations. This is the uniqueness of India. Design is an age-old tradition in India being practised since the pre-Harappan period. It is reflected in the way we lived, communicated and expressed our joys and sorrows of life. We have many examples of early cave paintings or artefacts that were unearthed during excavations, revealing how well conceived ideas were transformed into well-proportioned, well-executed pieces of art or craft.

Such objects of beauty cannot be created but by persons with imaginative mind and a heart full of love and compassion. These two ingredients of imagination and emotion are still the basis for creating any good design or to train the minds to develop and nurture. This aspect is the sole purpose of existence for any design institute.

2 Traditional Design Vs Design Tradition

A major part of the treasure of traditional knowledge in India has been preserved through Vedic scriptures, puranas and folklores. The remaining is taught through generations as a family oriented practice to maintain the secrecy and exclusivity of knowledge and skill. In music, it is called 'Gharana' or 'family' tradition of practising a particular type or style of craft, like Jaipur Gharana, Agra Gharana as in music or Warli painting, Madhubani painting in Art. Every region has its own rich 'gold mine' of traditional art and craft. 'Modern Design', as it is practised in India, has a strong base in our culture and the traditional way of doing things such as the woven tradition of Patolas or Ikat or the printed textiles of block printing or dyed variety of Bandhani. These age-old practices show no signs of aging and are going strong as ever. Similarly, the art of pottery or drawing various 'Alpanas' or motifs related to religious functions and ceremonies give our designers a rich 'mine' of ideas to build their concepts which can proudly claim an Indian identity. If we have to compete in the world market it is important to create an identity of our own having universal appeal. To give an analogy of Indian cinema, Bollywood, as we know it today, had the same technical origin as that of its Western counterpart. Gradually with time, Indian cinema acquired a unique structure, glamour and emotional appeal, which is very much based on our culture and tradition. In the absence of any suitable title, Indian cinema has been christened as 'Bollywood,' a distinct style of Hollywood. Similarly, 'Indian Design' can be different from any other country's design, if our traditional knowledge of handicraft and handloom can provide this base.

3 What Then is the 'Modern' Way of Designing?

India still has a 'Gurukul' system of imparting all knowledge from the 'Guru' to the 'disciple'. Disciples have to be with the 'Guru,' living with him and observing him like an apprentice. By spending considerable period of time with the 'Guru' and having gained the requisite knowledge or skills the 'Guru' will declare him qualified. This tradition of learning is the best way of transferring knowledge from one generation to another, though the delivery could be done through modern means of technology in the fast moving competitive world.

If we can adopt this system of learning for modern 'design' or modern 'craft design,' we would be able to achieve the goal of preserving our culture and tradition through modern times. At NID, the crafts training courses provide such learning opportunities. A student has to undergo a training to be able to cope with diverse needs of working with craftsmen making leather goods or agricultural implements in villages, and also deal with the complex problems of health or sanitation in urban scenario. This training needs to be taken further by bringing master craftsmen into the mainstream of design teaching. For this, establishing training institutions for artisans is required, where craftsmen and their children can learn the skills and business practices to make traditional crafts relevant to the modern needs. NID has been working in these areas, helping various state governments to set up Craft Development Institutes across the country. The Bamboo & Cane Development Institute, Agartala; Craft Development Institute, Srinagar and a proposed Craft Development Institute, Uttaranchal are a few examples of this initiative. Through these institutions, NID hoped to bring these extraordinary local craftsmen to come and teach as 'core' faculty to train the next generation. Unless we give craftsmen the honour and respect they deserve, very little can be achieved to preserve and continue this traditional knowledge and skills.

Secondly, design sensitivity needs to be inculcated through our school education as well. Exposure should be given to the secondary school students so that their thinking could be moulded to appreciate 'aesthetics' of the world around and it will help them to develop a 'creative' professional outlook for

whatever profession they may go into. At NID, we try to provide opportunities to our students to work with such individuals to understand the creative potentials of the craft and understanding of the material.

4 Creating Design Educators

I believe, if design as a profession has to survive, it is only through our rich traditions practised over generations and have withstood the test of time. As part of my association with Outreach activities of NID, I came in close contact with the crafts sector and the craftsmen. It is the passion and continuous practice that makes them master of their skills. It is also their survival mechanism and their livelihood.

We should approach crafts persons with sensitivity not to create a fear of their loss of identity due to design intervention. Nor should there be any attempt to show disrespect to their status and self-esteem because crafts persons are professionals in their own right. As a matter of fact, we should give them all possible support and freedom to grow so that they become accessible to share their skills and knowledge. This will not only ensure survival of the craft traditions, but also improve the quality of life of the crafts persons. Designers have to perform the task of bringing them into the forefront of design education and develop this sector to make it a truly global player.

5 Conclusion

As Mahatma Gandhi wanted "all hands to work to feed the mouths" to solve India's problem of poverty and unemployment, he created the 'Amber Charkha' (Eight Spindle Spinning Wheel) to bring the rural masses into an organized sector of 'Khadi' – handloom from hand-woven yarn. Over the years it has created a niché in Indian homes and has a huge potential to enter exports if 'positioned' well in the world market. 'The touch of hand' is making a comeback as the consumers all over the world are fed-up of too many mass-produced 'look-alikes' and are looking for 'value-added' goods. In this changing scenario our handicrafts and handloom sector can play an important role to fill this gap and create a niché for themselves.

We also have a large population of NRI (Non Residential Indians) and MRI (Multi-Resident Indians) who crave for 'Indianness' in their own surroundings. This can as well be a 'high-value' market opportunity for our crafts sector. Designers can help in creating innovative products that fit traditional aesthetics to modern needs.

In India design practice is understood to have an additional role of making our crafts sector, which has a large base in rural areas, self reliant so that they can produce and sell their goods to a wider and borderless universal market.

This has brought about a two-point agenda for the design schools in India:

- To create design practitioners who can think global and act local.
- To create a curriculum which does not exclude the vast traditional knowledge available with the craftsmen and artisans overlooked for centuries to the extent of extinction in some cases. This can be made possible by working 'with them' rather working 'for them'.

It will be a step forward for transforming design from a 'Living Art' to the 'Art of Living' - a dream many of our forefathers in the design world might have had.

Design Education & Research in the Global-Local Context:

Some reflections on the product and toy design education initiatives at NID

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Is it proper to carry on with borrowed concepts of design education without considering the socio cultural ethos and context that forms an integral part of design activity and profession? How has design education changed over the years at the National Institute of Design, NID, India? What has been one's contribution as one of the founding design educators?

More than 40 years ago, NID was set up on the basis of a Charles Eames report called "India Report". Eames had recommended a research and training institute of higher learning considering design as a synergy of art, technology and humanities disciplines. Gautam Sarabhai, the founding Chairman of the institute meticulously planned faculty development, physical infrastructure, and the management systems. He also believed in getting the best of people and best of facilities. But best is often not relevant enough to the specific environments.

India is one of the few countries which has had vast, magnificent heritage related to design. India also has had many community development models initiated and practised by visionaries of our time. But even today, the planners, managers, the policy makers, the technocrats, the financial institutes have little concern for these high value heritage resources.

Prof Khanna presents the initiatives made for the renewal of product design and toy design programmes at NID. These include the following: Rural design workshops and projects 1974-78, Craft Study and Documentation Course 1980-2004, System Design for Community and Environment Contexts 1980-2004, Toy Design Workshops, Research and P G Programme 1975-2004.

Keywords: community development models, cultural environments, heritage resources interdependence

The concept of modern design was introduced in India in 1961 when the Government of India established the National Institute of Design in 1961 on the basis of the "India Report" of the well known design team of Charles & Ray Eames. The report advocated setting up a national institute for research and advanced training of a new type of designers, considering the advancements of technology and rapid changes taking place within the traditional society. Eames advised training programmes based on real life projects from industry and the society. He considered modern design as an amalgamation of various disciplines and medias and recommended active interaction of professionals from architecture, technology, arts, culture and humanities to bring out relevant design solutions.

In the 50's and 60's there was a general euphoria that technological advancements will solve the problems of any society. A number of national institutes of technology, management etc. were also established during this period. However, indigenous knowledge, cultural diversity etc. were not seen

as important issues. In fact, the heritage based knowledge systems and the tradition based activities, practices and professions were often taken as signs and symbols of backwardness. Moreover, tradition based design activities were practised mainly by the so called backward and lower classes. Things have improved today, more so in urban areas.

Introduction of Design Education at NID

Gautam Sarabhai, the first Chairman of the institute from 1961-1973, had a clear vision. His focus was on new applications of modern technologies with modern management systems. During its formative years, NID invited the finest design professionals and design educators from all over the world to develop curriculum and to teach at the institute. Many trainees from the first batches were deputed for additional training at the best institutes of design in Europe, Scandinavia and America. The best of tools and equipment were imported and an industrial research and management system also put in operation. But the best may not always be relevant to the specific environments.

Looking back at the early years of NID, the Foundation Programme and Product Design Programmes were greatly influenced by the design education and research related work of the Bauhaus and Ulm institutes of design in Germany. However, the management, academic and professional staff of the institute were hardly influenced by the visions and lifetime work of renowned contemporary Indian visionaries of that period such as Rabindranath Tagore, Dr. K.C. Kumarappa (economic adviser to Mahatma Gandhi), Shri Aurobindo, J. Krishnamurthi, Baba Amte and others who not only had a global vision and foresight but also built institutions and centres appropriate for local community and environment needs. Their philosophy and action programmes were not confined to the narrow vision of what was "good for India" but were based on the concept of universal fair play and locational propriety.

Rabindranath Tagore established Shantiniketan and Shreeniketan as academic, research institutions for training young people in the arts, crafts and design, with high concern and respect for nature and social equity. Dr. K.C. Kumarappa advised Mahatma Gandhi to set up rural technology and development centres all over India for the development and empowerment of the masses without exploiting the nature and the people. Auroville, established by the renowned philosopher Shri Aurobindo, is an extraordinary example of a creative cross-cultural society where designers, architects, technologists, artists and business professionals from all over the world work together to establish rich traditions of human values. Social activist Baba Amte heads a community of over 4000 people cured of leprosy. Once considered as outcast and helpless, today they who live together in "Anandwan," the Forest of Joy, and have emerged as one of the largest self sustaining communities that produce and manufacture almost everything necessary for a healthy, dignified life. As Baba often says, the purpose of any development is to liberate us. If the act of development doesn't provide joy and liberation, it is not real development.

In the last 40 years, visionaries like Tagore, Gandhi, Aurobindo, Baba Amte and others have inspired many people leading some of the well known development institutions and organizations to adopt innovative and visionary approaches.

On the other hand, some 40 years ago, the Government of India had established national bodies for promoting and supporting the handloom, handicraft and the village level industry. While some contribution was made to the revival and up-gradation of the handloom sector, this did not happen in the case of handicrafts and the village industry. This is in spite of the fact that the employment opportunities provided by these sectors exceed far more than all the organized sectors of industry put together. Compared to the investment and support provided to the organized sector, village industry received very little support and funding. Yet, most of the creative, innovative and original work of design development was done in the heritage sector of design.

Design for What and Design for Whom?

First as a design student and then as a design educator in the 60s and 70s, I was not only fascinated by the approach and the curriculum of the Bauhaus and the Ulm institutes of design, I was equally fascinated by the Auroville and Anandwan models and approach to development. Besides, I was deeply impressed by the great heritage design, which covered hundreds of clusters and community based product manufacturing and distribution. The heritage sector of design included several hundred thousand potters, basket makers, over a million weavers, toy makers, painters, performers, communicators, gold and silversmiths of extraordinary talents and skills — all acquired through family/ community apprenticeship. Most villages had talented carpenters, smiths, weavers etc. India is probably one of the few countries where heritage craft and design have survived on a formidable scale. I was keenly interested in building bridges between modern design and heritage design sectors. At that time, it took me some time to understand why the sector of heritage design was not integrated and related with the modern design education research and education. It became clear that the administrators, technology mangers and the finance managers had a very narrow understanding of design. They were not trained and exposed to proper education and the value of community based learning. They did not understand real, eternal India and its rich heritage in every walk of life.

From the 1960's onwards, design in the Indian context has passed through the following broad stages:

Design for Industry

In the 1970's Design for Industry was the main slogan at NID. Yet some of us were interested in the issues of "Design for What and Design for Whom?" for developing societies like India trying to move towards a socialistic democratic set-up. In this context it may be interesting to note that the list of final diploma projects undertaken in the year 1970 by my batch of student designers included projects like designing mail sorting system, school furniture with local eco-friendly materials, system of building hardware and electrical hardware, pre-fabricated bathroom system, milk containers system etc. Most of the projects completed in 1970 had a strong socio-cultural context. But the institutional focus was on training designers for the organized sector of the industry and the media.

Design for Development

During the decade 1970-80, Design for Development was the new slogan in the design education. There was some concern for development issues and the role of design in the development of people and communities. Many non-governmental development organizations were being established. The issues of environmental degradation due to industry-led development were often discussed. Design for Development was being carried out by some non-government development agencies and by the heritage design sector in general. However, institutes of design, technology and management did not contribute much towards the development of this sector. Victor Papaneck's book "Design for the Real World" was a reminder of what the Gandhian institutions had been practising in India but modern institutes of design, technology and management were hardly paying any serious attention to — the real development issues.

Design for Fashion

During the period 1990-2000, was a debate on the role of the government and the industry in design education. Industry-led development models ignored the basic concern for social equity, leading to social tension and violence in many forms. As an outcome of the approach to design development during this period, a large number of fashion Institutes were established in the various regions of India. The crafts and heritage sector was left to the mercy of the exporters who were guided by business development with limited social perspective. There seemed hardly any concern

for the context of the design relevant to the common concerns of the common man. Several private institutes tried to enter the area of design education basically as a profit-making venture. Design for development seemed only a ritual.

Design for the Knowledge Economy

During the period 2000-2004, Information technology and the digital media technology got prominence in the design education, communication and product development. New courses relating to design for information technology and user interface, interaction design involving a variety of traditional and new media were introduced at NID. The digital media for communication seemed to be the new reality providing vast opportunities for design services.

Design for Global-Local Context

In the last 40 years of design education and research activities in India, there has been a moving focus from design for industry, to design for development, to design for fashion, to design for the knowledge economy and the latest being the design for the global-local context.

In the changing focus and varying scenarios from 1970's till date, what follows here is an overview of the courses and workshops that I initiated in the last 30 years as a design educator. Other faculty members have also renovated/innovated courses such as design overview, design methods etc. But I shall be describing only the courses and projects initiated and developed by me specifically for the Product Design and the Toy Design programmes at the institute.

Rural Design Workshops & Projects

During the period 1974-79, rural design workshops required senior students and faculty of design to visit a selected location having a development organization and a cluster of craft activities. Each student would work on a specific project in consultation with the experienced crafts persons. At the end of the two-week residential workshop, students would display the prototypes made with the assistance of crafts persons and discuss their work with the villagers. This was a remarkable learning experience for both the students and the villagers. The outcome was often new concepts for agricultural tools, new design for doors and windows, pots and pans with new forms and applications, new applications of bamboo material for ecological packaging etc. Students not only learned the idiom and the ethos of design in India but also got introduced to eco friendly materials and techniques and the philosophy of design for sustainability. In turn, the crafts persons were exposed to the process of modern design approach and the value of innovation and creative work.

Craft Study and Documentation

The course was introduced in 1980 for the students of industrial design. In India there are well-established clusters of highly skilled and talented crafts communities working on the production and marketing of products of everyday use. For example, there are craft communities in Maharashtra that produce musical instruments such as sarod and sitar. There are craft communities making large sized pots in Almora in UP, Visnagar in Gujarat etc. The jewellery crafts communities are highly skilled and knowledgeable about design. Also, there are many toy making communities all over India.

In this course, each student visited and studied a specific craft community during the two week of field study and research. The students covered a range of products, product features and development, materials and techniques used, quality control and pricing, the different channels of marketing and their influence on products, changes taking place, training of young people in family/community, the overall management system, issues and the opportunities, etc. The course has been in operation since 1980 and is getting enriched each year.

Today at NID, we have over four hundred documents which are like illustrated monographs of a variety of living crafts and crafts persons. Many of our trained designers are now working on projects and activities related to the development of new products involving the artisan and craft sectors. Quite a few schools of architecture and interior design have now introduced craft study and documentation course as part of their curriculum. This has become a very important resource for design education. In the time to come, there will be some cross-fertilization of modern design and the craft design idioms. It will be the role of the designers to interweave and create new design approaches.

System Design – Design for Community & Environment

System Design Course has been part of the Industrial Design curriculum all over the world. At NID, we had begun within the Ulm design school curriculum for the product design education. During the late 60's and early 70"s, the System Design course laid emphasis on inter-related products. The emphasis was on concepts like a modular structure, inter-changeable parts, a 'family type' outlook, the growth possibility, etc. This would mean projects as direct as design of a set of tableware, a set of furniture, a collection of a range of bowls/containers etc.

Gradually we experienced that in many cases, the product is not only related to its group but also to the environment of which it is a part, and the socio-cultural context. In many design projects, the design decisions are not merely influenced by the material production criteria or even product positioning in the market but by complex product-user-community relationships. Many products that have a closer affinity to architectural and landscape elements have a character, an identity relating to the people and communities that they belong to. For instance, public services like railways are managed by public institutions. Hence the product system would be influenced by the policies and character of the institutions that manage these facilities.

System Design courses have been conducted in close collaboration with visionary institutions in the last two decades. The work done by students at 'Anandwan' is a good example of System Design approach. At 'Anandwan' the rehabilitation community centre set up by Baba Amte, the students selected diverse areas of design, ranging from products for the visually handicapped which would be directly useful to the inhabitants, to greeting cards, leather and textile accessories etc. which would help in income generation and self sustenance of the community.

The briefs of the System Design projects are usually built through discussions with the development groups. It is not only a matter of material and technology but also about policies, procedures, community needs and aspirations. The constraints of the short-term, the long-term context, multiple stakeholders, plans and policies for this sector etc. are taken into account. The course has created a vast experience bank for students and has provided them with a way to look at projects in a holistic and fruitful manner.

System Design course started in the revised form in the 1980s is one of the most effective courses today. It has provided the vital experience of working with various committed and knowledgeable groups and professionals within the systems approach. The course has made us realize that design institutes would need separate cells or centres for public utility design. There could be professional design groups dedicated to railways, schools and higher education institutions, healthcare, environment, offices and public interface environments. These are the thrust areas for design education and research. Designers are better equipped to deal with the complexities and challenges of the community and public utility services.

We also worked professionally on a series of system design related projects such as a system of public toilets for the city, solar cooker for domestic use, reorganizing the city railway station and the three-wheeler auto rickshaw as the city's public transport. The experience of working on such projects made it clear that logical and innovative design concepts are not enough. That design cannot be

well implemented unless there is a responsible and sensitive administration for such public interest projects and that there is a need for design groups dedicated to specific areas of public service environments to work on a long term basis with the technical and managements groups.

Nature and Form / Design

This course was initially adopted from Germany's Ulm school curriculum in the 1970's. After conducting the course for a few years, we realized that nature is the most comprehensive knowledge system for design understanding and applications. This revised course introduces students to the elements of form including the form-function and form-theme relationships found in nature. Students select a specific nature form and make an in depth study of the same. Taking inspiration from this nature form, students come up with dynamic form, displaying their understanding of the interrelationship between form, function and the design theme. Revised in 1980, the course not only provides a very organic design process for form development but also exposes students to deeper understanding of forms and interrelationships. In some classes we also tried the bionics approach where students were expected to come up with concepts for new applications and product-oriented results. We often had a focus on designing of toys, educational materials etc through this nature and form course. This course has confirmed our belief that nature studies are the backbone of design education and research.

Toy Design Workshops and PG Programme

My interest in toys started way back in 1975 while teaching basic material to Foundation students. Many of our popular dynamic folk toys are remarkable examples of intelligent and imaginative use of materials. Toy as a product has meaning and purpose but transcends beyond narrow utilitarian use. Toy is nothing without the active participation of the user. Toys are primarily products of fun and education through interaction and interface. The form of a toy must communicate to the user how to interact and play with it.

Years ago, while visiting the local fairs to meet the indigenous toy-makers all over India, I became fascinated with classical dynamic folk toys. Some sponsored projects in this area provided me the opportunity to travel and meet groups of traditional toy makers and communities all over India. This experience made me study, document and publish books of design heritage in this sector. The next stage was to conduct workshops with children, teachers and others interested in innovative toys. We also worked with the Indian toy industry and toy clusters and this experience provided us valuable insights into the Indian toy sector. The design heritage in the toy sector is still alive but urgently needs institutional support.

Toy Workshops

We often conduct workshops for mixed groups of children, teachers and scientists at schools, at children's activity centres, museums, community centres etc. The experience of conducting workshops over two decades has provided insights into what it is to design and develop toys. At the workshops, participants do not just come up with good ideas but also show interest in developing them based on specific toys, concepts or themes. The workshops are enriching because a toy is not just a concept but also a working product with scope for getting feedback and evaluation from the users in a very honest and direct manner.

PG Programme in Toy Design and Development

In the year 2001, we could start an independent PG Programme in Toy Design & Development. The programme is open to graduates in architecture, technology, child development therapy, or any graduate with interest and experience in this sector. The Toy Design programme is basically user-centric, with a wide scope for using diverse materials, media and interactive technologies. The

Foundation semester gives basic inputs in design including colour and form, design drawing, computer techniques, ergonomics, design methods etc. Students get exposure to both the traditional craft based processes as well as industrialized mass manufacturing production processes. Other interesting modules like character design and story telling are also part of the programme.

The programme includes projects ranging from mini design projects to designing at a systems level in the areas of toys, games and entertainment products and environments for children. The students are encouraged to do design development, make working prototypes of their designs and test them with their primary clients – the children! Field training and study in areas of craft design development, industrial training, institutional training with children's institutions provides real life experience and confidence to work as a design professional. The education is based on an amalgamation of theory and project work in various areas. The user testing and evaluation lab as well as a toy resource centre provide active support to the education programme. Toy Centre also facilitates active interface with its network of national and international institutions and industries. The recent explosion of digital communication and global connectivity has provided a new dimension to toy design education and research.

The Path Ahead

The four new /revised courses and workshops introduced in the Product Design and Toy Design Programmes at NID during the last few decades have been explained. How far have these inputs contributed to the relevance to design education and research in societies with a rich design heritage? One thing is quite clear: today, these courses are being adopted by several schools of design, architecture and interior design.

Today, India has all the basic elements necessary for the growth of modern design education. Professions like technology, management and digital communication are widely established in the industry, media and development sectors. The cultural knowledge and its diversity, including the heritage of design, are alive. There is a vast network of self-help development organizations (non government organizations) increasingly expanding their base and making an impact at the grassroots level all over the country. Working with several groups of children, NGO's, developmental organizations, industry and craftsmen community has provided worthy insights to my students and me. The experience has also has provided motivation for many of our graduates to continue work in sectors other than industrial manufacturing and media. Many of our graduates work with developmental organizations or projects sponsored by them for the development of clusters and communities.

Design can also facilitate empowerment of communities. While there is a sense of satisfaction that design education and research has achieved certain depth and context, design education and research in India has not spread widely enough even after 40 years of existence of NID.

In the years to come what is required is not a replica of NID but high quality design experimentation programmes to be carried out in different parts of the country, institutionalising and building of a variety of modern design heritage centres.

Secondly the children from the heritage sector of design and crafts communities need to be professionally educated in modern design institutions. The role of the master craftsman needs to be rethought; use of renewable material and ecology needs to be looked at. Design inputs must become part of school and university education, especially in view of the diversity of our sub-cultures and the vast number of young talented people interested in a creative and meaningful career. The introduction of design education at the schools and universities will also help create an interesting learning approach to other subjects.

The new forms of design education and research programmes have to look into the above mentioned contexts of holistic development that is beneficial to the environment and ensures equity, dignity of all and leading to responsibility for self and others on this planet. Design diversity in terms of

philosophy, thinking and action needs to become a natural phenomenon in the growth of design education and research.

"*Nothing is worth making if it doesn't make the Man*." — Edwin Markham

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"Protecting the Commons": Intellectual Property Rights in Design Education

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Design institutions and universities have always given strong encouragement to its students to protect their intellectual property rights in the creations and innovations that they have generated. It is believed that the protection of Intellectual Property (IP) so generated is necessary to provide security, stimulation and incentives for innovation. However, critical theoretical and empirical analysis reveals that this may not always be the case. Intellectual property law has now evolved into a massive system to regulate creativity, which works not just through the protection, but through increasing control of uses of creative work. Strong intellectual property (IP) protection regimes are often deterrents to innovation and legal mechanisms outside the traditional IP framework may generate greater levels of creativity.

A direct response to the IP regime is the open-source software movement of the last decade, which produced innovative and economical computer software within the grey zones of copyright law. The methodology of the open-source model for computer software is based on the idea of material and information being in the 'commons' or in the public domain that is open for others to use and develop, leading to access, creativity and innovation. In the field of product design, graphic/video art and crafts, the availability of material in the public domain for artists and designers to build on, collaborate and innovate is critical and copyright, design rights and patent law regimes are insufficient to carry out a commons-public domain strategy into the design sphere.

The challenge of developing an intellectual property rights model which responds to the twin imperatives of promoting innovation while ensuring access to knowledge, information and works is the key legal challenge at the start of this new century. This paper aims to advance such a public domain strategy in the field of design innovation by paying attention to patent, design and copyright law. It proposes legal innovations, which are practical and beneficial to designers while retaining access and availability of products. It argues that such legal innovation is likely to contribute to a better-rounded and appropriate IP policy for design and art institutions to adopt and inculcate in their students.

Keywords: *protection regimes, open-source model, key legal challenge, empirical analysis*

Introduction

Design institutions and universities have always given strong encouragement to their students to protect their intellectual property rights in the creations and innovations that they have generated. It is believed that the protection of Intellectual Property (IP) so generated is necessary to provide security, stimulation and incentives for innovation. However, critical theoretical and empirical analysis reveals that this may not always be the case. Intellectual property law has now evolved into a massive system to regulate creativity, which works not just through the protection, but also through increasing control of uses of creative work[1]. Strong intellectual property (IP) protection regimes are

often deterrents to innovation and legal mechanisms outside the traditional IP framework may generate greater levels of creativity.

A direct response to the IP regime is the open-source software movement, which produced innovative and economical computer software within the grey zones of copyright law. The methodology of the open-source model for computer software is based on the idea that material and information is in the 'commons' or in the public domain that is open for others to use and develop, leading to access, creativity and innovation.

The success of the open source movement has evoked strong interest, even in disciplines that are not directly connected to software.[2] Lawrence Lessig's Creative Commons initiative extends this model to all fields of cultural creation including fiction and non-fiction writing, art and other cultural formats. In the field of product design, graphic/video art and crafts, the availability of material in the public domain for artists and designers to build on, collaborate and innovate is critical and copyright, design rights and patent law regimes are insufficient to carry out a commons-public domain strategy into the design sphere.

Design initiatives like Think Cycle at the Massachusetts Institute of Technology (MIT) have applied an open and collaborative model of design in industrial design and other fields[3]. Their efforts have been modelled on the open source distributed model of software production for design innovation. But this has not yet developed into an intellectual property model, which reflects this process of collaboration and creation.

The challenge of developing an intellectual property rights model which responds to the twin imperatives of promoting innovation while ensuring access to knowledge, information and works is the key legal challenge at the start of this new century. This paper aims to advance such a public domain strategy in the field of design innovation by paying attention to patent, design and copyright law. It proposes legal innovations that are practical and beneficial to designers while retaining access and availability of products. It also argues that such legal innovation is likely to contribute to an appropriate IP policy for design and art institutions to adopt and inculcate in their students.

Innovation, Intellectual Property Rights and the Public Domain

Increasingly intellectual property rights are viewed by art and design institutions to be critical to creativity, innovation and the generation of economic prosperity. An example of this logic is illustrated by the National Institute of Design (NID), which "…*strives to encourage creativity and innovation, which in turn leads to generation of intellectual property. Protection of Intellectual Property (IP) so generated is necessary to provide security, stimulation and incentives for sustained and enhanced output. Moreover, in the context of ever shortening product lifecycles and product differentiation and a market driven by vagaries, it is becoming more and more essential to manage intellectual Property Rights (IPR) effectively*".[4]

This protectionist approach has been the general approach by some of the most renowned institutions the world over such as the National Institute of Design, MIT etc. The encouragement to intellectual property rights protection is evident in their curricula and in the facilities and mechanisms the universities provide to the students to register and protect their intellectual property rights.

If one can fairly say that the aim of design institutions and art universities would be to promote learning, creativity, innovation and research, then are these aims fulfilled by encouraging a strong intellectual property rights protection regime? This is the question that I would like to answer in the following few paragraphs.

Intellectual property rights of copyright and patents were introduced with the aim of giving the artist or the inventor an incentive to create by giving her a monopoly over her creations or inventions over a limited period of time. Such an underlying basis to intellectual property rights was premised on giving an incentive to the 'author,' 'creator' or 'inventor' of the works, who deserved to be rewarded

for her creative genius, labour and skill. This incentive was given to the author or the creator by way of a complete monopoly over her works for a limited period of time. Such a monopoly meant that no one else besides her had the right to sell, use or distribute her works without her permission or license for a limited period.

Let us briefly go over the history of Anglo-American intellectual property rights statutes and how they first came into existence. In England, the Statute of Anne or the Copyright Act of 1710 was one of the first copyright statutes and was enacted for conferring the 'sole right and liberty of printing books' to authors and their assigns. The right lasted for 14 years from the first publication "and no longer"; but if the author was still living at the end, the right was "returned" to him for another 14 years.[5]

In the United States, one of the first copyright statutes was enacted in 1790 to grant "authors" exclusive rights for their "writings" for a "limited time" to — as the constitution expressly states — "promote progress." The U.S. federal copyright statute was enacted primarily to regulate the printing and vending of maps, charts and books for an initial term of 14 years.

Anglo-American intellectual property law had an article of faith — that ideas and unoriginal compilations of facts would remain in the public domain, that this protection of the raw material of science and speech was as important to the next generation of innovation as the intellectual property rights themselves. The system would hand out monopolies in inventions and in original expression, while facts and ideas would remain free for all to build upon.[6] This was allowed by carving out the exception of 'fair use' in copyright law which allowed regulated use of copyrighted material by others in limited circumstances such as non-commercial use, research and educational purposes, for the reporting of news items etc. This fair use exception was carved out to protect the commons, which really was one of the fundamental goals of intellectual property law.

However, this premise is being undermined. No longer does copyright protect only books, maps and charts. Copyright law in its present form touches practically any creative work reduced to a tangible form. It protects music, performances, architecture and certain designs not just for an initial term of 14 years, but also for the life of the author plus sixty years.[7] And, it protects this work not contingently, i.e., not upon registration, but automatically for a term that does not have to be renewed, for a life that exceeds the author's. The scope of copyright now even protects an extraordinarily broad derivative right. The right to translate, with some works, the right to perform, the right to adapt a play, or make a movie — all these are rights that are now included within the originally sparse "exclusive right" that the original copyright act granted[8]. In patent law too, stretched interpretations of novelty and non-obviousness requirements now allow proprietary rights over subject matter that was earlier never considered patentable.[9]

1 Innovation

So how does the present form of copyright and patent law affect creativity and innovation, which is what universities seek to promote?

An innovation can take place completely independently, when a work created is independent of any previous innovations. In reality however, most innovations are incremental and cumulative. This is equally true of both industrial and cultural innovation. In our present culture we are inclined to forget that the author or creator has used many sources — language, images, tonality, rhythms, colours, movements, meanings, humour, and so on — which belong to our common domain, the intellectual commons[10]. A vast majority of scientific and cultural creations, if not all, are built on pre-existing creations and discoveries. New 'things' are produced by combining existing elements to produce new combinations or variations.[11] Each existing element is raw material for future innovation. Even historically, industrial technology innovation was attributable to experimental incremental changes in design by firms whose results were then made available to other firms in the industry and potential entrants[12].

Therefore, efficient creation of new works and inventions requires access to and use of old works, especially if the by-product of such a practice is that the new work is superior to the pre-existing work. This kind of creation wherein the authors or artists borrow or build upon other works, is especially the case in works of contemporary art and design.

Appropriation Art

Much art is inspired, at least in part, by previous works and schools. Some works are more blatant copies, justified on the grounds that they are 'appropriation art,' i.e., images borrowed from popular culture, advertising, the mass media and other artists and incorporated into new works of art. Often the artist's technical skills are less important than his conceptual ability to place images in different settings and thereby alter their meaning.[13] As artist Richmond Burton states:

> "*…Everything you do is based on what came before and what is happening currently. I don't see history as monolithic. I feel very free to take and change whatever I want, and that includes borrowing from my contemporaries. If some people are upset because my work is similar to what they are doing, that's their problem. And if they take from me, that's great*!"[14]

However, strong copyright law regimes make it legally problematic for artists to borrow from other works. Since copyright law protects derivative works as well, the newer art trends of this decade such as using collage art, kitsch, borrowing and transformation into different media etc. can become a legal issue.

One well known example is the US 'string of puppies' case, when the kitsch artist and sculptor Jeff Koons was held to have infringed a photograph of a man and woman with eight puppies by making a three dimensional sculpture copying the photograph[15]. Koons' argument was that his sculpture was a satire or parody of society at large and that "String of Puppies" sculpture was a fair social criticism. Koons had drawn upon the artistic movements of Cubism and Dadaism, with particular influence attributed to Marcel Duchamp, who in 1913 became the first to incorporate manufactured objects (readymades) into a work of art, directly influencing Koons' work and the work of other contemporary American artists. But Koon's arguments failed to impress the judge and it was held that Koon's sculpture amounted to an infringement of copyright in the photograph taken by A. Roger.

Almost all forms of contemporary art work incorporate and borrow features and symbols of contemporary culture, signage and images and transforms them to give their work a new meaning. I would like to give an example here of two artists who collaborated on a photography project to produce a series of photographs which borrowed from popular and contemporary images of everyday Indian life and also used paintings of old masters depicting native south Indians and worked to recreate those paintings using different media and photography to make a social comment. The artists described their exhibition, titled 'Native Women of South India: Manners and Customs' as follows:

> *"The series of photographs presents an eccentric array of 'native types' by recreating images from familiar or historical sources, ranging from the religious to the mythological to the fictional to the real. The project ironically comments on the colonial obsession with classification as well as the Indian nationalist ideal of 'Unity in Diversity' – the notion of looking at ourselves as diverse peoples making up the nation, using performance and masquerade borrowed from the popular forms we see all around us, in the 'costumes of India' pageants, Republic Day floats, festival tableaux and dioramas and in the dream projections of roadside studio photography."*[16]

Although there has been no copyright claim against the two artists who produced the photographs, it is definitely open to a copyright challenge of infringement, especially since Indian copyright laws do not yet recognize parody broadly. The use of another's work as inspiration can also be copyright infringement if what is copied is a "substantial part" of the original work[17]. Thus, appropriation art and other art works that parody other works are potentially open to a copyright infringement claim,

assuming the work appropriated or parodied is still in copyright. In the case of the photography series described above,

The above examples illustrate the forms of artistic production, especially appropriation, transformation etc. and reinforce the belief that innovation and creation of new works requires access to and use of pre-existing data and works. But with the increasing regulation imposed by copyright and patent law, this access to pre-existing works becomes increasingly difficult. Such controlled regimes may hinder artistic developments instead of promoting artistic creation. Author-centred regimes of copyright and patent laws can actually slow down scientific progress, diminish the opportunities for creativity, and curtail the availability of new products because they 'can be used to deny biographers the ability to quote from or to paraphrase; to silence the parody; to control the packaging, context, and presentation of information.'[18] The blindness of an author-centred regime to the importance of the public domain can also lead to overly expansive intellectual property rights that deny future creators - novelists, scientists, programmers - the raw material they need to make new products. '[19]

Not only is the ever-broadening expanse of copyright law taking important works out of the reach of other artists and creators, it is also resulting in denying access to important works for research and educational purposes. The reaches of copyright and patent law are increasing to such great lengths so as to regulate almost any kind of use and access to protected material. The problem here lies in the issue that intellectual property law is premised on a narrow "author/inventor-centred" view of the circumstances of intellectual and cultural production. While we understand that innovative and inventive products are produced through varied techniques of inspiration, appropriation and transformation, it is obvious that IP law categories and analyses fail to accommodate, and may in fact stifle such innovation.

The Open Source Model for Collaborative Production and Innovation

In contrast to the formal intellectual property rights regime, the open source model of innovation challenges the conventional view that innovation is best supported by strong private intellectual property rights.

Open source was developed in the nineties by computer software programmers who placed their software at the free disposal of other users and developers. The software is published on the Internet and anyone interested can download it for free, use the software, view the source code of the programs, and even debug or develop the code further. They are even free to publish these amendments together with the original or the changed source code. In this way, open source projects managed to attract thousands of programmers to jointly develop the source without having exclusive property rights on the products of their work.

Open source software is released under a series of different licenses, the most important being the General Public License (GPL). The GPL acknowledges the copyright of the developer of the code and specifies that anyone may copy the software, provided the license remains attached and the source code for the software always remains available[20] . Users may add to or modify the code, may build on it and incorporate it into their own work, but if they do so, then the new program created is also covered by the GPL. It thus forces every program that contains a free software component to be released in its entirety as free software. In contrast to the conventional copyright, this license is called "copyleft." It "infects" the open source software with a "virus" to enforce compliance to the copyleft. Thus, it is ensured that any derived software will remain free software. Due to this nature of the GPL, the open quality of the creative enterprise spreads.

The Open Source methodology is seen as a process that creates a coordinated effort where the integration of users and designers leads to better results, establishes a community good through a publicly owned intellectual commons, generates intense peer review which leads to better reliability and performance, harnesses private contribution towards public causes, is able to effectively tap value from many domains of expertise and is open to any and all interested participants.[21]

Open Source Initiatives for Innovation

But does the open source model work to increase collaborative work and creation beyond the realm of software and can the open source analogy be translated to other forms of creative production like art etc?

A look into history shows that this collective model of innovation that we see in open source isn't really a new phenomenon. Allen was the first to describe a case of what is called the "private-collective" innovation model.[22] When looking at the development of blast furnace technology in Britain's Cleveland district in the second half of the nineteenth century, he discovered that the bulk of innovation neither stemmed from non-profit institutions like universities and government agencies, nor from R&D activities undertaken by commercial firms or individual inventors, which were the three then recognized sources of innovation. Rather, technological development was attributable to experimental incremental changes in design by firms whose results were then made available to other firms in the industry and potential entrants. He concluded that there was a fourth inventive institution, which he termed *collective invention*. Collective invention describes situations in which economic actors willingly reveal their innovations to an interested public so that others can learn and develop these innovations further. Technologies are thus developed by repeated interaction and feedback. Information is shared with the whole innovation system and not with just a selected few. Similar modes of innovation sharing could be observed in the development of the Homebrew Computer Club and the search for a dominant design in the flat panel display industry.[23]

Thus we see that the open source method of production is far more common than we realize. Even before the Internet, science, law, education and musical genres all developed in ways that are markedly similar to the model described above. The market place of ideas is itself an idea that owes much to the distributed non-proprietary model than it does to commodified innovation that we think about in copyright and patent. Not that copyright and patent are unimportant in the process, but they may well be the exception rather than the norm.[24]

The open source method of production has now spread to other disciplines, from the hard sciences to the liberal arts.

Recent trends in the "open source" movement suggest that many benefits can be derived from sharing design knowledge, and allowing an "open" evolution of design based on public peer-review and contributions from diverse participants. One example of this is Think Cycle. Design initiatives like Think Cycle at the Massachusetts Institute of Technology (MIT) have applied an open and collaborative model of design innovation modelled on the Open Source distributed model of software production.

The system in Think Cycle primarily aimed at, but in no way limited to, using the design and engineering skills of the students and researchers in universities worldwide. One scenario was for professors to assign challenges to their students, assist them in working collaboratively with communities and organizations in developing countries while encouraging peer review from domain experts of evolving design solutions archived on Think Cycle. Motivated teams of students also work on critical design challenges as independent study projects with their departments. The objective is to document all evolving design solutions, rationale, processes, peer reviews and contributions within a searchable and cross-referenced system. It also maintains a database that serves as repository for all the iterative design concepts, technical notes, working files and images around a problem, and its solution. This repository is searchable, cross-referenced, free and open to the public. Using this collaborative and peer-reviewed model of production, the Think Cycle collaborative design initiative has successfully taken up designing of the cholera IV treatment device and the drip-set equipment. Think Cycle continues to grow as a distributed community and open public domain site to support ongoing cooperative efforts, peer review and global dissemination of innovative ideas in sustainable design.

A number of artists are also looking to the open source movement and have devised a "Free Art License" which is designed to ensure that the user can copy, distribute and freely transform another's work whilst respecting the rights of the originator[25]. The intention behind the license is to encourage

access to art works and creativity "to promote and protect artistic practice freed from the rules of the market economy." It intends to create new conditions for creation in order to multiply the possibilities of creation, while respecting the originators by according them recognition and defending their moral rights. It also encourages a continuation of the process of experimentation undertaken by many contemporary artists.

Thus, we see that the open, collaborative model for production and creative forms of licensing, which do not take away but add to the public domain or the 'commons' to facilitate more innovation, is indeed possible. The economic incentive basis to formal intellectual property rights protection for encouraging creative production does not really hold good. The core justification for intellectual property protection is that, without it, no one would have any reason to produce cultural, creative content. But the dynamism of the open source movement shows that this fundamental justification doesn't hold. As Dan Hunter states, many people will produce creative content even outside what we can think of as the capitalist underpinnings of I.P. It's a small step to go from this to a Marxist revolution: The open source movement promises to put the means of creative production back in the hands of the people, not in the hands of those with capital[26].

IPR in Design Universities and Institutions

In universities there is almost a universal institutional context, culture and support for protection of intellectual property rights through registration of copyright and patents. Nitin Sawhney of MIT states how the Technology Licensing Office (TLO) at MIT greatly facilitates the patent process, lowering the overheads (both financial and administrative) and perhaps increasing the incentive to file for patents. In addition many departments at universities greatly value patents filed which is often regarded as a metric for the quality of research conducted by other departments or funding agencies[27]. Nowadays, the universities have strong incentives to extract rent from their discoveries and much weaker ones to keep certain fundamental scientific advances in the public domain, even if that would be socially beneficial in the long run.

Although intellectual property rights may sometimes be necessary to motivate private firms to develop and disseminate university-based discoveries, the trend towards assertions of intellectual property rights by universities might also impede the progress of science. Innovation can suffer both from leaving too little and from leaving too much in the public domain. The hard question, obviously, is deciding which aspects of science, culture and technology should be controlled through intellectual property rights and which should be open to all. Rai and Eisenberg's approach is to attempt to identify the body or entity that can best make that decision, rather than to identify a particular subject matter and argue that it is appropriately in one sphere or another.[28] Thus, an institution can evolve different patterns for Intellectual Property Rights with different levels of public disclosure as well as both formal and informal forms of property rights adopted (like patenting and open source) under different conditions. This is the challenge that institutions must take up, if they truly believe in furthering the production of knowledge, information and creativity and contributing the results of learning to the society.

Ethnographic studies conducted among student innovators in university design projects reveal that there is a great deal of ambiguity and conflict that emerges regarding how to deal with cooperative and collaborative innovations as they evolve from being sub patentable learning experiments to functional and commercially viable solutions with potentially large social impact. In order to facilitate such collaborative projects, I believe that suitable frameworks must be developed to deal with IPR, to provide appropriate policies, incentives and mechanisms that ensure reciprocity for innovators as well as fair access to innovations.

When people contribute their developments to open source projects, they do not simply give up their intellectual property rights. In fact, they use their property rights to protect their developments from ever being appropriated. This is achieved by open source licenses. As detailed in the above

section, there exists a variety of different open source licenses that mainly differ in the extent to which they allow public property to be mixed with private property rights. The common idea behind all these licenses is that 'there is no limit on what one can take from the commons, but one is expected at some time to contribute back to the best of one's abilities'.[29]

It is therefore important for universities not to have a strong formal intellectual property rights regime in its curricula, but to encourage collaborative design and innovation by instituting a variety of IPR mechanisms for sharing and protecting their design innovations. The IPR policies adopted should ensure the appropriate balance between protection and sharing among participants. I am not proposing that creators be locked into open licenses for all their projects. Individuals could choose on a project-by-project basis, which works to be open-licensed and which to be distributed based on the closed terms of traditional property[30] . In this way, universities and educational institutions can participate in a new politics of intellectual property aimed at promoting balanced information ecology.

Conclusion

While it is important to protect intellectual property rights for individual authors and creators to give them an incentive to create, it is also equally, or perhaps more important to ensure the survival of work in the public domain which would allow society to more access to innovation. Universities and educational institutions have the burden not only to promote creativity and innovation, but also the public duty to disseminate research, widen public knowledge, and contribute to society.

In order to fulfil these goals, it is necessary that universities should encourage collaborative styles of working and widen their legal approaches to intellectual property rights in design education. By this I mean that universities should not only promote the formal IP regime, but also inculcate the philosophy of collaborative work and the open source ideology. The ideal approach would be one that uses both the protection of property rights and the non-protection of the same or their sharing. It has the twin objectives of achieving a proper balance between protection of the rights of a creative author and the wider public interest. Universities thus need to introduce hybrid systems of protection and sharing that would serve to protect collective or cumulative innovations.

As Boyle states, Property is important. Our analytically rich and historically variegated love affair with the concept demonstrates just why it is important. Yet "the opposite of property"— its outside, its limitations, negations, inversions and correctives—this is important too.[31] If universities and educational institutions, can inculcate the importance of this 'opposite' or 'outside' of property to their students, then it would certainly be a richer and more balanced form of creation and innovation that they would generate.

Notes

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3 See http://www.thinkcycle.org/

4 See http://www.nid.edu/academics_iprapproach.htm

5 Copyright Act 1710, ss. 1,2.

6 Boyle, J. "The Second Enclosure Movement and the Construction of the Public Domain." (Research Paper No. 53 Duke Law School Public Law and Legal Theory Research Paper Series December 2003) Available at http://ssrn.com/abstract=470983

7 Indian Copyright Act 1957 s. 22. In other jurisdictions, such as the United States, the term for copyright protection is author's life plus seventy years.

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9 The so-called business methods patents that cover 'inventions' as auctions or accounting methods are an obvious example.

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18 Boyle, J. *Shamans, Software, and Spleens: Law and the Construction of the Information Society.* Cambridge: MA and London: Harvard University Press, 1996, p. 130

19 *Shamans, Software, and Spleens* (n 19)

20 Proprietary or 'binary-only' software is generally released only after the source code has been compiled into machine-readable object code, a form that is impenetrable to the user.

21 "Crafting the Public Realm: Speculations on the Potential of Open Source Methodologies in Development by Design." (n 3)

22 "Collective Invention." (n 13)

23 Osterloh, M. and Rota, S. "Open Source Software Development – Just Another case of Collective Invention?" http://ssrn.com/abstract=561744, March 2004.

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Intellectual Property Law, Indigenous Knowledge Systems and Design Education in South Africa

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The aim of this paper is to critically examine the extent to which the indigenous designs can be protected by the current South African law. The paper highlights some ways in which indigenous knowledge systems (i.e. indigenous technology, arts, crafts and materials) has been appropriated and exploited in South Africa. The study will also explore whether the existing intellectual property laws in South African can accommodate indigenous intellectual property (i.e. in terms of technology, arts and craft). To do this, the paper will specifically focus on two aspects of the South African intellectual property law: Patents Act 57 of 1978 and the Design Act 195 of 1993. Finally, the paper will look at ways in which indigenous communities can be informed and educated on their potential rights.

Keywords: *indigenous, knowledge, intellectual property, design*

1 Introduction

The rapid advancement of scientific knowledge in the last fifty years has made profound changes and impacts on society. Through new international regimes, knowledge has become a commodity to be bought and sold. It is protected by intellectual property rights that have grown and developed as quickly as the scientific advancements themselves. At the same time, traditional knowledge has also continued to flourish and develop, though at a much different pace. These forms of knowledge remain protected by a traditional way of life, and by values and norms that have changed little over the last Millennium. Increasingly, however, the worlds of traditional and modern knowledge are in contact and conflict, and the result can only be viewed as a clash of cultures.

Traditional knowledge has always had spiritual and utilitarian value to indigenous peoples, but in the last few decades its value for commercial uses has also been recognised. At the same time, the intellectual property rights designed to protect commercial innovations have been deemed inappropriate for protecting traditional knowledge. This has sparked an international debate about how to recognise and protect traditional knowledge, which is currently unprotected by the current Intellectual Property Law regime. In response, policy makers who deal with trade, development, agriculture, health, culture, and the environment have begun to give careful consideration to the implications of intellectual property laws on indigenous peoples. Despite this concern, indigenous peoples have remained largely outside these debates, seeing the fate of their knowledge decided without adequate consultation and meaningful participation.[1]

Developing appropriate strategies for indigenous peoples' participation and protection of traditional knowledge requires an understanding of the political landscape within the established intellectual property processes, the various perspectives of traditional knowledge holders, as well as how innovations are managed locally. Indigenous knowledge is the "information that people in a given community, based on experience and adaptation to a local culture and environment have developed over time, and continue to develop. This knowledge is used to sustain the community and its culture and to maintain the genetic resources necessary for the continued survival of the community."[2] In this paper, we refer to the indigenous communities in South Africa. Indigenous knowledge systems

include indigenous technology, traditional medicine, indigenous food systems, socio-cultural systems, arts, crafts and materials. It also encompasses belief systems and the dynamic social cultural milieu that play a fundamental role in people's day-to-day livelihood.[3]

1.1 Intellectual Property Law

A key aspect of indigenous knowledge system is the fact that knowledge is deeply entrenched and owned by the community. Intricately intertwined with indigenous knowledge system is the issue of intellectual property law. For instance, in copyright law the author-centred notion of copyrights in intellectual property law makes it difficult to protect folkloric productions. The indigenous communities prevent one from designating a particular person or even group as being the author in its modern sense. There is also the problem of age and the material form in which the knowledge is presented.[4] We need to understand what we mean by intellectual property laws and how they are related to indigenous knowledge systems.[5]

Intellectual property rights are the rights awarded by society to persons or organisations over their creative endeavours through inventions, literary and artistic works, symbols, names, images and designs used for commerce. "They give the creator the right to prevent others from making unauthorised use of their property for a limited period."[6] On expiry of this period the work falls into the public domain and can be used freely by anyone.[7] Intellectual property law is categorised as industrial property (functional innovations), and artistic and literary property (cultural creations)". Intellectual property law includes patents, industrial designs, trademarks, trade secrets, moral rights and copyright. In this paper, we specifically focus on the *Patents Act 57 of 1978*, and the *Design Act 195 of 1993* as they have more bearing on the theme of the conference.

South Africa is party to various international agreements and conventions relating to the protection of intellectual property including patents, trade marks, designs and copyright.

Being a party to the World Trade Organisation agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), South Africa is obliged to comply with the minimum standards set by that Agreement for the protection of intellectual property.

1.1.1 Patents

The Patents Act, 1978 provides that a Patent may be granted for any new invention which involves an inventive step and which is capable of being used or applied in trade, industry or agriculture.

Therefore a patent is "an exclusive right awarded to an inventor to prevent others from making, selling, distributing, importing or using their invention, without licence or authorisation, for a fixed period of time." [8] The Trade Related Aspects of Intellectual Property Rights (TRIPS) stipulates 20 years minimum from filing date. In South Africa, "the duration of a patent shall, unless otherwise provided… be 20 years from the date of application…"[9] In return, the society requires that the patent applicant disclose the invention in a manner that enables others to put it into practice." This in turn increases the body of knowledge that is made available for further research. An invention can be patented if it satisfies the following three requirements, which differ from country to country: it must be new; it must involve an "inventive step" not obvious to one skilled in the field, and must be industrially applicable.[10]

1.1.2 Designs

The Designs Act, 1993 provides for the registration of both aesthetic and functional designs:

> 'Aesthetic design' means any design applied to any article, whether for the pattern or the shape or the configuration or the ornamentation thereof, or for any two or more of those purposes, and by whatever means it is applied, having features which appeal to and are judged solely by the eye, irrespective of the aesthetic quality… 'Functional design' means any design applied to any article, whether for the pattern or the shape or the configuration thereof, or for

any two or more of those purposes, and by whatever means it is applied, having features which are necessitated by the function which the article to which the design is applied, is to perform, and includes an integrated circuit topography, a mask work and a series of mask works;[11]

The duration of the registration of an aesthetic design shall be 15 years and that of a functional design 10 years calculated from the date of registration thereof or from the release date, whichever date is earlier.

The study specifically deals with the indigenous *intellectual* property protection rather than protection dealing with physical indigenous cultural objects, such as cultural sites, sacred places and objects etc.

2 Exploitation of IKS

Indigenous communities claim that the existing intellectual property law, i.e. designs and patents in South Africa do not adequately recognise and protect their cultural products, expressions and designs. In certain instances, intellectual property law is considered to be a threat to indigenous community's cultural maintenance[12] because it does not sufficiently protect indigenous intellectual property and this knowledge is sometimes misappropriated.

In recent years patents have been granted for inventions derived from traditional knowledge. For instance, the hoodia cactus plant used by the Khoisan community in South Africa to curb hunger whilst hunting was patented by the CSIR without prior consent[13] of the community. Numerous designs have been and are being exploited without prior consent of the indigenous communities. Designers usually refer to this as the "African influence." However, I would argue that to a greater degree, the indigenous designs are exploited without legal permission from the concerned communities.

On the international front we notice that the same legacy has been established. For instance the wound-healing property of the herb turmeric used by Indians was also patented in the United States of America. The plant named *Banisteriopsis caapi* used by the tribes in the Amazon as a ceremonial drink was patented in the United States of America. In this paper we strongly emphasise vulnerability of the intellectual property of indigenous people.

Furthermore, the western intellectual property laws create individual property rights which foster commercial and industrial growth. However, these systems are conceptually limited in their ability to afford recognition and protection of indigenous intellectual property. For instance if we look at the copyright law, there is also a problem in author-centred notion of copyright in the intellectual property law. Firstly, there is the problem of age. For the western intellectual property law, patents can be protected for a period of 20 years whilst a copyright can last during the life of the creator plus 50 years. In indigenous communities, these inventions and ideas have existed for long periods of time. Secondly, while the material form of these inventions and ideas from indigenous communities are usually expressed in oral form, the patent and copyright laws prescribe that for patents and copyright to be valid they must either be documented or recorded. This poses a crucial problem for indigenous communities in the sense that their transmission of knowledge has been through oral tradition and personal reminiscence. It is only after the process of colonisation that writing and recording was introduced amongst the indigenous communities.

On the international front, the incorporation of Trade Related Aspects of Intellectual Property Rights into the General Agreement on Tariffs and Trade in 1994 has provided some impetus for further commercialisation of the knowledge and products of indigenous communities by predominantly affluent industrialised countries. These industrialised countries get the oral knowledge from indigenous communities and later claim that they are the originators of such knowledge.

The intellectual property of indigenous people extend to include a wide range of subject matter, beyond what is recognised within the existing intellectual property law and other protection systems. Indigenous intellectual property amongst the indigenous communities is related to:

> …Cultural heritage… and also cultural property. In addition, indigenous communities possess some unique features of their knowledge, creative expressions and innovations, which emphasise communal rights, in which many creative works are of an indefinable antiquity, and in which cultural products, expressions and manifestations are tightly integrated into all other aspects of society. These features are at odds with conventional western notions of intellectual property.[14]

However, there is a growing body of declarations and statements by the UN and its agencies calling for the attention to the unique features of indigenous communities intellectual property. Discussions within the World Intellectual Property Organisation and UNESCO may provide some grounds to expand intellectual property law to include indigenous communities. The development of new *sui generis* legislation systems[15] provide recognition of the full range of indigenous peoples; cultural products and expressions, and which enable community empowerment for the control of their cultures, this might be the only way to achieve a just solution to the problems faced by indigenous peoples in the exploitation of their indigenous intellectual property rights.

In the light of the above, the following section focuses on the shortfall of intellectual property laws and the pressing need to accommodate indigenous knowledge systems so that the above-mentioned instances might be re-looked at bearing in mind the indigenous communities.

3 Current South African Intellectual Property Right Laws

The study specifically looked at the following books which deal with intellectual property law from a western perspective: Dean, *Handbook of South African Copy Right Law*; Burrell, *South African Patent and Design Law* and Cornish *Intellectual Property: Patents, Copyrights, Trademarks and Allied Rights*. Dean's book outlines key issues on copyright law whilst Burrell specifically deals with patents and design laws. Cornish's book continues to provide comprehensive and authoritative coverage of the whole spectrum of intellectual property law as it applies in the UK. These books form the basis of our analysis in this study. However, we should bear in mind that there are numerous books written on copyright law and patent law in South Africa.[16]

After examining the current law, it became evident that scholars in South Africa need to interrogate the current South African intellectual property law, so that useful input is provided from the indigenous knowledge systems. Current legislation dealing with indigenous knowledge systems is found in the National Heritage Resources Act 25 of 1999. Some indigenous knowledge systems' aspects of copyrights and patents are clearly left out and not addressed in this Act.

4 Indigenous Community and the Designer's Roles

Indigenous communities need to be educated on the kind of limited protection the intellectual property law offers them in South Africa. They need to know they recourse they can take in cases where there is ample evidence to claim that the patent or design law has been infringed. Also indigenous designers need to be aware of the potential monetary benefits that could be accrued if their designs are patented. If the government does not formulate policy with regards to the protection of indigenous designs, the exploitation will only increase as consumers yearn for products with a slant of indigenous aesthetics.

On the other hand, designers and design educators should always try to act fairly as possible when using indigenous designs so that the communities from which the designs originated are properly acknowledged and if possible the design registered in that community's name.

5 Conclusions

This paper critically examines the extent to which the indigenous intellectual property such as design is protected by the current South African law. The paper briefly highlights some ways in which indigenous knowledge systems has been appropriated and exploited in South Africa and abroad. The study also explores whether the existing intellectual property laws i.e. the Patents Act 57 of

1978 and the Design Act 195 of 1993 in South African can indeed accommodate indigenous intellectual property. Finally, the paper looks at ways in which indigenous communities, designers and design educators can be informed and educated regarding the intellectual property law and indigenous knowledge systems in South Africa.

Notes

1 Hountondji Endogenous Knowledge: Research Trails. Dakar: CODESRIA, 1977.

2 Hansen, S A, and VanFleet J W, Traditional Knowledge and Intellectual Property: A Handbook on Issues and Options for Traditional Knowledge Holders in Protecting Their Intellectual Property and Maintaining Biological Diversity. New York: AAAS, 2003 p.3. Also see National Research Foundation, Indigenous Knowledge System: Focus Area.

3 National Research Foundation, Indigenous Knowledge Systems: Focus Area.

4 Woodmansee M and Jaszi P. The Construction of Authorship, Textual Appropriation in Law and Literature. Durham and London: Duke University Press, 1994. Introductory chapter.

5 For the purpose of this paper, it is important to note that the term "Intellectual Property Laws" refers to the Intellectual Property Rights conferred by the current South African law and "Indigenous Intellectual Property" refers to the intellectual property of the indigenous communities.

6 See Chapter 1: "Intellectual Property Rights and Development."
(http://www.iprcommission.org/papers/text/final_report/chapter1htmfinal.htm), p.1.

7 Burrell T. Burrell's South African Patent and Design Law. Durban: Butterworths, 1999, p.1. Also see Premier Hangers CC v Polyoak (Pty) Ltd 1997 (1) SA 416 (A) at 4241.

8 Ibid, p.2; Also see Philip J. and Firth A. Introduction to Intellectual Property Law. London: Butterworths, 1995, pp. 33-65; Jacob R. and Alexander D., A Guide to Intellectual Property. London: Sweet and Maxwell, 1993, pp. 21-33 and Flint M., Thorne C and William A. Intellectual Property the New Law. London: Butterworths, 1989, pp.159-162.

9 Burrell T, Burrell's South Africa Patent and Design Law. Durban: Butterworths, 1999, p.547; Also see Patent Act 1957 S 46 (1).

10 Philip J. and Firth A., Introduction to Intellectual Property Law. p.44.

11 Design Act 195 of 1995.

12 Davis, M. "Indigenous Peoples and Intellectual Property Rights" Research Paper 20 1996-1997 (Parliament of Australia), p.1. In South Africa, provision is made through the National Heritage Resources Act 25 of 1999, to protect some aspects of indigenous knowledge systems. The Act, among other things, aims to promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations.

13 Finger, M and Schuler, P. Poor People's Knowledge: Promoting Intellectual Property in Developing Countries. Washington: Oxford University Press, 2003, p. 19.

14 Ibid.

15 Sui generis refers to methods of protection other than the use of the traditional categories of Intellectual Property. The most common form of sui generis protection for new varieties involves some kind of "plant breeders rights."

16 See for instance, Klopper and Van der Spuy, Intellektuele Goedereg; Smith. Copyright Companion; Copeling. Copyright and the Act of 197; and Smith, Allan. Copyright; Copeling. Copyright and the Act of 1978. See also Philip and Firth. Introduction to Intellectual Property Law; Jacob and Alexander. A Guide to Intellectual Property; Flint (et.al), Intellectual Property: The New Law; and Garnet, K. (et.al). Copinger and Skone James on Copyrights.

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Shiva, V. *Biopiracy: The Plunder of Nature and Knowledge.* Massachusetts: The South End Press, 1989.

World Bank, *"Indigenous Knowledge and Intellectual Property Rights."* Vol. 19, April 2000.

Legislations and International Agreements

The Copyright Act 98 of 1978 as amended

The South African Patents Act 57 of 1957

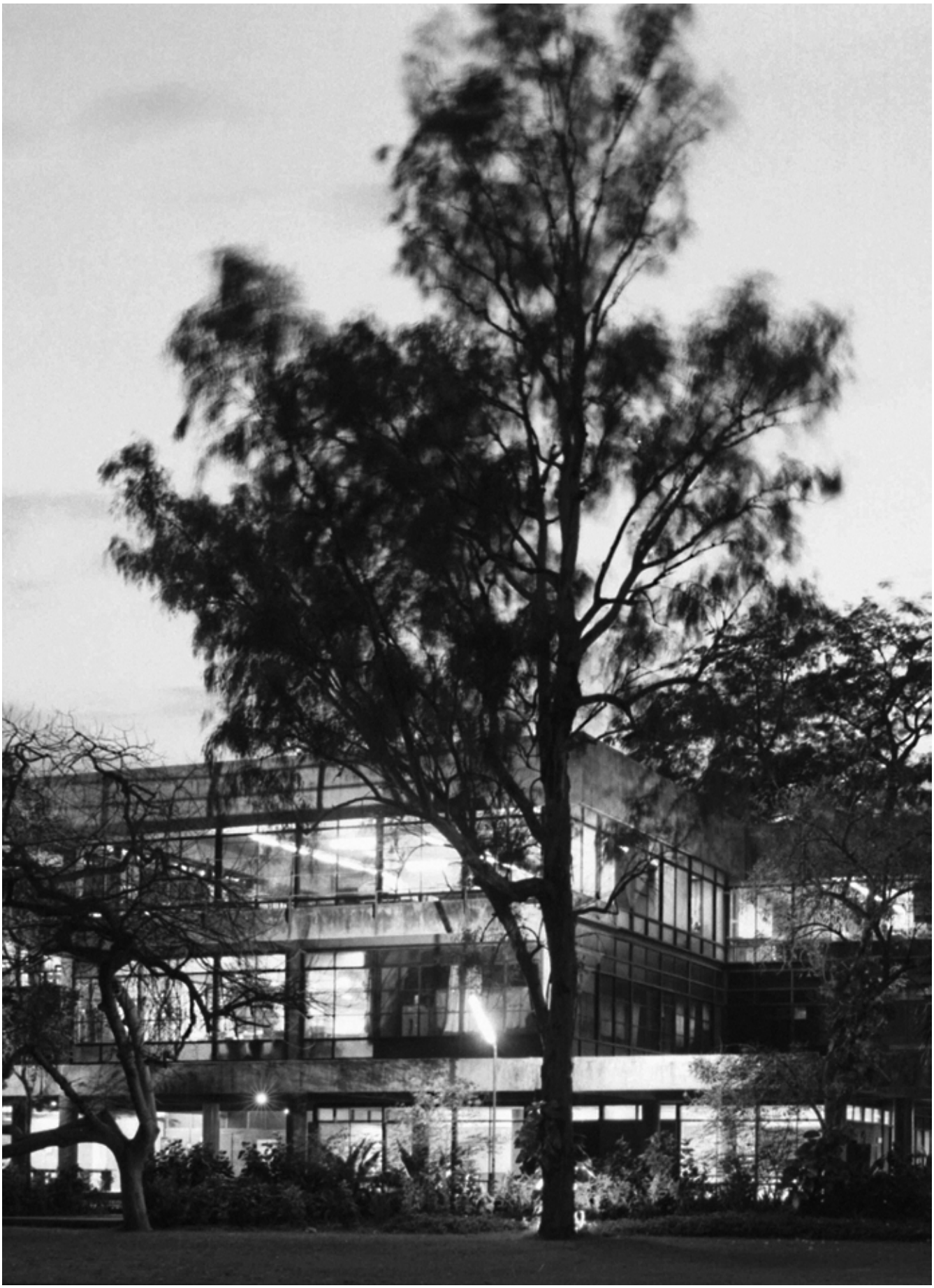
The Trademark Act 194 of 1993 and

The Design Act 195 of 1993

The National Heritage Resources Act 25 of 1999

The International Berne Convention of 1896 as revised

Agreement of Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) (1994)



Envisioning The Future

The concluding session at the DETM Conference was directed at seeking answers to the obvious question: what is the future of design education and practice? What is the impact of digital technology advancements on design pedagogy that has traditionally favoured the analog design process? Has design curriculum, pedagogy and design practice done justice to the local skills and traditions that exist in abundance in developing countries? Has design, as a problem-solving discipline, been able to contribute as a tool for development? How can designers provide the cutting edge not just to industrial products for the commercially globalized world, but also to traditional arts and crafts? Is the modern-day designer sensitive to the issues of sustainability? How can design inputs be integrated in non-design disciplines? Is there a scope for percolation of design to all levels of education…? The papers that follow in this section attempt to find an answer to these and many more contemporary issues in the domain of design education and practice.

Lalit Kumar Das of Indian Institute of Technology, Delhi, envisages a future where designers with different approaches to designing will form a design manpower that is capable of handling the complexity of the contemporary man made environment. V. Rajamanickam and Ravi Krishnan express the need for design educators to bring design to non-designers, while Gayatri Menon makes a strong case for design education to become an integral part of school curriculum, especially at the primary level.

Keynote speaker Uday Athvankar states that to be globally relevant, design teams of the future would have to be necessarily multi-cultural. He articulates the concept of integrated design teams that comprise national and international experts from design, engineering, manufacturing, marketing and management. Another keynote speaker, Helmut Langer proposes a fundamental change in design education to educate "a generation of globally responsible designers." In the same vein S Balaram calls for design education to lead the market for the good of the society rather than be led by it to suit private profits.

The papers included in this section clearly envisage a future where multi-cultural, multi-disciplinary and integrated design education will contribute significantly to the well being of the humanity.

The World Challenge for a Global Designers Generation

Helmut Langer **Chairman, Advisory Bord, Institute for Design Research, Germany**

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He is a speaker at international design conventions and guest professor at various universities in Asia, Latin America and Europe; recently he was a guest-professor in Nagoya, Japan, and at the Ecosign Academy in Cologne, Germany. Helmut is the chairman of the advisory board of the Institute for Design Research in Germany and a member of the International Institute for Information Design (IIID), Austria.

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Global change needs global adaptation. Growing human populations and economies are driving an unprecedented cultural, social, environmental and technological transformation. Expanding human needs are boosting the demand for freshwater, clean air, energy, food, timber and other natural resources.

The environment is struggling to keep pace. Humanity's growing consumption is overwhelming the capacity of the oceans and atmosphere to absorb our wastes. Since 1900, fresh water consumption has multiplied by 6. Transport is the chief emitter of greenhouse gases. The number of vehicles has risen to almost 800 million. Additionally our human civilization is struggling to keep the balance of cultural variety. Extensive commercialization thinking and Western cultural imperialism are spreading around the world. As a result, the loss of culture is progressing at rapid speed. This loss of culture is beginning to destroy our global heritage.

A fifth of the world's population lives in industrialized countries, consuming and producing in excess and generating massive pollution – not caring for the future. The remaining four-fifths live in developing countries and, for the most part, in poverty. The Earth's situation is not irreversible, but changes need to be made as soon as possible. Sustainability is the key word for the future of all of us. Yet, sustainability is about more than just the environmental impact of consumption. It has social, political, economical, cultural, and human rights dimensions. It relates to human choices and quality of life for all.

Designers are in a key position to influence this shift. None of us can tackle these challenges alone. The author proposes a fundamental change in design eduaction. There is a need to educate a globally responsible designers generation.

Keywords: *global adaptation, growing consumption, loss of culture, human rights dimensions*

Prologue

Earth provides enough to satisfy every man's need, but not every man's greed. – MAHATMA GANDHI
Nature never breaks her own laws. – LEONARDO DA VINCI

Introduction

The world is changing faster than ever before. Growing human populations and economies are driving an unprecedented cultural, social and technological transformation. Our modern world is undergoing a fundamental transformation as the industrial society that marked the 20th century rapidly gives way to the information and knowledge society of the 21st century. This dynamic process promises a fundamental change in all aspect of our lives, including knowledge dissemination, social interaction, economic and business practices, political engagement, media, education, health, leisure and entertainment.

Expanding human needs are boosting the demand for freshwater, energy, food, timber and other natural resources.

The environment is struggling to keep pace. Humanity's growing consumption is overwhelming the capacity of the oceans and atmosphere to absorb our wastes. Industrial emissions ranging from sulphur to persistent organic pollutants to carbon dioxide are re-ordering the chemistry of the natural world. Remaining wilderness areas are being degraded or converted to farmland or housing – threatening the survival of plant and animal species.

Additionally our human civilisation is struggling to keep the balance of cultural variety. Coca-Colanization – synonym for commercialisation and Western cultural imperialism – is a force that may in fact be a greater threat than wars to our global cultural and environmental heritage.

The Environmental Challenge

Since 1950, economic growth has been considerable, and world production of goods and services has multiplied by a factor of 7. During this same period, while the world's population has only doubled, the volume of fish caught and meat produced has multiplied by 5. So has the energy demand. Oil consumption has multiplied by 7, and carbon dioxide emissions, the main cause of the greenhouse effect and global warming, by 4.

Since 1900, fresh water consumption has multiplied by 6, chiefly to provide for agriculture. And yet, 20 per cent of the world's population does not have drinkable water, 40 per cent lacks access to improved sanitation, 40 per cent is without electricity, 826 million people are underfed, and half of humanity lives on less than 1 Euro a day.

Meat production consumes vast amounts of resources – 10,000 litres of water is needed just to produce one kilogram of beef, compared with only 500 litres of water needed to produce one kilogram of potatoes.

In other words, a fifth of the world's population lives in industrialized countries, consuming and producing in excess and generating massive pollution. The remaining four-fifths live in developing countries and, for the most part, in poverty. To provide for their needs, they make heavy demands upon the Earth's natural resources, causing a constant degradation of our planet's ecosystem and limited supplies of fresh water, ocean water, forests, air, arable land, and open spaces.

The number of vehicles has risen to almost 800 million, most of these in developed countries: 29 per cent are in the United States alone, and just 2.4 per cent in Africa. The level of ownership is also unequal: there are 790 vehicles per 1,000 inhabitants in the United States, but just 8 in India. Despite the pollution and congestion in cities, the number of cars continues to grow relentlessly.

Transport is the chief emitter of greenhouse gases, and the sheer number of users renders the measures for controlling it complex. Although emissions from industry have fallen since the Rio Earth Summit in 1992, emissions from transport have risen by 75 per cent. For example, in our Western societies — especially in the cities — people have heavily estranged from nature. Instead of having a walk in the country they buy a Sport Utility Vehicle for driving in the city. The product image of those cars suggests with neo-liberal phrases a "green lifestyle" to the customers. But those cars are most dangerous for our environment. They consume far too much petrol and exhaust far too much climate killing CO2 and other dangerous gases. Petrol-guzzling cars have a 50% market share in the US. This American car trend is a disaster for the global environment. Americans – 0.5% of the world population – are responsible for 26% of the worldwide CO2 emissions. Americans consume per capita 10 times more petrol than the world average.

The world now consumes in 6 weeks the same amount of oil that was consumed in one year in 1950. Half of it is used for transport.

We've been using electricity for 200 years, yet today over 2 billion people (40% of the world's population) still can't access it.

This is not all. The Earth's population will have billions additional inhabitants, as statistical forecast say. These people will live, for the most part, in developing countries. As these countries develop, their economic growth will jockey for position with that of industrialized nations – within the limits of the Earth's ecosystem.

The Earth's situation is not irreversible, but changes need to be made as soon as possible. We have the chance to turn towards a sustainable development, one that allows us to improve the living conditions of the world's citizens and to satisfy the needs of generations to come. This development would be based on an economic growth respectful both of man and the natural resources of our unique planet. Such development requires improving production methods and changing our consumption habits. With the active participation of all the world's citizens, each and every person can contribute to the future of the Earth and mankind, starting right now.

Sustainable development – the satisfaction of current human needs without depleting the natural resource base for future generations – is the greatest challenge facing humanity today. Mind the gap: Every day is Earth Day.

Do we realize that if every one in the world were to consume stuff like the average European or North American, we would need other SIX earth planets to provide the necessary resources?

Much more needs to be done to reduce the stresses on our environment and natural resources. We must learn to meet our needs while reducing our burden on the planet. As the momentum of global change is so strong we must also learn to adapt.

In these days, the industrialised countries speak about economic problems. Mind the gap. We do not live in an economic crisis; we do live in an imagination crisis. In all areas and fields of daily life.

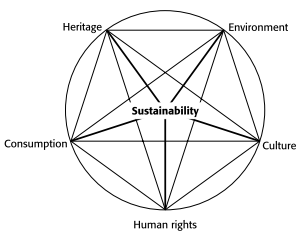
As I said in the beginning, the world is changing faster than ever before. The environment is struggling to keep pace. Much needs to be done to ensure the future of our planet.

Humanity – including designers – must learn that we live in a closed system. We cannot add new or additional planets. Sustainability is the key word for the future of all of us.

Sustainability is about more than just the environmental impact of consumption. It has ecological, social, economical, cultural and esthetical, political, and human rights dimensions. It relates to human choices and quality of life for all.

Sustainability is a global platform. Just as sustainability is not a one-way direction, globalisation should also not be seen as a one-way direction: often the developed / industrialized countries can learn from the so called less developed countries.

The Cultural and Human Rights Challenge



Environment and culture are so much interconnected and related to each other. And it will increase even more as the global knowledge society is evolving at breakneck speed. Video phone and satellite conferences, the visualisation of audio-communication, visual simulation in science and research, the graphic ability of mobile phones, the World Wide Web, multi-media, universal mobile telecommunications systems, global networks; all lead to the beginning of a visual alphabetisation of culture. In other words, this represents a visual presence from and on every corner of the world. We are standing at the beginning of a global product and visual culture, and value revolution.

A new visual culture is replacing the world of linearity. The accelerating convergence between telecommunications, broadcasting, multimedia and information and communication technologies is driving new products and services, as well as ways of conducting business and commerce. Never before in the history of mankind have so many had access to such a wealth of information available for data rendering and application. Access to and understanding of information are the keys to success and to survive in social, cultural, economic, technological and environmental terms. Information may be what is presented but knowledge is the goal – the value. Designers, as the

communicators and constructors are in the process of "changing paradigms," that is, from information to knowledge to environment.

The highest degree of creativity and innovative ability, combined with technological expertise, is required to continue this process of value shift towards re-orienting, re-cycling, re-using and re-ducing – re-constructing. This will include new consumption patterns and new value understanding, such as moving from buying and possessing products to sharing products. To sum it up, the design becomes less material, more immaterial, more social and more ecological.

Worldwide, design has become more and more significant over the last years in all areas and fields of industrial, commercial, cultural, ecological and social activities. Design is necessarily multi-faceted and multi-dimensional in nature. There is excellent design and traditional craft, avant garde movements and popular culture in every metropolis. Design is expressing, communicating and constructing every typical culture and characteristic value of our civilisation. Culture encompasses language, traditions, morals, laws and the art of a community.

The extensive commercialisation thinking and Western cultural imperialism are spreading around the world. As a result, the loss of the local, regional, ethnic or the national culture is progressing at rapid speed around the world. This loss of culture is beginning to destroy our global heritage.

We can see it in Africa, in Latin America; we have it in Europe. You have it here in India, and it is exploding in China. For example, in the big Chinese cities one can see more visual pollution than in most Western cities. Which effects will have such domineering foreign culture – and I better should say "un-culture" – on future generations of Chinese people?

Generally, designers are in a key position to influence this shift. Responsible designers as creators in any cultural process have the power to protect their own cultural heritage, including new categories such as the intangible or ethnographic heritage.

The end of the cold war has created a series of tentative attempts to define "a new world order." So far, the only certainty is that the international community has entered a period of tremendous global transition that, at least for the time being, has created more social and ecological problems than solutions.

We have the end of super-power rivalry, the growing North/South disparity in wealth and access to resources, and the beginning of the new system of wealth creation. This new system – the super symbolic economy – of the knowledge society will soon additionally split the world between the fast and the slow. In fast economies, advanced technology speeds production. But this is not the least of it. The speed with which data, information, and knowledge pulse through the economic, social and cultural systems is the important aspect.

This coincides with an alarming increase in violence, poverty and unemployment, homelessness, displaced persons and the environmental destruction.

While industrialised societies enter into the information and knowledge society, and modern technologies develop and spread at rapid speed. 860 million adults are illiterate, over 100 million children have no access to school, and countless children, youth and adults who attend school or other education programmes fall short of the required level to be considered literate in today's complex world. Literacy is about more than reading and writing — it is about how we communicate in society. It is about social practices and relationships, about knowledge, language and culture. Literacy — the use of written communication — finds its place in our lives alongside other ways of communicating. Indeed, literacy itself takes many forms: on paper, on the computer screen, on TV, on posters and signs, and on all everyday life products.

At the same time, previously isolated peoples are being brought together voluntarily and involuntarily by the increasing integration of markets, the emergence of new regional political alliances, and remarkable advances in telecommunications, biotechnology and transportation that have prompted

unprecedented demographic shifts. The resulting confluence of peoples and cultures is an increasingly global, multicultural world brimming with tension, confusion and conflict in the process of its adjustment to pluralism.

We must practise intercultural dialogue and respect cultural diversity as a contribution to global pluralism.

Our planet counts an endless number of peoples and communities, each with its specific languages, traditions, know-how and identities, which is an infinite source of creativity and as such should enrich our lives. In this era of globalisation, where the contact with the others is a daily matter, we must learn to use this wealth instead of rejecting or ignoring it.

The cultural diversity is a collective strength, which should benefit the entire world. In this sense, it should be recognized and affirmed as a "Common Heritage" of Humanity.

Therefore it is important to add to the design curriculum another new dimension: The learning and studying of other cultures. Globalisation also means cultural understanding and cultural respecting on a global basis. This is the other great challenge we face. Culture is more than just culture. It has an ecological, social, economic, esthetical, political – environmental and a human rights dimension. And it is part of sustainability.

Global Dimension for Design Education

Designers are in a key position to influence this change. In fact they are part of it. Design education has therefore to change dramatically the design thinking, design creation and design understanding and to influence the general public.

The growing digitalisation, the advance of globalisation, the cultural merging and environmental challenges cause rethinking and reorienting for all of us. The interaction of multitude and complex positions and the ever-increasing sophistication of the rapid development are of fundamental importance for global communication. Therefore the responsibility of designers is gaining significance for society and environment.

We can't say anymore we didn't know. We do not have an information problem; we have an orientation problem.

Individuals and communities will have to adapt to tomorrow's conditions both spontaneously and through planning. Both need the highest creativity. The five priority strategies for adapting to change are:

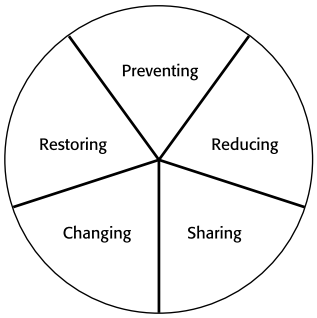
These are the fields where designers of all disciplines have to focus on when thinking, planning and creating design.

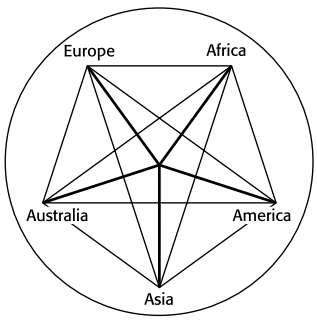
Radical changes in consumption, production and distribution, thinking in a sustainable sense is necessary for the future of our global environment and culture. Of course there are different answers for different people around the world. Some will choose to consume less; most – the poor in the developing countries – will have to consume more! We should not forget that poverty is one of the biggest challenges we have to face in the future.

Some countries do not yet have such general conscience for the global environment and sustainable consumption. But designers as the creatives should always be ahead. Designers worldwide must be ready to meet the challenge.

None of us can tackle these challenges alone. Therefore I propose a fundamental change in design education:

1 Design education worldwide must be totally based on the broader sense of sustainability, which must become the most important criteria for any design.





2 A "Merry-Go-Round" should be introduced in the curriculum. Each design student has to be, at least for one term in design education, in another continent.

Responsibilities are common, as well as differentiated. All those involved must be seen to move for the common goal, even if at different speeds on different routes. And way must be found to compare effort, so that all are seen to be pulling their weight, pulling their oar in the same direction. Different ways – common goal to educate a **global designers generation**.

Other cultures and the knowledge about other cultures are a great resource for the own culture.

The knowledge and experience of environmental problems in other world regions may contribute to a new design thinking and different consumption behaviour as well as responsible use of resources: preserving through designing – we must think about a new (re)productive economy for living in different societies and cultures.

Nature, culture and society are endless resources for designers' inspirations, in the past, today and in future. Cultural variety is of equal importance as biological diversity. Global reflection and knowledge can create more global awareness. It will provide us with an opportunity to deepen the understanding on the values of the cultural diversity and the natural environment, and to learn to better "live together."

A global designer thinks and acts globally responsibly.
A global designer protects the global environment.
A global designer respects global cultural diversity and human rights.

Confucius said,

"The human being has three options for intelligent acting
- through reflection — this is the most difficult one,
- through imitation — this is the easiest one, or
- through experience — this is the most bitter one."

Towards a National Design Policy and a Multi-tiered Approach to Spread of Quality Design Education

Darlie O Koshy National Institute of Design, India

Dr. Darlie O Koshy, is a renowned expert in the area of Strategic Marketing & Design Management. He has been actively contributing to design education and design promotion as the Director of India's premier and foremost design institution, the National Institute of Design (NID), Ahmedabad since June 2000. Besides his masters degree in Business Administration with specialization in Marketing, he did his Ph.D in Management from IIT Delhi. After starting his career in 1977 in the Handloom Sector and becoming General Manager of National Handloom Development Corporation / Managing Director of Kerala State Handloom Development Corporation etc., he was a founding faculty member at the National Institute of Fashion Technology, New Delhi, from 1987 to 2000.

He owns the credit of the authorship of 2 books on International Marketing titled Garments Exports; Winning Strategies and Effective Export Marketing of Apparel to US, EU and Japan. Dr. Koshy has written over 100 authoritative papers and articles on Apparel Industry Management, Strategic Fashion and Brand Marketing and Design Management in national and international journals and magazines.

Ex –officio Member of the NID's Governing Council, Dr. Koshy is also an ICSID Board Member and Chairman of CII Task Force on Innovation and Design. Dr. Koshy's contribution to design education and promotion has been recently recognized by being named as one of the "50 leaders reshaping Indian Education" by Education world, The Human Development magazine.

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With design playing a crucial role in today's innovation economy, the approach to Design education needs to be reviewed in the context of a "developed India" target, and the reality of networked information society. The need is felt more so with the fact that Design moves horizontally across all segments of industry, commerce and development and thus can add value to various facets in its own ways.

The paper explores the need of modern design institutes to be equipped with mind to market transformation capabilities and also elucidates the strategies for addressing the demand- supply gap for Designers and the desirable ratio of mangers, technologies and designers in the country. A rough estimate indicates the requirement of 5,000 to 8,000 designers per annum against the current supply of 300-500 designers. Having talked about the need, the paper suggests the need to focus on a clear blue print for Design education and recommends a five tiered approach to bring design to the mainstream education.

Keywords: *National Design Policy, Quality Design Education*

1 Introduction

Design moves horizontally across all segments of industry, Commerce and development. The 21st century being focused on knowledge, dematerialization and innovation would need the processes and qualitative skins of design as a central strategy. The efforts have to be directed towards this process and synthesis whether be in a government infrastructure project or in creation of products or services. Design plays a crucial role in today's innovation economy which is based on constant innovation for achieving national and industry competitiveness, protection of culture, tradition and crafts, and distinctive positioning.

Approach to design education in the 21st century needs to reflect the emergence of knowledge economy and convergence of media, communication, entertainment and information. The design education initiated in the 20th century led by German schools and later by other European schools which have been the foundation of our design curriculum need to be reviewed in the context of a "developed India" target, and the reality of global village set in an information society. The design values like harmony, ethics, consumer delight, quality, functionality, visual culture, aesthetics and such other tangibles and intangibles can provide great value in the "information society and knowledge economy" which is somewhat impersonal and devoid of human touch. This brings to sharper focus

a greater emphasis on culture, emotion, ethnicity, vernacular expression, traditions etc. The modern technology and engineering education need to therefore absorb some of the power and beauty of creative and lateral thinking emanating from art and design.

2 Adding Value

For engineering and technology education design can add value in two significantly different ways:-

a Converting technologies to tangible and intangible benefits through creative problem solving and opportunity creating methods which are broadly under the domains of "design and innovation". While design is a synthesis of a trans-disciplinary thinking leading to creation of products, services, experiences and communicating them, innovation results in converting knowledge to wealth.

b For an engineer with a strong understanding of technology and techniques it is necessary to provide self-development and market development tools. Design plays a critical role by adding value in the thinking and doing processes while also connecting business to consumers in the mindspace leading to market space.

3 Demand-Supply Gap for designers

The 21st century focus on integration of IT with design, experience design, instant need gratification and design being seen as a major "intangible" necessitate a bold vision on Indian design. In a developing country like India moving on to become a developed country by 2020, design enablement at all levels provide added value in every link of the chain. The cost difference in design development which India enjoys with the availability of creative talent make it necessary for India to build expertise, facilities and capabilities to nurture this competitive edge. Apart from 40% - 45% of the project cost being design, the "time to market" issue is a critical aspect in the times we live in with built-in obsolescence and replacement cycles. Modern design institutes need to be equipped with mind to market transformation capabilities. Steps required to create the future especially for preparing for IPR-based competition underscores the need for strategic design in the country. The need to develop design entrepreneurs through incubation system in the design Institute itself has now come to focus, and NID's new foray to entrepreneurship is a case in point.

It is reckoned by experts that large number of continuous design interventions are required in several high growth and other sub sectors spannng different segments of Industry, commerce & service sectors. The SME and crafts sectors also require designers in large numbers. However the requirement in high growth sectors like automobile / jewellery / animation may drive the market and demand-supply situation in India. A rough estimate indicates the requirement of 5,000 to 8,000 designers per annum against the current supply of 300-500 designers. The ratio between technologists, engineers, architects and designers in the country is also highly skewed. This has resulted in lesser number of original design which are suitable to our people and an absence of visual culture. Designers will be also required for different levels of design related work including concept / high-end designers, designer-technicians, and related professionals for catering to different requirements of the industry sectors. The development of IT and related service sectors call for a new breed of designers with a ubiquitous design approach just as ubiquitous computing!

4 Towards The National Design Policy and Spread of Design Education

The proposed National Design Policy needs to focus on a clear blue print for design education in the country with systems for monitoring and accreditation of quality while taking into view the learnings from design education and practice of world's leading 25 economies.

5 Spread of Quality Design Education in India

A five tiered approach is suggested for spread of design education in India especially in the technology – engineering educational structure and even in other congenial host Institutions and Schools.

a It is suggested that nearly 1000 engineering colleges should have exposure to design education at different levels. Tier-one institutions should necessarily have separate "Design Schools" or a centre like IDC in IITs or Centre for Product Design and Manufacturing in Indian Institute of Science, Bangalore.

b The second tier of the institutions is those which will choose either a product design stream or communication design stream as per the context of the institution at an Undergraduate level. It is sufficient to have a generic design programme or a product design programme in the second tier institutions. In this programme the accent is on design as value addition and design as strategy which enable engineers to see beyond technologies and think more in terms of products, brands and companies.

c A third tier would be that of information, communication technology, media institutes like the IIITs or other such institutes encompassing design for information societies keeping in mind that India is already a 46% service economy, while US is a 71% service economy. There are huge opportunities for the software and communication sector to encompass virtual and service design areas by incorporating information design, interface design, moving images and such other areas by which the programmes created by engineers become user-friendly and emotionally and culturally relevant.

d A fourth tier programme will be that of offering at least two courses in the later semesters in every engineering programme one called "Design Fundamentals" and the other called "Design Methods and Processes" by which most of the designers will be acquainted with the need for developing another dimension to their knowledge which will come in handy at different stages of their career.

e A fifth tier is introducing design in school curriculum through the existing CBSE / IB / ICSC boards so that availability of a creative talent pool is enhanced.

Conclusion

The higher education scenario in India is changing and rapidly transforming. At this stage, need for design education to be part of the main stream need not be overemphasized. This may help in design playing a crucial role as part of the 4-legged modern economy, the other 3 legs being technology, management and social responsibility.

Globalization and the New Mantra of Design Education for India

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For over 35 years, Uday Athavankar has been committed to design education, design research and design related consulting for companies. As a researcher for the past several years he is exploring the relationship between cognitive science and design decision. Using cognitive theories as a framework, he has focused on areas like 'product semantics' and 'object and culture relationship'. His current work also includes exploring the role of mental imagery and visual thinking in design problem solving. He has extensively published and lectured internationally on these research areas. Some of his designs have won national and international awards. His current projects deal with culture specific localization of products and technologies for global companies entering Indian market.

Prof. Athavankar was trained as an architect and worked in that field for four years before he studied Industrial Design at Institute of Design, Illinois Institute of Technology, Chicago. Prof. Athavankar has held positions like Head IDC and later Dean, IIT for planning functions. He is currently member of the Governing Council of IIT, Mumbai.

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Design schools in India have two alternatives before them. First, they could flex their scope and structure to include networked school idea into their stride. The urban centered design schools, already shaped more or less in the European tradition, could easily shift their alignment to submerge in the globalization wave and develop networks, but they should not miss the point that they have to partner with anthropology, engineering R & D and management, who would play an active role in global products. The schools will have a dual face. They will use the international networks whenever they are working on global project. On local issues, they will work with local partners in technology, management and NGOs.

The current programmes in India expect students to offer services to such diverse requirements. How does one train a student to design for global village as well as real villages in India? It is difficult to envisage how a single educational model can support these extremities of demands. I believe that the current structure of design schools in India have not been able to respond to this situation and in fact works as a hindrance than facilitator. Though this is consistent with the tightrope walking that the Indian design schools are familiar with, none of the schools in India are prepared for this degree of change. I believe that with such a diverse contexts and opportunities, the existing design schools are unlikely to do justice to these diversities.

The second alternative is to develop specializations in the schools, where some schools will work only on global issues, while others will concentrate in local urban and corporate projects, while still others will work on affordable technology products and some with craftsmen. Each will have the independence to develop partnerships with other disciplines based on the projects handled. Perhaps the extreme disparities demand different kinds of schools with unique and different design approaches and skill sets. The second alternative is easier to conceive but difficult to implement, particularly for the existing schools.

Keywords: *scope and structure, international networks, develop partnerships, extreme disparities*

Debates on tradition and modernity are typical when there are discontinuities. Perhaps we are forced to look at the Indian tradition again because modern design ideas as well as design education were implanted in this culture during the colonization period. It did not evolve as a product of this culture. Modern design education started in the later part of nineteenth century with the opening of schools in architecture and what was known then as commercial art. It brought in western design thinking, ideas and aesthetic sensibilities.

These discontinuities also reflected in Industrial Design education, though it started later, in the post-independence period. (in 1960s). With Charles and Ray Eames' 'India Report,' Industrial Design education and practice had a unique start that not many schools outside could boast of. It led to the first step in initiating Industrial Design practice and education. In spite of the focus on Eames report

on Indian design tradition and sensibilities, the design education programmes in India, like in many other countries, actually borrowed their pedagogy as well as thinking from Bauhaus as well as the Ulm school tradition. Since then the design discipline has been attempting to address the conflict between the need to rapidly modernize, to promote economic development to tackle poverty and the need to minimize the effects of economic developments on the traditional culture. Caught in this conflict, the design schools in India have been trying a tightrope walk, balancing between the international design approach and India-centric rootedness in local issues, tradition and imagery. Globalisation has given yet another jolt to this conflict, forcing us to question the validity of the tightrope walk, particularly in design education.

I plan to build my arguments on following somewhat overlapping statements:

1 One of the purposes of the design education is to create professionals who would then effectively contribute to the economic activity across sectors. I agree that this is not the only focus of design education and should not be, but I believe that at least in developing countries in their early cycles of development, we should accept this as one of the important goals. The profession can afford to choose its own path only if it wants to alienate itself from the national perspective. It is then logical that in developing economies, design practice and education agenda would be influenced by the socio-economic and political concerns. Have the design schools in India been showing sensitivity to the changes in the political thinking?

2 So far as design education remains project oriented, it is expected that the project agenda will reflect the prevailing political thinking. Looking back, one can see discernible paradigm shifts in the Indian political thinking and development approach. Have the project agendas of the design schools reflected these evolving shifts in political thinking?

3 Limitations of design schools come from the fact that they respond to new thinking through changes of contents and accommodate them within their existing structures. While the contents move and align with new thinking – the structure of the schools is lot more inert and is not easy to change quickly. Have the schools accommodated the changes in the agenda that the globalized and the non-globalized world demand?

4 Having borrowed design thinking and pedagogy from outside the culture, reflections on tradition and modernity seem natural. In this globalisation wave, what has perhaps prompted us to look back suddenly at the tradition now is the sheer pace and intensity of cultural changes. The traditional cultures like India are uncomfortable with this sweeping invasion of culture. However, there is no question of rejecting these changes, as the local cultures do not have that choice any more. It is better to look for opportunities within the current pro-globalisation political thinking and study how profession can address its concerns about tradition and modernity.

In this three-part paper, I plan to delve on how design schools responded and could have responded to these shifts in the political thinking. Much of the initial developments in design practice and design education (1970s and 80s) have been already documented in my earlier paper (Athavankar 2002). I plan to only briefly touch this area in part I. In part II, I plan to delve extensively on the globalisation scenario (1990s), the post 2000 AD political thinking, the new challenges and their implications to current design agenda. In part III, I hope to show that the design schools should have changed in their structure to meet the challenges offered by globalisation and the changing political thinking. But design schools have always shown a phase difference in catching up and have lagged behind in their responses.

This paper is all about the tightrope walking that I have not only witnessed but also participated in. It's about nostalgia, reflections and the potential opportunities in the design history in making.

Part I

Evolving Political Thought in India

As mentioned earlier, the pedagogy as well as the design education programmes were actually implanted into the Indian culture, initially under the British influence, and later by voluntary acceptance of the Bauhaus and the Ulm models. Yet, modern design thinking in India shows the reflections of conflict between aligning with international trends and the need to address the changing local issues and agendas, perhaps because it was difficult to neglect the prevailing political thinking.

1970s Paradigm: Using Design as a tool for development

Political thinking in the 70s was dominated by the ideas of industrial development protected by licensing and production quotas. It was unfortunate that the first formally trained designers with fresh ideas and pioneering spirit had to struggle to get a foothold in the not-so-receptive corporate world busy in manufacturing products under licensing agreements with multi-national companies operating in a non-competitive market environment. However, in reality it turned out to be a blessing in disguise.

These nascent years of Industrial Design education in India also coincided with the international debate on the ideas of economic development and its relationship with social justice at grass-root level. The debate prompted the designers to find the relevance of design in the life of the vast majority of Indians untouched by development. There was synergy because of the feeling of participation in nation building, prompting designers to explore the role of design as a means of income generation. Could design offer solutions to the politically important grass-root level issues like unemployment?

Design schools exposed the students to two diverse directions in thinking. Corporate world issues dominated the education agenda as much as the real world grass-root level issues. Schools subscribed to the idea that the 'third world' needed unique design responses and the inspiration for this has to come from within. The corporate model of the designer sat next to the new 'barefoot designer' model. Obviously the western orientation in education and practice of design came under the magnifying glass. First, there was recognition that design should be viewed as a tool for development. Second, it recognized the role of craft, craft products as a legitimate modern design activity. Third, it recognized the need for non-commercial interventions in the society. Interestingly much of this was consistent with the then international thinking in design and technology development (Papanek, 1971; Schumacher, 1973).

The schools had to cater to the diverse 'corporate' and the 'barefoot designer' models at the same time (see figure 1). It was not easy to fit this diversity in the urbanized structure of the design schools. They had to work with industries on one hand and also develop partnership with NGOs at local level or create extension centres in the nearby rural area. It was tightrope walking for the urban biased schools. Looking back, it appears logical that the socio-economic diversity in the society had mirrored in the two very diverse designer models. In spite of this diversity, the essential form and the structure of the school did not change very much.

1980s Paradigm: Hi-tech root to development and international benchmarking

Mid-eighties showed a major shift in the political thinking in India. The new political leadership changed gears and committed itself to the hi-tech route to development. There was a political ambition to enter the new Millennium by being technologically on par with the advanced countries. Realizing the possibility of being denied access to modern technologies, the political leadership supported some extraordinary technology development projects. Abandoning of the licensing system of production in some areas also resulted in a positive market environment and induced some private industries to develop technologies and products indigenously (See figure 2).

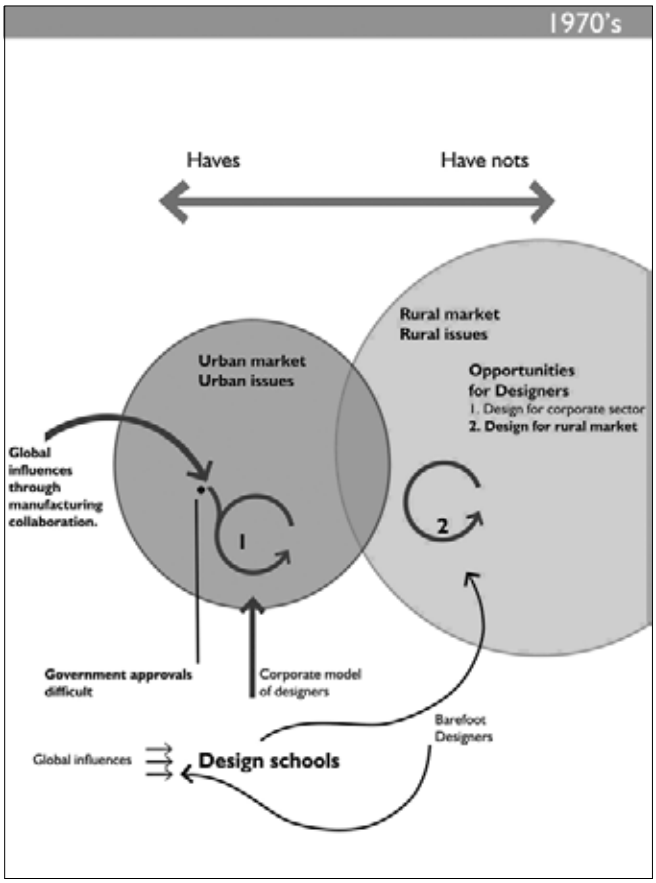


Figure 1: Design schools did a tightrope walk by combining the corporate model of designer catering to the urban manufacturing set-up and barefoot designer model catering to rural design needs.

New orientation meant partnering with technology development groups and engineering designers. However, the rather rigid structure of the design schools did not encourage such partnerships. Design schools continued to run their projects independently and could not adjust to the new agenda. A good opportunity was lost. In any case, the synergy was short lived. Globalisation in the 90s was to change all this.

There was also a negative side to this energy. Western design norms, products and standards of aesthetics tended to be treated as benchmarks by the graduating students looking for taking up the professional challenges. The design focus shifted from the grass-root to the hi-tech, from the idealism of the 70s to professionalism of the corporate sector in late 80s.

Internationally, it looked as if everybody had gotten rid of the 70s popular guilt of squandering resources. Nor were the issues related to poverty on the top of the agenda in design literature. Development issues of the seventies and the focus on the village level technologies and craft skills were not on top of the design agenda. Obviously, the disparities in income continued to widen. This has been discussed extensively earlier. (See Athavankar, 2002) In this paper we will mainly focus on the design opportunities that these two decades offered.

Design Opportunities till the 80s

Design schools did make serious and planned efforts to be in sync with the political thinking and educated students to take advantage of the design opportunities. Schools mainly focused on the first two opportunities, as it was consistent with the India-centric version that they were trying to evolve. Opportunity three was short lived, but four was also a focus for a short time.

1 Design for the corporate sector and mainly for the urban market

Indian industry was mainly a manufacturing platform with very low technology or design development capabilities. Except few who updated their design capabilities to meet the challenge of new product development, most of the companies initially went in for partnership with multinationals to bring in new products. The depressing effects of lack of free competition with global products on the industry and on design practice have been extensively dealt with earlier and are not repeated here. (Athavankar 2002)

2 Design for the rural market

Everybody recognized the need to add value to the objects that the masses use in their day-do-day life. There is a vast potential in this area that had been tapped only marginally. Design contributions in this area demanded that the product traditions are understood and not disturbed too much. Design schools did promote these ideas, particularly in 70s. The approach was a difficult option, not because of design challenges, but because the manufacturing of such products was too local and decentralized to plan any direct intervention.

3 Technology route to development

Based more on self-reliance idea, this opportunity seemed appropriate in some specific sectors like defence technologies and other sensitive areas, where the technology was guarded and not easily accessible. Designers were involved in some of the national projects then.

4 Designing for global export

With shortage of foreign exchange, it was identified as a key area. It was also an area that the government was keen to support through incentives. However, with most modern product development closely linked to technology development, developing world had a handicap. This approach was valid in product areas where technology was not a key determinant. Even now it is valid and is separately dealt with later.

Part II

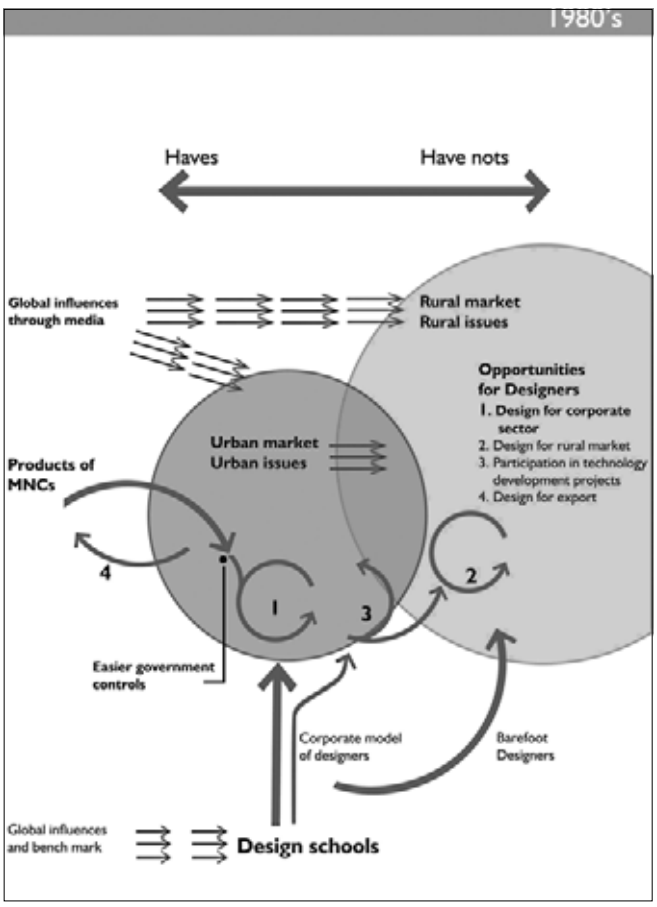
Responding to Globalization Wave

1990s Paradigm: Design challenges of open markets and free trade

Fierce economic compulsions and pressure of continuous market growth had started forcing the technologically advanced countries to seek new markets outside their geo-political borders. The process of globalization brought about several rapid changes in the international design scene. The modern business and industrial environment changed rapidly. Extremely competitive international markets created an intense pressure to be first in the global market and forced pace on new product development, prompting designers to adopt new technologies and techniques to curtail the concept-to-consumer time. Designers from the developing world could not have been immune to this pressure and had to quickly adapt to the changing scene. Though the designers were getting ready, the local industries, threatened by global competition, found survival difficult. It was a bittersweet experience for the Indian industry. (Jha, 2000) For detailed discussion on the way the industry and designers responded, see Athavankar 2002.

The globalization process induced several changes that had the potential to influence design approach. Global companies realized that future new markets would be in the developing world and wanted to push their products globally, but were not ready with new product responses to local needs of communities across the world. Most companies, with minor modifications, labelled their existing portfolio of products as 'culture free Global products' and marketed these products to the small, rich and already westernized urban segments in the developing world (see figure 3). This segment was anyway aspiring to become part of the global village, participate in the global economic activities and was too willing to accept them. With their newly acquired purchasing power, it was a bonanza for the urbanites. They benefited from the qualitatively superior and abundantly available foreign brands in the Indian market.

Figure 2: Hi-tech root ensured that western products were seen as benchmarks.



The global market itself went through some radical changes. With immigrations and international travel becoming common, coupled with easy communication, two opposite trends were becoming visible. The plurality, a common feature in some of the Asian cultures, started showing its face in countries that had kept their doors open to immigrants. These countries had also started showing distinct plurality and cultural diversities. The familiar correlations between objects, places and cultures had started rapidly vanishing and prompted people to become more conscious of their regional roots. With the result, they had started surrounding themselves with objects from the country of their origin to express their regional roots. The issue of expression of regional identities not only has the potential to become an important factor in traditional cultures, but also has the promise of becoming a new selling strategy at least for some products.

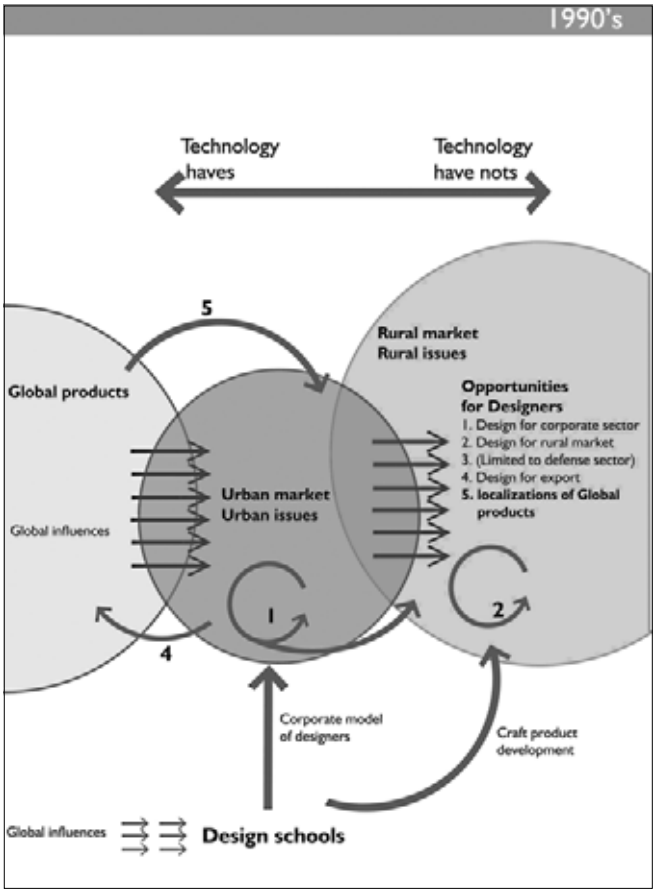


Figure 3: Localization, a new term, referred to redesigning the global product to suit the local conditions. In reality, it referred to minor changes to push the product in the local market.

Developing countries like India, because of the internal income disparities, faced peculiar problems. The divide between the rich and the poor was increasing at a faster rate. Besides the economic and social dimensions, the disparities now had newer variables like technology 'haves' and 'have-nots,' often also referred in 90s as a digital divide. The urban rich were comfortable with global products and even aspired for them. They quickly adjusted to the modern marketing, 'mall' culture and the retailing revolution that thinned the boundary between the product and the brand. While these privileged urbanites were 'online' all the time, there were large segments of population in the developing world, who were yet to get electricity connections. This vast majority could not afford the new technologies, nor could they relate to them. They have remained beyond the radar range of the global companies, at least till these companies realized later in the new Millennium that this is the market segment that will drive growth in future. For Indian designers, the country reflected challenging but desperately different contexts.

2000+ Paradigm: Globalisation - The India-centric Version

Feel-good and the Aftershock

Globalization and the open market economy showed some 'visible' signs of progress in India, with resurgence of industry and boom in IT related businesses. The then government was quick to take the credit and attributed this to their policies of open market. The result of the visible prosperity was more fondly called as 'feel-good' factor. It redefined the idea of progress at least for the urbanites.

The 'feel-good' campaigners missed the point that much of the real India had no access to these new technologies, nor did part of the benefits trickle down to them. A large part of population was left out of the globalization wave and its consequent benefits. When used as an election plank, the 'feel-good' slogan failed to convince the masses of the then government's idea of progress and development. The immediate political fallout of unfettered globalization and the open market was a democratic change in the government and the outright rejection of the 'feel-good' globalization. New political thinking did not support the idea of progress that focused on small section of educated urbanites, neglecting the larger cross section of people, who did not benefit from it and, in fact, suffered.

Income disparities had not vanished nor will they in the near future. In fact, with globalization, they have actually increased further. It is natural that the income disparities should reflect in the design agenda in India. The poor have little or no access to the benefits of new technologies and the online advantages. They have yet to see drinking water, continuous electricity at home or a blackboard in their schools.

New Slogan: Globalization with a Human Face

New political compulsions demanded that the policies, dealing with globalization or otherwise, should give the masses benefits in some way. It coined the phrase 'Globalization with a human face,' an act of balancing the benefits. On one hand, the government did not want to miss the economic opportunities provided by participation in the globalization process. On the other, it also wanted a part of the benefits and prosperity to be passed on to the masses. This duality suggested embracing and exploiting the opportunities of the open markets and yet ensuring that the new technologies benefited the masses. It was clear that India could neither escape 'globalization,' nor the 'human face' issues.

The new government's ambition was well spelt out in the recent speech at the Design Summit by the Minister of Industries (Kamal Nath, 2004). He made it clear that "First, the government wants the Indian products to come out quickly into the global market as powerful brands. Second, taking a cue from the role played by IT companies on the global scene, the government is now looking forward to develop India into a 'global design hub,' offering quality design services to global companies and ultimately make 'Designed in India' a major USP." Even when spelling out these ambitions, the human face of the globalization is not missed. For instance, in the same breath, the Minister states that the "government wants to explore the potentials and power of design to uplift the rural crafts to new hi-end products…" To ensure that the benefits of new technologies as well as the new markets are passed on to the rural areas, the government is willing to create the necessary policy framework. What are the new opportunities that emerge from this political dispensation?

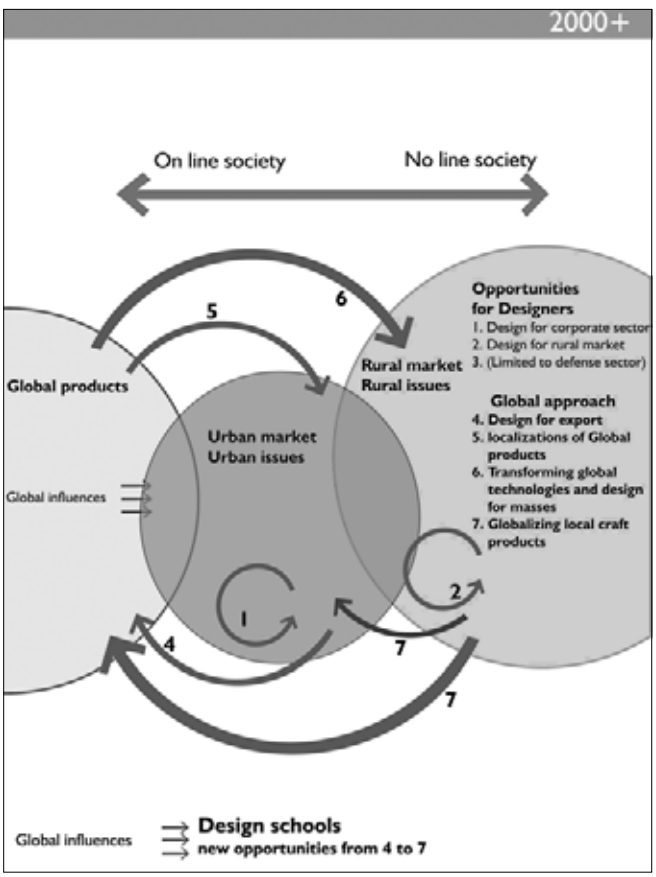
New Design Opportunities

Note that the first four opportunities were listed earlier in figure 2 and were available before globalization. They are shown in the figure 4, but are not discussed here again. Opportunity four is included as there is a substantial change in how this opportunity is viewed now. (See figure 4)

4 Designing for global export

This pre 90s phrase referred to identified markets in specific countries outside the country of origin. This idea needs to be redefined in the new context. As mentioned earlier, most the new product development continues to be closely linked with technology development. However, the handicap of the developing world in not having home grown hi-tech is not valid any more as they are free to source technology from outside the country. It should now be seen as developing yet another global product with almost no reference to the country of origin. In other sectors, where technology is not a key determinant, there is a distinct opportunity. This is separately dealt with under point seven.

Figure 4. New opportunities brought in by the 'Globalization with human face'. The future agendas of the design schools would have to emerge from these four new opportunities.



5 Localization of global products for urban markets

The urban market is under the current onslaught of global products. While a small cross-section among the urbanites aspire to buy global products, others have to adjust their lifestyle to match the capabilities of these products. Should not the global products respect local cultures?

Can a small design team in one country decide what other cultures need? Some companies do send small teams to study market or commission market surveys. Others find an easy route of asking local immigrants to comment on the appropriateness of their solutions. The process is often referred to as localization. These strategies are employed more to get rid of the guilt and are not as substitutes to the serious efforts required to understand the product needs of the new cultures.

Subsequent aggressive marketing of these products ensured that the cultural resistance is at least temporarily neutralized. However, it is not a good long-term strategy, nor is it likely to work when they tap the markets outside the urban areas. Global companies will have to create new product responses that meet the functional and cultural aspirations of the locals, often in partnership with the local designers.

6 Transforming global technologies and products for mass market

The real design challenges would come from this opportunity. Faced with fierce competition and low potentials of growth in their own countries, most of the global companies have started realizing that their future growth in the developing world will come from addressing the urban and rural middle classes. This is a price as well as culture sensitive market and to address this untapped market, integrated innovation is required in design, technology development and managerial strategy.

To make sure that the benefits of technology are accessible to masses and rural folks, one may have to re-look at the technologies to make them available in an affordable form, either as a product or a service. Precedents for such efforts are available in development works like C DOT's RAX telephone exchanges in 1980s as well as in current products like electronic voting machine, simputer and other affordable computing solutions. These are not just technology development opportunities, but also opportunities to develop new spin-off products that are specific to the cultures and skills.

Design schools could join hands with technology developers to develop products based on new technologies that this segment can afford. They could ensure that these products meet the needs and capabilities of the local cultures. Else, design schools can also team up with management institutions to conceive systems that make benefits of new technology applications accessible to masses as a service, thus making them affordable. Ideas like STD booths and Internet kiosks for villages have shown how unaffordable technology solutions can be offered as an affordable service than as a self-owned product, in turn generating a range of new product spin-offs.

In this sector, the new product opportunities will come as a spin-off of new technologies or business models. This can only happen by working in close partnerships with engineering and management. There is a need to bring these partners into design activity.

7 Globalizing local craft products

Another initiative is to use craft skills and materials, but the products are developed specifically for the urban and the global market, thus making a huge new market available to the craftsmen. Designers would have a major role because of their exposure to the global market and their understanding of changing global needs and trends. Besides, designers will be able to update the craft techniques to bring in some of the values of industrial products. The crafts sector is a very large employment generator and will benefit enormously by design intervention and low cost technology infusion. The Indian design practice and education sector cannot ignore the design needs of the crafts sector.

The problem of unemployment is not going to vanish in the near future and is as relevant to the development of the country as globalization is. Focus on global products through crafts will prompt the trickledown effect of globalization and show direct benefits to the craftsmen. It is important that such an activity is recognized as a legitimate 'Industrial Design' activity. Design schools, and to a limited extent, design practice, did address some of these questions since their inception. They have successfully networked with NGOs to develop grass-root level contacts. None of this work is irrelevant in the globalization era. In fact, it needs to be repositioned to meet the modern marketing challenges. Obviously, this area also needs new managerial innovations to organise production in such an informal sector. To achieve this, the partnership with management schools and NGOs is inevitable.

Part III
Design Education: India-centric and/or Global

Four decades ago, when Industrial Design education started in India, the design schools took inspirations from the Bauhaus and the Ulm school models and thus were somewhat international in content and structure. Since then, design education had been trying to find its roots within the country and its culture. Responding to the evolving political thinking and local issues, the schools gradually moved to become more India-centric.

Design practice and education has been catering to the urban markets; to a limited extent the rural markets by helping voluntary efforts of the NGOs in craft/product development and supporting export by participating in the corporate efforts to export products. In the first two decades, consistent with the then prevailing political thinking, the design schools continued to evolve by focusing on the first four design opportunities.

Since inception, the design schools have tried to stand independently. They have tended to interact with other disciplines on their own terms. This did make sense in the nascent stage of the profession as it ensured its identity and also gave visibility to the new discipline. Unfortunately we have continued this isolation even now.

The current discussion on globalization suggests diverse design challenges and a very different agenda for design practice and education. What would be the ideal way of meeting these challenges? Can design education come up with programme/s that creates designers who can take the new challenges? Should not the design schools respond to the new context and the pro-globalization political thinking?

Globalization has offered new opportunities that were earlier listed under opportunities 5, 6 and 7. We may also have to re-look at the way the opportunity 4 is being handled in the new context. Though all of them deal with evolving a global product in someway, it is important to recognize the differences in the challenges. They do share something common, but they also have their unique and different characteristics. Are we really ready to handle global products in each category?

Let us imagine for a while, that we are making a fresh start to design educational content. If we are given a blank slate (may be a digital slate!) how does one ideally educate a student to design for the global village? What principles should guide such a programme? To list a few that I consider important,

1 Acceptance of globalization and open borders as an opportunity.
2 Accept the prevailing political thinking, in this case,
    i making Indian presence conspicuous on the international design scene and developing India as a 'design hub,'
    ii need to give a human face to the violent changes with globalization, as a pointer for future directions in design.
3 Look for opportunities within the current pro-globalization political thinking and study how the profession can address its concerns about tradition and culture.
4 Commitment to the 'human face' of pro-globalization development and its implications.

I believe that the design approach to development of global products will be technologically and design wise opportunity dependent and would change for all the four new opportunities listed earlier (4 to 7). We will take a short detour to explore the new design approach required for evolving a global product and then return to study the impact of this approach on design education.

Developing a Global Product: New Issues

Designers are beginning to realize that designing a global product is an altogether different experience. Human needs and user interactions have always been a focus of design decisions so far. Suddenly designers are confronted with a situation where they are required to offer design responses to the needs of people and cultures that they have never seen, experienced or interacted with. More often, there would not be a single individual in the design team who would know and understand the cultures in which the product was likely to be marketed. How does one account for the differences in the requirements of the local cultures? Will a short visit to these cultures allow the design teams the depth of understanding of the local needs for an effective design response?

On the other hand, designers have always been conscious of the fact that they are involved in artifacts that will have cultural connotations. Design practice and educational programs have to recognize that the cheaper alternative of 'one world, one standard' design approach is

counterproductive in the long run and reflects the arrogance of hi-technology companies to make decisions for all cultures. Such thinking has actually shaken the premise on which the design profession was built. The global diversities in cultures are not easy to respond to without major developments in the process of design as well as the structure of design practice and education. It may demand developing a core product around which you could develop variations that respond to local cultures. These situations have started throwing new challenges and raising new questions that the design profession has never experienced before.

It is also known that design of global products involves not only very high investments but also high risks. The costs of understanding the market needs globally, costs of designing and manufacturing as well as of marketing globally, are very high. With the result, eveloping a product for a global market has become an expensive proposition. There is also a very high cost associated with failures. It is indeed bringing up issues that were never encountered before in industrial design practice or education.

Hypothetical Design Process for Global Products

If we continue to believe in the design profession's commitment in responding to the users, their needs and aspirations, then this idea should be extended to designing of global products. Conventional design process will never be able to handle such a complex task. This effort should be an integrated approach with teams in different countries working together. To remain globally relevant, besides being multi-disciplinary, the design team would have to be necessarily multi-cultural. To remain globally competitive, the teams will have to source talent, technologies and materials from across the globe.

The simplest way to visualize the idea of such teams is for national and international experts from design, engineering, manufacturing, marketing and management to form integrated design teams that undertake design projects for global markets. In this team with graded membership, primary groups would be mostly from other design background in different cultures; secondary groups would involve experts from backgrounds like engineering, human factors, manufacturing and marketing. Tertiary groups will include experts from related fields like sociology, ethnography, anthropology, psychology, and, of course, management. Understanding cultures and their product needs, offering design responses, technologies and marketing strategies will be the priorities of the design team in that order. The management teams will see these priorities changing and so would the engineering teams.

Each design and ethnography/anthropology group in different countries will try to present to the team the understanding of the design problem from the point of view of the local culture. To present the local context and to recreate the local experience in a way that the team players from outside the culture can understand and are motivated to participate will remain the biggest challenge. (Athavankar, 2004)

Depending on the perceived differences, the team may evolve a single product or a set of variants that respond to local needs and cultural practices. Teams from marketing and management can become part of the group initially during the conceptual phase and for developing culture specific idea of branding, packaging and marketing the product variants. Manufacturing team will join mid-way. Thus the interaction of teams and perhaps the roles of the team members will keep changing along the timeline.

Challenges in Working with Culturally and Geographically Diverse Teams

How would such a team work together, particularly when a large number of them had no opportunity to either see each other or predict each other's responses? How would they understand the cultural differences within the team or in the market segments? The real challenge would be more conceptual than practical. The design challenges would be to tackle the complexities of contexts in different

countries and the ability to recreate and present your team's thinking to others working at distant locations, so that they can participate effectively (Athavankar, 2004).

Answers to some these questions are now emerging gradually through current research in co-design and other design literature. There are also examples available in information technology (IT) area, where this is more a norm than an exception. IT took full advantage of connectivity and initially learnt on the job by implementing and later by planned action. Their experiences are worth tapping.

Not that everything is fine with the idea of partnership. In our pursuit of 'global,' we may have to certainly pay a 'price' and we must try and avoid falling in that trap. Because so many people would be involved in different capacities, the products may get reduced to the lowest acceptable denominators and can potentially become non-descript. It is difficult to visualize buildings like 'falling waters' or furniture like 'soft-pad' chairs coming out from such teamwork. May be I am wrong and I hope I am.

Developing a 'Global Design Hub'

If this could be one of the acceptable ways of developing global products, what will be its impact on agenda and structure of the design schools? Would such networking between design schools and other related schools help India become a 'global design hub'?

Global Networking of Schools

To become a 'global design hub,' the schools will have to move from being India- centric to become international and global in their outlook, content and structure, at least when training for global problems. Let us assume that it is possible to exclusively develop a school that would meet the challenges posed by globalization. What would it be? What is required is a new program and structure of design school that can effectively prepare students to participate in international teams. I call these as networked schools. (Notice the word 'design' is dropped!)

The design school programme could to be based on the following:

1 Integrated approach to design, technology and management.
2 Design project agenda that is in sync with the evolving socio-economic and political thinking.
3 Creating flexible contents as well as structure for schools so that they can respond to the changed environments quickly.
4 Project orientation with sensitivity to the cultural issues.

One of the goals of design education is to prepare the students to work on simulated real world design problems (see figure 5). The focus will be on teamwork, particularly where several geographically distributed designers working together as a team, a feature design students will find difficult to handle. Special efforts will be necessary to get the students used to this idea. There will be other problems that the teams will have to face. First, decision taking needs to be streamlined to avoid misunderstandings. It is never easy to get others to accept decisions through emails. Besides, the process of wide consultations between the teams may delay the design process.

It is fortunate that the globalization wave was also coupled with communication revolution making networking relative easy and extremely fast. It is possible to visualize the idea of the school as groups connected on the net and share teaching as well as facilities with each other, not as a measure of economy, but as a conceptual tool to understand other cultures. The focus is on interactions and assimilating influences. Depending on the courses being offered the groups within the design schools will choose to interact with groups in other universities. Thus Indian students would take courses in European lifestyle and culture, if they are required to understand the European market and vice versa. Truly global products will emerge through conceptual and working partnership between cultures. You can't become a global design hub without creating an educational system that caters to this goal. Opportunities 4 to 7 listed earlier need such networked schools, but the kind

Figure 5: Graphic representation of the idea of the internationally networked schools and the layered approach to school interactions.

of teams and the nature initiatives required will differ for all four opportunities. In some cases, the initiatives would have come from technology or management groups.

The ability to create group synergy will define the success of the network and its contributors. Schools could specialize by how they get connected to other groups and it's the nature of connections that will give the schools their distinct identity. Since schools will be branched in several countries, their 'physical' existence in any one country could be marginal. Schools could give 'joint global degrees,' which are not rooted in a single known university or a specific country. Ivy League design schools would obviously get replaced by Ivy networks.

A number of thinkers have offered a word of caution to such an open approach. It would lead to not only accepting global products but also the cultural baggage associated with it. They argue that the products and cultures are inseparable. All you have to do is look at the urban landscape in India. In fact, at one time I was also convinced of such a scenario. (Athavankar, 1997 a,b; Athavankar, 2002) I am beginning to think now that it was too hasty a conclusion. The experience has shown that these products get transformed when they start penetrating the mass market. Besides, by being in partnership with global designers, you have a chance of sensitizing the designers with local cultural issues and influencing their design approach.

I believe that the current structure of design schools in India has not been able to respond to the network situation and in fact work as a hindrance than as a facilitator to become a global design hub. Nor have the schools outside tried to attempt networking with the developing countries. Some design schools in the developed countries get their students to spend a semester in other countries. But it is only a small step that permits some sensitivity to the cultural issues. It does not necessarily prepare the students to work on global projects later as professionals.

Local Networking of Schools

Would the globally networked design programme conflict with the India-centric developments that the schools have consciously pursued so far? Would they be able to handle the non-global agenda of designing for local industry, craftsmen and working on local issues? And should the schools leave their pursuit of India-centric approach?

To imagine that all products will become global in due course will be grossly incorrect. Even in the global village, substantial part of design assignments will continue to be local in nature. Corporate work from local industries and for local markets (opportunity 1) will continue to be the mainstay of the assignments of the Indian designers in the near future.

If we agree to the idea of developing a 'human face' of globalization, the real villages not only would remain on the agenda but also generate new challenges. Therefore, the ideological underpinnings of the seventies need to be supported. Design schools must also educate the students to work with local village industries and craft technologies and cater to the local urban and rural needs. Besides, culture sensitive craft/product development directed towards the local urban market will remain on the agenda. These real village design projects will have substantial difference in the knowledge base, skill sets and technologies used. Similarly, the design schools will need local partnerships with engineering and management schools to learn to develop affordable technology solutions to ensure that the benefits of progress are accessible to the masses. Like in the global assignment, partnership and integrated approach will continue to be the two inseparable pillars of such locally networked schools.

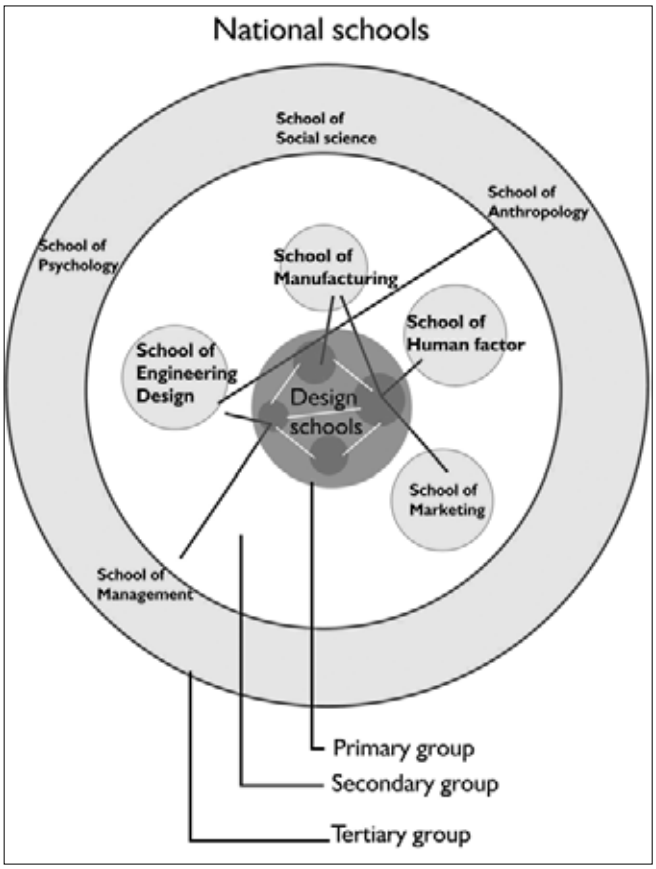


Figure 6: graphic representation of local interdisciplinary three layered network of schools

Though design schools in India are already involved in this kind of work, it does not mean that the current structures of the schools would remain valid in the new context. To ensure the much needed integrated approach, it would be consistent to develop partnership with design schools elsewhere, if you are globalizing the craft products (see figure 6).

Dilemma of the Design Schools in India

With globalization, there was a major paradigm shift in the political thinking. It is important to understand this new context so that you could create appropriate design education program to meet the new challenges. Yet, most schools in India continued their tightrope walk, hoping that they would somehow meet the new challenges. There has always been a phase difference between the political thinking and the school's project agenda. Should not the diversity generated by the new political thinking reflect in the structure of the design schools?

Exercising Choice

The design schools in India have two alternatives before of them. First, they could flex their scope and structure to include the idea of networked schools into their stride. The urban centred design schools, already shaped more or less in the European tradition, could easily shift their alignment to submerge in the globalization wave and develop networks, but they should not miss the point that they have to partner with anthropology, engineering R & D and management, which would play an active role in global products. The schools will have a dual face. They will use the international networks whenever they are working on global projects. On local issues, they will work with local partners in technology, management and NGOs.

The current programmes in India expect students to offer services to such diverse requirements. How does one train a student to design for global village as well as the real villages in India? Demands of the global village are very different from the demands of the real villages in India. This balancing act is becoming more and more difficult as the two, the global and the real villages, depart further. It is difficult to envisage how a single educational model can support these extremities of demands.

I believe that the current structure of design schools in India has not been able to respond to this situation and, in fact, works as a hindrance than facilitator. Though this is consistent with the tightrope walking that the Indian design schools are familiar with, none of the schools in India are prepared for this degree of change. I believe that with such diverse contexts and opportunities, the existing design schools are unlikely to do justice to these diversities.

The second alternative is to develop specializations in schools, where some schools will work only on global issues, while others will concentrate on local, urban and corporate projects, while still others will work on affordable technology products and some with craftsmen. Each will have the independence to develop partnerships with other disciplines based on the projects being handled. Perhaps the extreme disparities demand different kinds of schools with unique and different design approaches and skill sets. The second alternative is easier to conceive but difficult to implement, particularly for the existing schools.

We have already lost a substantial time. If we are looking for the human face of globalization, then design schools will have to make the choice quickly!

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Design Education & Design in Education: A Framework for the Future

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Teacher as a partner in learning is a very relevant modern progressive concept, particularly important in creative fields such as Design education. This is the subtlest yet most positive aspect of the learning method adopted at NID since its inception.

Design thrives on creativity and creativity is a delicate bird! The bird will fly away at the slightest murmur of authority. The existing university education method where teacher is only a giver of knowledge and skills, suffers from authority of the teacher. Such education only can produce at best, carbon copies of the teacher and it is difficult for growth of individuality in the student. His explorations will be limited and not free. It also inhibits another important quality of design profession – the ability to question the existing rules. It is only by questioning that one may break the rules, which is what creativity all about.

We often hear visions of India emerging as a great global power in the near future. I feel, there is vast potential for design education and design can play a key role in realizing that vision. This can happen only if we explore and utilize this vast potential. Then Indian designers can serve not only India but the world. To be able to do this we must consciously and determinedly remove the hurdles. Change the content to be relevant to future needs and exploit new technology and tools for the best they could give, in order to take design practice to new heights. Without this, tools of new technology will remain mere gizmos to play with like a child.

Design education should neither be dictated by the commercial interest of the market nor entirely driven by charitable social concern. It should be a good balance. In near future if India is not able to provide enough design schools for its young minds, the foreign universities will start their schools in India (the trend has already started). The danger then is that the pedagogy would be something of their interest, a vested interest.

Keywords: *subtlest, charitable social concern, explorations, balance, carbon copies, questioning*

Tradition of Learning Together

It is an Indian tradition in schools to start the day with the "Sahanau Vavatuh…" *a sloka* from *Purusha Suktam* of the Hindu sacred text – *Upanishads*. The most important aspect of this collectively sung prayer is "Saha" – meaning togetherness, and most significantly, the teacher and the student learning together. The teacher as a partner in learning is a very relevant, modern and progressive concept that is particularly important in creative fields such as design education. This is the most subtle yet the most positive aspect of the learning methods adopted at NID since its inception.

Design thrives on creativity, and creativity is a delicate bird that will fly away at the slightest murmur of authority. The existing university education method where the teacher is only a giver of knowledge and skills, suffers from authority of the teacher. Such education can, at best, produce carbon copies of the teacher; it cannot promote growth of individuality in the student. His explorations will be limited and not free. It also inhibits another important quality of the design profession – the ability to question the existing rules. It is only by questioning that one can break the rules, which is what creativity is all about.

The Tradition of Mentoring

In the ancient education system of India there is a tradition of "Guru Shishya Parampara" which is still practised in the training of pupils in classical music and classical dances. It is a vigorous and almost entirely practice oriented system. Its limitation is that only small groups of students can be trained. But its best aspect is mentoring than mere imparting some skills and knowledge; inspiring rather than mere instructing the student. In the increasingly mechanized and cold education system of today, mentoring has become crucial to good education. Some modern management institutions today are trying to introduce the system of mentoring in the management education. NID's attempt to achieve this in design education met with limited success initially when the student intake was small and teacher dedication was high.

However, over the years, NID has experimented and established its own traditions of design education. These noteworthy traditions have given it a distinct identity and have been adopted by several design schools in India and Pakistan that were established later.

Learning From the Past

India is one of the world's most tradition-rich countries, with nearly 5000 years old culture that is an infinite treasure of knowledge, resources and practised wisdom. India's pluralistic character has enhanced the richness of this treasure multifold.

The uniqueness of India is that modernity here has not replaced the earlier traditions but co-placed (co-existed with) it. Thus we have mostly living traditions and very few lost traditions. While researching lost traditions is a near impossible task in an oral culture such as ours, our living traditions are a great source of learning for designers. At NID, students of Textile Design and Product Design learn extensively from our traditions during their course in Craft Documentation. I see no reason why this cannot be applied to every field of design education. Students of Communication Design and Exhibition Design can learn equally much from investigating into the washer man's marks, temple clothes or folk performances of the living traditions. When modern management and political science is learning from ancient Bhagavadgita and Mahabharata, when computer science is learning from Vedic mathematics, every field of design can learn from related wisdom in Indian tradition.

Learning From the Living Environment

In oral cultures, most of the knowledge remains with the people in their ways and in the environment, without being articulated on paper. Indian design students can learn a lot merely by observation and study of these people and the environment. Besides, such study is also vital because it makes the budding designers' skills and creative abilities relevant to the society. In India, which is 70% rural, this means a study of the rural environments. It could be the study of common people in the cities and their methods of working. One of the best-known examples is the "Dibbawalas" of Mumbai, who have been granted 6 sigma rating in management. NID introduced this indigenous method of learning as "Environmental Perception" for the undergraduate level students. This could be useful for students at every level and must be made mandatory.

Flexibility in Learning

Creative learning such as learning design thrives on flexibility. In 1990 a curriculum review team lead by the author observed that there was a crying need for flexibility as the curricula in India are rigid and linear in structure. It recommended electives, departmental electives as well as open electives. At NID the open electives have been particularly successful because of their ability to bring together students of different disciplines and different ages, thereby effecting cross-fertilization. It has also enabled constant change of topics, change of teachers and facilitated experimentation. Some examples of these are 'Beautifully Bad,' 'Haha Hehe,' 'Restless Design' and 'Transcendental Design.'

Electives must happen regularly in departments as well as across departments in a planned manner and the student will graduate earning the required credits. This ensures graduates of different shades rather than graduates of merely one mould. Life requires designers in many shades, as problems exist in many shades.

Relating to Reality

Design is a practising profession. It is crucial in design education to continuously relate to the world outside as much as possible. At NID, this has been inducted in three ways:

1 By an increase in fieldwork. Nearly 25% of the learning time is to be spent in the field;

2 By undertaking in the classroom client sponsored real projects which are carefully selected to fit the required course objectives;

3 Comprehensive public presentations such as the pre-diploma show and open jury, where the public can view and react to the learning imparted at the institute.

The important thing to remember is that reality is not just the market reality. Good education must lead the market for the good of the society rather than be led by it to suit private profits. It must be emphasized that the marketing and business interests may or may not always be in the best interest of the people.

These time tested ancient Indian traditions and the carefully evolved NID traditions must be preserved and reinforced in the times to come in design education in India.

But how do we as design educators respond to Nobel Laureate V. S. Naipaul's criticism of 'Imported Design Education in India'?

Is Eames Report Relevant Today?

Nearly half a century after the 'India Report' India is no more what Charles Eames saw then, and his recommendations may not be any more relevant today. India is no more a post-colonial country with protective policies but a globalised country with liberalised policies. It may not yet be industrially developed, but a village dominated agrarian country. However, it is next to none in the use of latest technologies of space, IT, Telecommunication or services. In the past two decades alone India's increase in annual economic growth has been from 3.5% to 5.5%, literacy growth from 44% to 68% and increase in life expectancy from 50 to 65 years. Most important of all – the population has grown to more than one billion, nearly twice what it was when the Eames visited. Perhaps it is time that another India Report should be written, preferably by an Indian.

Alvin Toffler's Third Wave swept the world and new technology changed the face of the world and India. Design is the application of technology for human needs. How does design and design education address this emerging technology in future? How can the new tools be put to best use to satisfy new needs? Future design education depends on answers to these questions.

Coping With Numbers

Less than a dozen design schools are pathetically inadequate for a country with a population that is one fifth of the humanity. But merely starting a large number of new design schools is not the answer because such action will create only a large number of unemployed design graduates. Therefore, first and foremost, a strong demand for design should be created within the country. Designers believe that they are key players for the industry; however, people do not seem to have felt so. A design awareness at all levels – from the public manufacturing and service industry, to the bureaucrats and politicians — is a prerequisite. This could be done in a focused and sustained manner as below:

1 Higher Education

Introduce design as an optional subject in engineering colleges, polytechnics, IIT's and management institutions throughout the country. This will create a cadre of engineers, technicians and managers who can understand and appreciate design and can seek designers' support in their professions.

2 Primary & Secondary Education

In October 2004, NID, in collaboration with the British Council, conducted the first National Design Camp for children as an experiment. The results of this camp are very encouraging. The idea is a long cherished dream of introducing design at all primary and secondary schools in the country, so that every child grows up with creativity and problem solving attitude which are basic to design. This designer thinking would help the students in whatever career they pursue later in life.

Today visual literacy is increasingly needed to cope with the emerging modern communications and technology. There is demand by parents in industrially developed countries to make 'Design' an integral part of primary, secondary and university education.

England has shown the way by introducing design in their secondary schools and running a popular magazine "Designing" which showcases children's designs and makes the public aware of innovations.

Introduction of design education in schools has four distinct advantages:

1 Young children are more creative
2 Children have less un-learning to do compared to those who spend several years already in the rote-routing type learning which is entrenched in them.
3 Children are more in number, so design has the widest reach.
4 Such design attitude, if inducted early, helps not only in pursuing design as a career, but in any career specialization the student may pursue later in life.
5 Everyone is a consumer. Design input in schools makes everyone become an enlightened consumer.

But what about a vast majority of children who cannot afford to go to schools? What about the 80% villages where adults have no idea about design, but need it the most?

Barefoot Designers

Years ago I suggested a concept where chosen young boys and girls from villages would get a short crash design training at reputed design institutions. After the training they would go back to their respective villages and train others in design. Ideas and creativity are not limited to "literacy level and school education." The National Innovation Foundation in Ahmedabad with which the author is closely associated, gets a wealth of ideas every year from grass-roots people from all over India.

Changed Tools and Technologies

Form:

New tools, new technologies and new materials have already been changing the face of design. These must effect design in two ways: i) its form ii) its content.

Changes in form could be seen everywhere in the past decade or so. Exhibition Design was earlier a manual cut and paste job of panels and heavy installations. Now it is quick computer overlap printouts complete with typography text. Earlier only designers could make sleek presentation using slides. Now any computer operator can make a great presentation. Earlier, cinema posters and billboards used to be hand painted by artists. Now, there are huge standardized digital prints. From long local customization to quick global standardization, the form has come a long way.

Changed socio-economic contexts

1 India and China, with their huge human resources, are emerging as the major work force providers to the world both as migratory force as well as service force within the country. India, with its advantage of English language and liberal democracy, is becoming the world provider of BPO (Business Process Outsourcing) and services such as call centres. Some multinational industries have already started their operations in India. This will open major opportunities for design.

2 India's own service industries are blossoming in the major areas of tourism, health care, Yoga and spiritualism. The fast emerging areas that are unique to India are event design areas such as Wedding Design (from searching for a match to destination weddings), Ceremony Design (from religious rituals to death ceremonies), and Developmental Programme Design (from self-employment, rural health training to craft training).

Colours of Future

The colours of future for designers all over the world are Green, Grey, Blue-yellow and Black. They represent design for ecology, design for the elderly, design for the disabled (special needs), and design for the dark calamities — natural and man-made. They are the real and urgent concerns of the world's future.

To the earlier list of emerging areas of design demand, one has to add the following need areas that are a global phenomenon:

a&b Universal Design which includes the needs of the disabled, the elderly (who are 21st century's major consumers), children and the anomalous people.

d Sustainable and Ecological Design, particularly drinking water, which is a life necessity.

e Disaster Prevention and Management Design to deal with natural disasters such as the tsunami; and man-made disasters like wars, terrorism, riots, etc.

The content of Design Education must change to add all these new and urgent areas.

The Teachers

Long ago Bernard Shaw critically commented on teachers — "If you can, do; if you can't, teach." It is necessary to remember this as a caution because the trend today is almost proving him right. Good designers have no time for teaching. They do full time practice because design practice pays several times more than design teaching. An ideal situation would be to make it mandatory for every design teacher to practise and motivate every practising designer to teach regularly at a design school. This ensures continuing relevance of education to the realities of the society. Successful current practice rather than decades old education certificate should be considered real qualifications for a design teacher.

Secondly, a good teacher should conduct research and publish his thoughts on professional and pedagogical issues in national and international journals of repute.

Thirdly a design teacher must constantly develop case studies that are reality checks and convincing learning tools. Such case studies, however, should be not only success stories but failure stories too. It is usually forgotten that there is much learning in failures.

The Hurdles

In addition to the issues of quality, the other hurdles to future design education in India are:

a Poor infrastructure in general and in educational campuses.

b Lack of the important academic culture of debating on design issues and publishing in international journals of repute.

c Most importantly, misconception about design resulting from the distorted image created by fashion and fostered even by business journals. At the bottom of the pyramid, the people are too misinformed to send their children to study design as a serious and meaningful career. At the top of the pyramid the politicians and planners have ignored design education as a crucial development tool for inclusion in the country's Five Year Plans.

At present there is still a lack of strategic use of design in spite of much voicing by designers for the last five decades. This is perhaps because of the overlap of industrial design, engineering design, design management and product development. Designers training in non-linear and non-logical areas dealing with fuzzy problems, high levels of ambiguity, assessments that are "subjective, personal, emotional and outside quantification" makes design a subject that is far from being taken seriously.

Conclusion

We often hear about visions of India emerging as a great global power in the near future. I feel there is vast potential for design education and design can play a key role in realizing that vision. This can happen only if we explore and utilize this vast potential. Then Indian designers can serve not only India, but also the world. To be able to do this we must consciously and determinedly remove the hurdles. Change the content to be relevant to future needs and exploit new technology and tools for the best they could give in order to take design practice to new heights. Without this, tools of new technology will remain mere gizmos to play with like a child.

Design education should neither be dictated by the commercial interest of the market nor entirely driven by charitable social concern. It should be a good balance. In the near future if India is not able to provide enough design schools for its young minds, foreign universities will start their schools in India (the trend has already started). The danger then is that the pedagogy would be something of their interest, a vested interest.

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Specks of Light:

Musings on tradition, modernity and design education

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As a therapy for manic depression he cooks and creates books that he illustrates and sometimes writes. Currently he is working on a project that involves collaboration with traditional painters from Orissa, Rajasthan and Madhya Pradesh. He may be reached at IDC, IIT Bombay.

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The morphing of the Indian mindset in recent years, to the global view of the world, symbolizes yet another encounter between tradition and modernity. The contact between cultures is not however an unusual occurrence. The views of the Buddha date back to the sixth century B.C. but have found their way to the remotest corners of the world. Philosophers and thinkers from Jiddu Krishnamurti to Ken Wilber have continued this dialogue between the West and the East.

The interpretation of "design" as an activity where art meets science; the right-brain meets the left; where East meets West; the sacred meets the secular, necessarily implies that design is a dialogue. The new generation symbolizes the modern. The legacy it receives from the past symbolizes tradition. It is the dialogue between these that can lead to specks of light that is generated as dualities meet, transform and reappear as energy.

We live in a time that could be called the golden age of technology. This is a visible truth and surely does not need elaboration. To predict the changes that various technologies would bring to our lives would be at best, speculative. Thus while wanting to shape the future, it helps to understand not just the immediate past, but also a sense of the journey that we, as a people, have undertaken, over thousands of centuries. This can provide a perspective that forms the basis of any action-plan that seeks to shape the future.

The growth of a democratic structures require a sense of accountability and transparency and a need for systems and processes to handle complex exchanges and transactions. While the democratic ideal attempts to raise the collective sensibilities to a higher plane, it is the less visible aspiration of the spirit and its growth that also need to be fostered. This paper attempts to present some views in this regard.

Keywords: *cultures, design interpretation, transformation, future perspective, collective sensibilities*

An Invocation

To begin with I shall invoke a few words from the Mundakopanishad. The Upanishads are replete with poetic analogies that contain profound insights. Mundaka removes the super-imposed veil of ignorance that obscures our vision.

Dvau suparna sayuja sakhaya
Samanam vrksam parisasvajate,
Tayor anyah pippalam svadv-atty-
Anasan anyo abhicakasiti.

The transliteration in English, taken from the commentaries by Swami Chinmayananda reads thus:

Two birds bound to each other in close friendship, perch on the self same tree. One of them eats the fruits of the tree with relish, while the other (just) looks on, without eating.

From the London Diaries

On a recent visit to the science museum in London I came across the landing gear of an Airbus. It had so many parts that I was even more thankful that most of the time planes take-off and land safely. The text placed near the exhibit told me that the wheels were filled with nitrogen (If the tyres are filled with air the vapour in them is likely to condense at the sub zero temperatures at high altitudes). It also told me that the tyres were designed to land at speeds of 120 mph and needed to be changed after 300 landings.

The Two Faces of a One-billion-people

The India that shines

Beginning work in 1985, the Aeronautical Development Agency (ADA) of India, on the 4th January 2001, succeeded in flying a lightweight supersonic combat aircraft (the LCA). India has, therefore, demonstrated her capability of producing flying machines that can defend her but is far from creating huge buses that can fly like the Airbus or the Boeing 747. Flight, navigation, wheels that allow a return to the earth, and good brakes, all of these represent an understanding that comes to us from the West.

In recent times, the magnificent mastery over matter is almost entirely an achievement of the West. The same understanding is reflected in art and design, through excellence achieved in the creation of bridges, chairs, and more recently chips, computers and cellular phones. Innovation and design in this sense, to put it across without grace, is simply not the stuff that India is as yet capable of.

Detailed documentation of processes is symbolic of the ordered and systematic approach that is typical of the West. Being an oral culture, written documentation is anathema to the Indian. The predominance of books, journals and publications from the West in academic libraries and knowledge management centres clearly reflects this. Most Indians seem to have an innate understanding that all meaningful knowledge is not to be written down but lived. The image that India presents to the world is of a functioning anarchy, where processes, systems, and standards are files that are meant to gather dust, rather than serve to regulate and improve the life of people.

Proclamations such as "ISO 9002" certified are indicative of the difficulty that companies struggling to change this perception of India confront when dealing with clients from over the world. The complicitous assurance of the shopkeeper selling a fellow Indian some "phoren" made product and the conspiratorial grin of the thankful customer provides us with a revealing glimpse of the Indian psyche.

Arindam Banerji, in an interesting article "Can India produce billion-dollar innovations?", observes that India has made rapid strides in the world of research and development in the last few years. He goes on to question: "Are its (India's) innovations world-beaters? In an era that has been dominated by American innovations, can Indian scientists and technologists make a lasting impression? What will it take to institutionalize innovation in India? Banerji concludes by saying:

"This century is India's: innovation on a large scale is a way out of many of India's miseries. Now the question is: who will do this? Here, I can simply hope and pray that organizations like the CII, FICCI and Nasscom step up to the plate. We all would like to see the next cellphone-like society-transforming invention to come from an Indian corporation or university. After all, if our pharma scientists and doctors can make a similar impact with AIDS drugs and HIV vaccines why not in other areas? Why not in India, really, why not?"

Similarly Subroto Bagchi in BusinessWorld says, "India is on the cusp of interesting new times... we have the golden opportunity to present ourselves as designers of monuments, not suppliers of granite."

Banerji ends his analysis with an exhortation. Bagchi too captures the newfound vitality of the young Indian. The realities of global competition seem to have stirred something deep down in the psyche of the Indian people, familiar for years to passive submission and acceptance or at best an accommodative absorption of views that were distant from its own. What one encounters in the youth of today is an ebullience bordering on aggression that they can indeed change the squalor around them. As such a confident assertion replaces diffidence and the promise of economic upliftment spurs entrepreneurship. It is little wonder that this vibrant peninsula along with its

counterpart China has suddenly acquired attention from the world over. Indeed the humongous population, which at the same time is a weakness and strength, infused with a dream becomes a powerhouse and an exciting new prospect.

The other face of India

Buoyed by such currents the previous government had launched a campaign that sought to project India as a nation that was shining. The campaign backfired, for even today there are millions who live in conditions that are abysmal.

Udit Raj, in an article on the plight of Dalits, people who are so low in the still prevalent caste system that they are denied a ranking altogether and perform the tasks that nobody else does, says: "Dalits fight tsunami daily. Caste continues to be a social catastrophe in India. What is more surprising is that the government initiated separate camps for Dalits and others. Is this in the spirit of the Constitution, which says that the state will not practise any kind of discrimination on the basis of caste, creed, sex and race. Human beings don't just need to fill the belly, cover the body and have shelter. Human beings require respect, dignity, and generosity too, and the absence of the latter reduces them to the level of animals. If humanity does not exist, how humanitarian is it to serve tsunami-affected people? Let them be like any other creatures of nature."

Gurucharan Das, in his account of social and economic revolution in India, concludes by saying that India could do well to bypass the industrial revolution and aim for the knowledge revolution as typified in the burgeoning IT industry and its glass and steel architecture, and an increasing awareness of patents and intellectual property. Such a view does seem to agree with the cliché that matter and its phenomenon is best understood by the West; and India would do well to leave this to them and focus instead on what it does well: the realm of the mind, on knowledge building.

Das observes that "India offers a spiritual guide to the art of living" and spirituality is something that even the bold and the beautiful, the rich and the successful turn to at some point or the other in the course of their lives. In the same breath he mentions that the pursuit of the "Indian way of life" can be no excuse for a hardheaded, rational approach to solving our problems of poverty, illiteracy, and disease."

This is a snapshot of present day India. Weighed down with the billion many of who are far from the luxury of leisure and choices, and almost paradoxically buoyed up by the newfound zest of the middle classes. It is good that the hangover of the socialistic approach of Nehruvian times still lingers, for it shows a concern for the less privileged. At the same time the new found stature accorded to the creation of wealth, the determination to work hard and play hard, is a quality that the young Indian of today is no longer ashamed of. Indeed the transparency of hidden desires paves the path for a deeper understanding.

In this sense the engagement of modernity with tradition holds great importance. America was a new nation when it decided to build itself. Through honesty, effort, respect accorded to those who laboured, it built itself into the most powerful nation of the world. The zeitgeist of our age might well be the hand of Midas that has touched America so that America became gold. The hand of Midas reaches out next to his daughter, India, who begins to glitter and shine. If India's heart becomes a heart of gold where shall we find a heart that bleeds?

For, a sense of compassion and tolerance has been India's strength. India has a history of understanding and absorbing the "other", which a great nation like America, sadly lacks. India has a history that is several thousand years rich. The direction she chooses to take should be guided by the glow of that knowledge.

A Brief History of Design Education in India

There is a legacy bequeathed to the new generation of teachers by their teachers who had a commitment to values that were traditional and grounded. Inspired by the call to build "temples of

modernity" dams as well as design schools were visualized as places where a community of designers could build a new India.

The two principal centres for imparting design education were the National Institute of Design at Ahmedabad and the Industrial Design Centre at IIT Bombay. Graduates from both these schools are sought after by the private and public sectors, as well as by various NGOs working in crafts, education, rural development, and urban planning. One key feature of the education provided in these institutes is to lay a broad foundation through various problem-solving methodologies. In addition the education has emphasized the need for holistic outlook through sensitizing students through an exposure to films, arts and crafts. This has been possible through the sustained and committed efforts of design teachers and educators.

In the sixties and the seventies educators were enthused by the prospect of building a new nation. After fifty years of Independence, educators once again face a new nation. The growth of the middle classes has brought about a shift in the socialistic policies that shaped the years after Independence. However, there are still large sections of the society without basic amenities. The governance of a country like India is truly a daunting task. Any criticism must be in the light of this Herculean task.

The liberalization of economic policies in the nineties led to a turmoil. This had its echoes in the perception of the role of design. The information age and the proliferation of personal computers, networking and Internet led to a demand for computer savvy designers. Digital transformation created platforms that required industrial designers, typographers, photographers, film makers, animators to be conversant with the computer. While the computer was touted as just another tool, it slowly became an omniscient presence. The resources of the Internet came to substitute the usage of the library.

As teachers struggled to come to terms with this new wave, students took to the new tools with greater ease. An invisible perceptual shift took place. A generation that had grown up composing lines of text to compose a page found a new generation that could squeeze and distort fonts without a tinge of regret. The hours spent in developing a curve by polishing plaster were replaced by the slick imagery of modelling software. Those inclined to illustration turned to tweaking vertices in virtual character studios. The demand for computer-based applications led to the development of user interface design. The same principles that underlie the design of images and text on a page came to be applied for human computer interfaces and websites. New words like "user experience" and "usability" replaced "aesthetics", "form" and "function".

Outsourcing of business processes and backend work created new employment opportunities. Animation studios sprung up in many places as the requirement for cost effective skill-sets led to a beeline for animation learning. A similar trend was also apparent in the requirements of the IT driven design. Responding to the new realities created stresses as traditional and modern ideas about design clashed in conference rooms. In the traditional view "experience" played a key role in the learning process. The student was invited through an interaction with diverse people and materials to develop a view of the world. Amongst many who spoke up for the "new design" there was recognition of the old values, but only in passing. The urgencies of the new era required new approaches. Discussion forums became venues of exchanging ideas. New programs in design were started at IIT Delhi, Kanpur and Guwahati. The National Institute of Craft and Design was started at Jaipur. The Shristi School of Design in Bangalore, Symbiosis in Pune and various other private schools reflect the growing need for designers in India.

Challenges for Design Education

The challenges ahead are discussed as having two principal directions. The need for better systems and processes in design education and the need to foster an atmosphere conducive to creativity and growth through a robust education in arts, crafts and design at a primary and secondary level as well.

Building organic systems and processes

There are larger numbers who flock to design schools. The pressures of excellence and survival at the workplace are sharper. This alters the priorities and mindsets with which students embark on a career in design. There is a demand for more teaching that is specialized and "focused". This has led to the splitting up of design teaching into specialized areas. There is, at the same time, recognition of interdisciplinary and collaborative approaches.

This necessarily implies efficient systems of information and organization so as to facilitate the teaching of design. The task of bringing about proper systems is not a mechanistic one and necessarily calls for dialogue and an accommodative spirit. When resources need to be shared it calls for even greater degree of interaction between the participants to ensure that systems that are evolved serve the purposes for which they are devised. The imposition of systems without participation of the community of designers is often a cause of stress and discontent. Paradoxically, systems require a much greater need for patience and tolerance.

Websites and publications become important mechanisms to project institutions in the correct light. Guilds and societies for promoting design become essential for influencing policies adopted by industry and the government. Mechanisms of trade between nations are also based on the manufacturing, industrial and aesthetic sensibilities. India has built a reputation for intellectual strength and expertise. The analytical bent of mind finds expression in the huge numbers of software professionals.

Design required by the manufacturing industry lacks a track record of any great degree of vitality. Industrialization was adopted by India much after it took root in the West and lags behind greatly in this regard. Whereas there will be a certain demand for innovation in design by the industrial houses, India is far from being a leader in this field. In recent history, the exploration of matter has been the playground of the West. The increasingly material culture will certainly bring about a change but this will require changes in our approach not just to design education in schools of design but at the level of primary and secondary education.

Fostering links between arts, crafts and design

There has been a discernible divide between the arts, crafts and design, not just in India but the world over. This superior status accorded to the mind over tasks performed by the body, to the intellect over skill, is a malaise that afflicts most modern societies. Whereas the dignity of handling matter in the West ensured a connection between the manual and the intellectual, the Indian attitude to the material world and manual tinkering as lower order tasks than the journey of the mind, led to a compartmentalization of education. Even now art, craft and design are often viewed as separate activities in India, with a certain step-motherly treatment meted out to practitioners of arts and crafts by the relatively "high-brow and happening" field of design. The practitioners of art and craft in turn have viewed the self-proclaimed superiority of designers with a certain distaste. Such a mutual distrust and suspicion has helped neither design, nor the teaching of art and crafts. It is imperative to build bridges between centres that impart art, craft and design education through student and faculty exchange programs. It is the spirit that connects the two realms of mind and matter. The subject of the three graces, painted by Renaissance artists is also interpreted as the third quality that held together two divergent inclinations.

Whereas the fine arts have explored the subtler realm of the spirit, craft has implied a high degree of skill learning, design has been viewed as a tool that provides an edge to products in a global market place. The design intervention in crafts has also been similar. The realities of the marketplace, leading to a development of mechanized tools and production methods, have sought to create a new idiom for craft activity. This approach necessarily upsets something integral to the craft activity and this is the personal involvement of the craftsperson that is at the same time inspirational, intellectual and skill based. Dissected by the designer into components and processes, with an eye on meeting steady supplies, reflects the reductionism of analysis that is highly critical and no different from the bent of mind that looks to innovation of new and better designed industrial products, consumer durables, entertainment software forms for a different sort of a marketplace. Indeed it is

such a tendency in the arts that has led to protest forms such as "Dada-ism" and more recently site-specific installation art that could not be possessed.

Indeed the activity of "design" has come to be linked with profit that very often design, ends up missing the point altogether. It is important that design does not forget the spirit at the heart of things. For an African sculptor, a mask was not just a decorative piece, but was imbued with significance. For a calligrapher, a letter was not just a font that suited some specific application, but a breathing entity.

Specks of Light

I shall end by recounting a story from the West. It is the story of "The Little Match Girl" that was animated by a student at the Industrial Design Centre, IIT Bombay.

I shall tell you briefly the story of the making of the story. In our initial round of discussions with students when they begin their project the initial statement by the student was to do an animated film on a story by Hans Christian Andersen. It was my suggestion to the student that she chooses a story that was closer to our own surroundings. There is at times a tendency on the part of a teacher to instil a value that seems so important to instil in a student. I felt that I should impart the lesson about reading and researching and at the same time another lesson of being open to the realities that we saw around us. "Why not an Indian story?" I suggested. "Are our libraries not full of books and magazines from the distant West. Are you aware how insidious is the conspiracy underlying the films from Hollywood?" However when the student suggested that she would like to take up a story called "The Little Match Girl" I immediately relented. It was a story that I had read and a story that had reached out and touched me. Sure someone in the West wrote it but I saw the story in life around me; at traffic signals where children come and touch your knee for money for a meal. I also remembered an insight that I had read. "Animation" it said, "is not so much about moving things as about moving people."

It strikes me that some stories transcend the borders that we create. These are stories that spread specks of light.

Conclusions

Beauty draws people towards it. It is not just writers, artists, musicians and designers but just about everyone is drawn to beauty. Designers have often sought to measure beauty, for indeed beauty can be measured. And yet there is something about beauty that is beyond measure.

There was a time when the formal was considered beautiful. Then came a time when the functional became the beautiful. But the spirit has always been beautiful.

The challenge for design education is to infuse systems with a spirit that transcends the borders and divisions created by insecurities of various shapes and sizes. Creativity, imagination, but above all, a sense of tolerance and generosity has to be present so that centres that educate are centres of energy, warmth and light.

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Let's be Creative about Design Education:

Let a billion flowers blossom

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Manmade environment is not homogeneous, it is heterogeneous yet harmonious with integration of different levels of creation. Design evokes creativity, yet there is the danger that in design education we may be seeking a singular pedagogy, to be repeated and replicated in all design schools. In this paper it suggested that such a concern is impractical and dangerous. It is important that designers with different approaches to designing be encouraged if we are to produce design manpower that is capable of integrating themselves into a design super organism needed to handle the complexity of contemporary man made environment. It is important that different design schools cultivate and develop their own unique approaches to designing of product, systems, services and environment. This uniqueness could stem in the core and peripheral intelligence that we may develop in the design programmes, the type of case studies and projects that the programme encourages. Then there could be programmes that specialize in the perception of current and emerging needs or with forecasting emerging physical building blocks. Then there could be programmes that are concerned more with styling or ergonomics, or with computer aided design or with design methodology. Further that could be differentiation in the design programs concerns with crafts industry, SME, or with global markets. If design is to flourish then design education must become creative unto itself. Only then design can blossom.

Keywords: *harmonious, integration design manpower, singular pedagogy, design super organism*

Design is a magical world. It inspires imagination, expectations and hopes. It also embodies a desire for self-actualization and spurs people into action. It unleashes a desire to do something, to improve oneself more than that seems possible with what is available. Imagining, conceptualizing, configuring, exploring, evaluating is very much inherent part of the mind, and it is at its peak in human beings. No wonder human culture is distinctly different from that of other species, in the way it creates and transmits its culture. Designing is very much an innate part of the human mind itself. And so is the desire in man to design and structure his environment. The rationale for this is best understood in the instinctual biological instability and the consequent feeling of insecurity in man. This provides motivation for man to structure an environment, of beliefs, knowledge and theoretical structures, objects and practices. There is also an effort to create consistency and compatibility among these different levels of human creation. Peter Berger provides a theoretical framework for understand the dynamics of man-made environment.

> "The fundamental dialectic process of society consists of three moments or steps. These are externalization, objectivation, and internalization. Only if these three moments are understood together can an empirically adequate view of society be maintained. Externalization is the ongoing outpouring of the human being into the world, both in the physical and the mental activity of men. Objectivation is the attainment by the product of this activity (again both physical and mental) that confronts the original producers (and other participants) as a facticity

external to and other than themselves. Internalization is the reapproriation by men of the same reality, transforming it once again from structures of the objective world into structures of the subjective consciousness. It is through objectivation that society becomes a reality sui generis. It is through internalization that a man is a product of society."

With the advancement in sources of energy, materials, processes, mechanisms, control systems and the associated new possibilities in fulfilling needs in new way, design becomes the crucial link. Yet in India design has remained premature both in its capacity and capabilities. Other professions in India have been advancing much more rapidly than the design profession itself. This has only resulted in other professions becoming service and support structures to foreign design paradigms. What could be the reason? As designers we all know that when we view any problem or its solution too narrowly then we are neither able to feel the problem correctly nor are we able to muster the appropriate design response.

Designing any product, systems, services or environment requires viewing the proposed configurations from many different viewpoints and concerns of many stakeholders. The high cost of inadequate consideration from a viewpoint or concerns of a stakeholder can result in unacceptable costs and risks. No design education program or for that matter no designer can have the capability of a holistic visualization that is also quantified in its adequacy. Designers with different perceptions and capabilities have to work as teams, which can be, viewed a macro design organisms. Design education as such has to be viewed not as a singular paradigm but a polarity of approaches working harmoniously. As the man made environment increases in complexity and costs of errors increase, it will become essential to integrate specialist designers working together to conceptualise new and evolving product, systems, services and environments. The possibilities in design education and many. Let's consider a few so that we can create designers who are complementary. It is when we integrate complementary into a whole that creativity flourishes.

Design Intelligence: Core & Peripheral

H. Gardner proposes seven primary forms of intelligence:

- Linguistic,
- Musical,
- Logical-mathematical,
- Spatial,
- Body-kinesthetic,
- Intrapersonal (e.g., insight, metacognition) and
- Interpersonal (e.g., social skills).

Each one of us possesses all seven types of intelligence but in varying degrees. All forms of intelligence have one basic function: to conceive viable configurations and relationships and subject it to evaluation.

Every profession emphasis its preferred set of intelligence from among the seven articulated by Gardner. The training and educational programs are structured to hone that selected set of intelligence.

Ceramic and Glass Design	Body-Kinesthetic
Architecture	Spatial
Engineering & Science	Logical-mathematical & Body-Kinesthetic
Mathematics	Logical-mathematical
Philosophy	Logical-mathematical & intrapersonal
Industrial Design	Spatial, intrapersonal, body-kinesthetic
Engineering Design	Logical-mathematical
Production equipment Design	Spatial & Logical-mathematical
System Engineering & Design	Spatial, Logical-mathematical & intrapersonal

Professionals possessing other intelligences in addition to the core requirement can considerably benefit from the same and can have an edge over their peers. Physicists can benefit from musical intelligence. Chemists can benefit from spatial intelligence. Engineers can benefit from spatial and interpersonal intelligence. While not undermining the importance of core intelligence, any education program should provide opportunity to hone other types of intelligence and produce better professionals. Such professionals are more capable of teaming with professionals from other disciplines. Deficiency in one type of intelligence can be considerably, often fully, compensated by other types of intelligence.

History has numerous examples of engineers making great architects, architects making great product designers, mathematicians turning into psychologists, school dropouts becoming leading inventors. The greatness of any professions lies in its ability to recognize professionals with achievements through unorthodox routes. Any profession that is unable to do this will only deteriorate into priesthood.

Case Studies & Projects

The next level of differentiation can emerge in the type of case studies that the educational institutes use to illustrate excellence or for problem solving. Design institutes can vary a lot at this level. Art based design institutes have an entirely different emphasis as compared to engineering based design institutes. Different institutes could have very different concepts of what is good design. Still others may have no single concept of design and could all the time be exploring what is design.

In the field of Industrial Design new product configuration could be created under different constraint situation and optimizing criteria:

Design of new configurations with the same layout of internal components.
Design of new configurations by changing the arrangement of internal components.
Design of new configurations by changing the technical specification.
Design of new configurations by inducting new technologies.
Designing a product to create a new relationship in system of products or alter its performance.
Designing by negating, by removing or subtracting.
Designing by adding, proliferating or multiplying.
Designing for long life or for obsolescence.
Designing for integration or for differentiation.

Every student prefers as to where he or she would like to operate. So does every educational institute and for that matter every culture, and this could vary from time to time.

To promote design in any culture it is important that we should be open and accepting all expression of creativity. Unless we can do this design can never flourish. Parochialism and partisanship will only prevail.

Design centred around perception of needs

Perception and detailed identification of need could be made the foundation of Design Education programs. The design program under such a situation could acquire a very different character and will have immense popularity among business leaders. Maslow provides a starting point for understanding human needs. The characteristics of these needs change as we progress from an individual to a family unit on to village, to city or the nation. As larger social units emerge they start dictating the pattern of fulfilment of need at the lower (smaller) levels.

Hierarchy of Needs (1990's eight-stage model based on Maslow)

Biological and physiological needs
Basic life needs - air, food, drink, shelter, warmth, sex, sleep, etc.

Safety needs
Protection, security, order, law, limits, stability, etc

Aesthetic needs
Beauty, balance, form, etc

Cognitive needs
Knowledge, meaning, self-awareness

Esteem needs
Achievement, status, responsibility, reputation

Belongingness and love needs
Family, affection, relationships, work group, etc

Self-actualization
Personal growth, self-fulfilment

Transcendence
Helping others to self-actualize

Spiritual fulfilment
Realizing oneness with creation

At the cultural level services have to be created to ensure that needs can be easily and efficiently catered to for a very large number of people concentrated in a small area. Mother's milk, which is just sufficient for a single baby, can find support in cow and buffalo milk. Dairies emerge. These in turn give rise to mother dairies and milk booths to feed entire cities. A whole new range of products and systems has to designed to cater to requirement of these emerging method of fulfilling needs. Then there can be a situation where the services can fail or the services cannot reach. Here is a new need. New products have to be developed for such situations. Condensed milk, powder milk may become an answer for which new technology and products have to be developed. Then surplus milk can be modified into new food items to act as an accompaniment with other meals. Ice cream, curd, sweets are invented and with that a whole new range of products emerge. Once the concept of packaged milk becomes viable, then packaged soup and packaged juice and other drinks is only a logical next step.

Similarly all biological, physiological, safety needs are institutionalised and services are developed to ensure reliable and steady flow of amenities. Cyclic assurance of such well-being is enough reason for celebrations and thanksgiving. Festivals are celebrated. An even newer set of products filled with emotional expression is created. Such acknowledgment of success is also celebrated at the individual and family level.

Similarly aesthetic, cognitive, esteem, well-being and love has to be assured through ever new and better products, systems, services, environments and institutions. Stages of attainments are shared and celebrated. This happens from individual to cultural levels.

Self-actualization, transcendence, and spiritual fulfilment are stages of growth that throw up creative leaders in any culture. These are very important to cultural growth and self esteem and are well supported through product systems, services, environment and institutions.

Overall high order of well-being can generate interest and often dangers to and from other fellow beings. New products and services are created to handle opportunities and contingencies. This can also happen from across the borders. This in itself leads to newer sets of product systems, services, environment and institutions.

Maslowvian model, when viewed in the context of characteristics of viable system framework can provide a useful starting point for the understanding of the evolution of needs. Any individual or culture behaves as a viable system and creates product systems, services, environment and institutions for its well-being.

Individuals and culture will constantly strive to enhance its well being and as such strive for ever new product systems, services, environment and institutions.

A framework for delineation of changing and emerging needs can become the focal point for a design education program. The parameters for specifying the need and assessing the opportunities are the million-dollar challenge.

Design evolving from forecasting emerging physical systems

There could be another focal point for the development of design education. Men lacking in omnipotence cannot create out of nothing. Therefore designers will operate by bringing together already existing elements into a new and distinctive relationship to each other and thereby creating a resource that is new and often propels a new matrix of growth (Das L. K. 1977) developed at length the importance of energy, materials, structures, process, and control systems as elements of the matrix of physical realizability of man made environment. While existence of these is necessary condition for the coming into being of new products, it is not a sufficient condition. A need and an associated product must continue to prevail for development in each of these elements to impact development of the product itself.

Mooneyham J. R. in his website on 'An Illustrated Speculative Timeline of Future Technology and Social Change' writes:

> "In around 60 AD the Egyptian scientist 'Hero' holds the concept of the steam engine. If this concept were to be seized upon and suitably developed now, world technology could be advanced by over 1600 years in the fields of self-propelled vehicles, water pumps, and more, compared to what actually transpires over coming millennia. The wheel, principles of mechanical leverage and hydraulics, crafting of aluminium, cast iron, copper, certain elements of chemistry, and more are all available at that time, in addition to the steam engine idea, but no one integrated these elements into a coherent whole." (http://www.jrmooneyham.com/lostcv4.html#section49)

Having an idea together with the resources is not enough. What is also needed is a large number of people desiring, wanting, and working for it simultaneously.

Persistence of a need, for a sufficiently long period of time is a prerequisite to evolutionary change even in the man made world. New forms of energy and associated supply sources have created opportunities that have influenced the design and development of new product and services. Transportation was always an important need. Vehicle was a fundamental product to fulfil the need. Developments in energy sources were important to the development of transport vehicles.

- Manually driven wheeled carts
- Horse driven wheeled chariots and carts
- Buoyant hot air balloons
- Steam powered railroad locomotive
- Gasoline-engine automobile
- Zeppelin air ship
- Motor-driven airplane
- Petrol fired jet aircraft
- Electric vehicles
- Nuclear powered submarines
- Hydrogen powered space flight

Our ability to pack and deliver more energy has brought about phenomenal changes in the speed of travel and the distance travelled.

Consider another fundamental product. The wheel — without it there would be a no carts, no carriages, no bicycles, and no cars, not even the aeroplane that flies in the air. The development of wheels was prompted by development in materials, new structural understanding, process of manufacturing and development in control systems to manage high speeds and heavy load.

- The oldest wheels were wooden disks consisting of three carved planks clamped together by transverse struts (Structural development).
- Spoke wheels appeared about 2000 BC, when they were in use on chariots in Asia Minor (Structural development).
- Later developments included iron hubs (centre pieces) turning on greased axles, and the introduction of a tire in the form of an iron ring that was expanded by heat and dropped over the rim and the ring on cooling shrank and drew the members tightly together (process development, structural development).
- Metal spokes wheels (material development, structural development).
- Solid rubber tyres (material development).
- Pneumatic tyres (material development, structural development).
- Nylon and steel reinforced tyres (material development, structural development).
- Alloy Wheels (material development, structural development).
- Composite wheels (material development, structural development).
- Wheel balancing systems (control system developments).
- Online tyre pressure and temperature monitoring systems (control system developments).

Similarly developments in steering system, engine, braking system, suspensions, seating, safety aids, method of manufacturing, method of presenting details of components for manufacture influenced the style and performance of the automobile.

Design centered around Ergonomics

Ergonomics or Human Factor Design has been an important concern in Design Education. It is feasible to make Human Factor as the primary concern. This has resulted in very challenging and innovation design education programs to be created. Universal Design receives the spotlight in this respect. College of Design, North Carolina State University has a design program where people and all people is the central theme. The strategies they employ enable students to gain an awareness of the issues of all people as part of a continuum of life experiences including those who are temporarily able bodied, those with permanent and temporary disabilities, and people who are older. Students are encouraged to understand that there are design implications when meeting the needs of people with different abilities. Students will understand the natural range of human performance that can include variances in sight, hearing, movement, and thought processes. Students will also understand the importance of considering a range of ages in design problems. It is a very important concern and will be a trendsetter.

Universal design specialists can play a very important role in design of public places that are used by a variety of people from young and old, able and differently enabled. Hotels, sports stadiums, theatres, markets, hotels is only a small list. The requirement for such design specialists is large and significant for creating a contemporary caring lifestyle accessible to all.

Besides there are human centred performance critical workplaces where operator centred design is the key challenge. Aircraft cockpit design, submarine, spaceship, nursery school, sports equipment, etc are situations where we require very special designers for whom human factors is of prime importance. There is ample need to create such design manpower.

Design methodology centred design education

Sixties saw the popularisation of Systems Design Methodology. Early seventies saw the publication of the book Design Methods by Christopher Jones. Since then 'design methods' has become part of design education curriculum. However it was only an "add-on extras" that are desirable but not as important as other aspects of the design — particularly the aesthetic. In many cases it was introduced only to be sidestepped in favour of power free flowing creativity. Justification was taken from Jones' preface to the second edition of the book 'Design Methods.' Nineties have seen the growth of various methodologies for user centred design and usability studies. This sustained growth in systematic design methods is fuelled by the need to sure that the new design effort is moving on the right track. There is an increasing need to quickly introduce new products into the market, risks have to be minimized, and expected gains have to be maximized before the competition can react.

The manpower requirements are immense. Design socio-psychologists are needed. Besides we need design audit, design management, design research closely integrated with data logging and data reduction techniques. If design institutes do not get into this then such personnel will be created by management and liberal art institutes.

Computer Aided Design and Styling

Computer today is driving product styling, product engineering, gaming, animation and graphic design. It has become the essential working style for all creative people engaged in shaping the man made environment. The Cad facilities that were available with Chrysler, Ford and Boeing are now affordable for any large industry. Even the mid level CAD packages provide astounding capabilities. No product or communications industry can do without CAD professionals. Product design engineers and A class surface styling specialist are the most in-demand professionals. It is the new sunshine area in BPO boom. Spatial and aesthetic intelligence is essential for success in this field. Design schools have to formally get in this field and train the best professionals needed the global industry.

Gray R. Bertoline from Purdue University very lucidly brings out the requirement for CAG specialist:

> "The ideal student of this emerging discipline is bright, articulate, visual, analytic, and motivated by a passion for computer graphics. This student uses both sides of the brain but is keenly focused on the visual mode to solve problems. They are the modern-day Da Vinci's, capable of visualizing what is non existent and finding solutions to complex problems."

Purdue University produces such professionals at their Department of Graphics Technology. Some suggested areas are:

Interactive Multimedia Design
Computer Animation
Computer Aided Design
Computer Graphics
Rapid Prototyping
Virtual Reality
Finite Element Analysis
NC Simulation and Machining

In spite of major thrusts in information technology, India is still very much lacking in such professionals. This is essentially because its education system is too narrowly focused on linguistic and logical-mathematical intelligence.

Designers for the Craft Industry

The handicraft sector employs over 7.7 million artisans. There are over 6300 handicraft exporters. The 2003 export target was US$ 1600 million. This industry requires very different type of designers. Perhaps artisans trained to be designers or designers who understand the visual language of Indian culture and can team with artisans. Artisan education requires a very different paradigm in education. Distance education that looks at the artisan's workplace as an extension of education system is the right answer. Master artisans will have to be groomed to be faculty members. Gurukuls under their leadership will have to be set up that will act as study centres of larger universities.

Designers for the SME

Small and Medium Enterprises provide yet another challenge. There are more then 33,70,000 small scale industries. They all function without professional designers. If we were to provide 1 designer for 100 industries, we would require 33,700 designers. These designers working as low cost consultants could enhance the value of production by up to 30% in a very short time. This estimate is based on the value difference between the produce of small-scale industry and the bigger players. The designer for this segment will have to be an expert in handholding and take quality design proposals to completion.

The Future: A New Education System

India faces a new manpower development challenge. It has to recognize and respect intelligence other than linguistic and logical-mathematical intelligence. Only then India can produce creative leaders and geniuses that can provide her the rightful place in the community of nations. India has suffered in the past because of the priesthood that stifled the renaissance. We only hope another priesthood will not do the same. We have to become creative at least in our outlook to design education before a billion flowers can blossom.

Broadbasing Design Education: A Challenge and an Approach

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As design steadily moves from a stylistic, individual pursuit to a multidisciplinary, collaborative approach, it impels design education into being all encompassing (incorporating knowledge from other disciplines) and more embracing (becoming accessible to other disciplines). While progress has been made in many design curricula to widen the knowledge base, little effort has been made to make design education available to a wider audience. By this we refer to the absence of design primers for non-designers. This paper analyses the evolution of design education, pointing to the present barriers to its widespread diffusion. It proposes some models of design education that can facilitate rapid diffusion. Finally, it presents a case study of a campus-wide design primer at an engineering institute.

Keywords: *knowledge base, design-primers, widespread diffusion*

1 Introduction

The role and significance of design has grown dramatically over the recent years. The explosion of information due to technological advances, increased competition resulting from globalisation, and heightened sophistication on the part of consumers have made organisations re-look at design as a source of competitive advantage. The New York Times in its Sunday supplement on design, proclaims, "Design, once regarded as an afterthought, or an affectation, is increasingly recognized as a powerful tool with which to change opinions, move markets and solve problems." The role of design has changed steadily from being a visual delight to a tool for solving problems, from a trade trick to business strategy; from a novelty factor to an engine for innovation; and from a fringe discipline to something that permeates all domains.

Paradoxically, however, if we look at the discourses on design and design education today, it is clear that designers still spend a lot of time explaining what they do and why it is important. They detest design being treated merely as a stylised commodity; despise the lightweight, decorative role that mainstream media usually assigns to design; dislike being kept at the margins and made to work on the surfaces of problems; and despair the lack of scholarship, rigour and robustness in both the education and practice of design.

This conundrum, in which the design profession finds itself, is hard to miss. On the one hand, the economic value of design and its potential to contribute to our society, culture and lifestyle is much better understood now than at any other time in the history of the profession. Yet, on the other hand, designers seem to be unsure, inarticulate and ill equipped to meet the challenges of the changing nature of the profession and the shifting demands of design education.

Two responses are required to meet the challenge. First of all, constantly upgrade methods and skills of design practice. Fortunately, more and more designers and design firms are beginning to combine emerging technologies with innovative methods in their practice. Secondly, it is important to create a context for design to exist and thrive. This entails using a common language to recruit stakeholders, creating design awareness among non-designers, and educating professionals from fellow disciplines about the role and value of design. Unfortunately this is not happening, and in this paper, we examine why design education has resisted such diffusion and how it can become more broad-based.

2 The Changing Face of Design

The nature of design, and its role and influence in society, has gone through discernible phases during the course of its evolution as a profession. This evolution has happened in layers, rather than in a linear fashion in which a new phase replaces the previous one. Understanding this evolutionary path may help us predict the future direction that design education should take. In this section of the paper, we identify some key phases of design evolution and discuss how they came to influence the nature of design education today.

2.1 The designer as a craftsman

For the greater part of human civilization, design has existed as part of the crafts tradition. Artisans and craftsmen developed, improved and protected their design expertise and handed it down families, clans or guilds. The artefacts themselves were fairly uncomplicated because the art, craft, science and commerce of their production remained firmly under the control of the craftsmen who produced them. The practice-oriented nature of the profession basically stems from this craft tradition. The education of a craftsman/designer was carried through long apprenticeship under a master craftsman whose studio, workshop, factory and school were rarely differentiated from each other. Education usually progressed from acquiring the basic skills of a craft, to knowledge about materials and manufacturing processes, to the wisdom of innovation. Although the crafts had a strong utilitarian purpose, some craftsmen were able to elevate their trade to the level of fine art. These craftsmen commanded a higher status and prestige as compared to their less talented peers. The artistic effect in their work, their ability to influence the aesthetics of the period, patronage from the rich and powerful, and a carefully nourished public image were hallmarks of master craftsmen. This success model, pursued by many but accomplished by few, has had a lasting impact on the character of design education.

2.2 The designer as a decorator, stylist and consumption engineer

When trade began to open up between distant centres, enterprising businessmen transported goods from one place to another. In due course, crafts from one region came to be in huge demand in another (e.g. Chinese porcelain in Europe). Though it seemed like a good thing in the beginning, this brought about two important changes in the way designers operated. First of all, designers lost touch with their markets. They no longer responded to needs or problems based on understanding of their immediate surroundings. Instead, they catered to distant markets, mediated by middlemen,

who were mostly concerned with the bottom line. Moreover, designers neither had the marketing know-how nor the resources necessary to understand and serve distant markets, independent of the middlemen. Secondly, when the market expanded from immediate neighbourhood to distant lands, designers were unable to meet the increased demand. This, coupled with the onset of industrial revolution, propelled manufacturing towards mechanised mass production. Materials and production processes became drastically different from what designers were used to. Ignorant of the mechanised production processes and lacking the merchandising wits, designers increasingly operated, less in the realm of product innovation and ideas and more in the realm of styling or decorating them. This further accentuated the perceived importance of aesthetics in design.

As styling and decoration were so easy to incorporate in a product lifecycle, marketers exploited rapid alternations of the cycles of novelty and redundancy to create a perpetual demand for products. American economist and social critic Thorstein Veblen (1899), best known today for his theory of "conspicuous consumption," believed that aesthetics directly related to monetary value. In his book, *The Theory of the Leisure Class*, he proposed that the more wasteful and ill adapted an object is to its ostensible use, the more likely is it that the consumers will prefer it. Designers with an ability to generate rapid and copious variations on a theme to feed the consumption frenzy were amply rewarded. Vestiges of such an approach are prevalent in many industries, even today. In software engineering for instance, designers are brought in to 'skin' software after the underlying engineering work is completed. The industry continues to develop work processes where design input is only skin deep, both literally and figuratively. Design education inevitably had to cater to developing such skills and this came at the expense of engagement at a much deeper level of problem solving.

2.3 The designer and the modern corporation

After World War II, AT&T hired designer Henry Dreyfuss to redesign the telephone. Henry Dreyfuss, renowned for his attention to user convenience, comfort, and preferences, founded the field of ergonomics, and brought human factors research to design. This new field provided the much-needed tools and language to articulate and justify design decisions. It also attracted individuals with a scientific bent and an inclination towards empirical research, to the profession.

Around the same time, another corporate design patron, Thomas J. Watson Jr. of IBM, funded work by design luminaries such as Eliot Noyes, Paul Rand, Charles Eames, and Eero Saarinen. IBM's use of design began — as it did with most companies at that time — at the periphery of its business. "In every IBM factory and laboratory today, there is a design section, free to change the exteriors of our machines, if it does not hinder their function, in order to make them fit a cohesive and attractive design," wrote Thomas J. Watson Jr. (1975). Although he strongly believed that good design is good business, he was also quick to understand the many intangible benefits that a good design program can bring to the company. For instance, he believed that good-looking facilities attracted people to work for or do business with a corporation. When designers began working in big corporations, they were exposed to the rigours of cost-benefit analysis, production efficiency, economies of scale, prototyping and testing, and so on. Some of these factors eventually trickled back into many design curricula.

2.4 The designer with a social conscience

With corporations using design to improve their bottom-line, design became so popular that it was completely removed from the hands of designers and put into the hands of the marketing department. Among clients, "good design" almost always meant, "what yields profit." Driven solely by profits, design spawned a slew of unnecessary, dangerous, exploitative and environmentally harmful products. Around this time, a few designers began deviating from the corporate agenda and started contemplating their responsibility towards society and the environment. Victor Papanek's (1971) book, Design for the Real World, best reflects the sentiments of this period. Many design curricula that were developed during and after this period, incorporated social, environmental, and ethical issues in design.

2.5 The user-centred designer

In his influential book, *The Psychology of Everyday Things*, Donald Norman (1988) elegantly articulated the concept of user-centred design. The process focuses on affective, cognitive and behavioural aspects of a user's interaction with a design offering. It moved design research beyond the use of marketing surveys and focus groups toward determining user preferences. More informed design decisions were made based on design research that drew from ethnographic observation, exploratory techniques, participatory design methods, and investigation of the cognitive processes related to the interaction of the user with the designed artefact.

2.6 The e-Designer

The 1990s saw an explosion of new technological tools for designing. The arrival of WYSIWYG software, prototyping and designing software, low-cost printers and computers, created the fields of desktop publishing and computer-aided design, which permanently altered the design profession. Design skills long considered indispensable were rendered useless in no time. The initial reaction of design educators to this new phenomenon was to continue using old principles to bolster new methods. However, the tools continued to get better and more powerful and they either rendered obsolete many of the principles or made learning complex principles easy. Furthermore, students motivated by job opportunities and seduced by the digital empowerment, drove the adoption of these tools into the education process at the expense of existing design methods and process-based courses. Where design schools failed to meet this demand, quasi design schools sprang up to help many acquire tool competency and compete with trained designers. These pressures threw many design curricula into disarray. Even after a decade of these upheavals, design education, to a large extent, has not defined its profile clearly, for clients to confidently distinguish designers from the rest, nor has it embraced non-designers through any sort of bridging mechanism.

Back at the design office, the new tools effected equally profound changes in the way designers worked. First of all, they simplified, shortened, streamlined and made the production process cheaper. Secondly, they made the design process transparent and therefore, controllable. The process that once seemed esoteric, highly specialized, and hard to understand from the outside, was now laid bare with the new technologies and clients can now micromanage every step of the design process. Because of this, in the recent years production has become the central and most time-consuming part of every design office's activity. A more widespread awareness of the design process and a presence of common language and standard vocabulary would alleviate this problem and smoothen the interaction between the client and the designer.

2.7 The designer today

The design profession in today's networked economy has begun to shift its focus from dedicated forms to the larger systems in which they reside. The designer's contribution is no longer seen in isolation, but as part of a system of multiple interconnections with other disciplines. For example, the introduction of stored value fare card for Singapore's multi-modal transport system could involve a multi-disciplinary team of:

1 Engineers to build the technology backbone
2 Anthropologists to understand how people travel
3 Sociologists to explain some of the behavioural differences of different cultural and social groups
4 Cognitive psychologists to figure out what confuses or interferes with the task of using the system
5 Interaction designers to create the digital interface and user experience
6 Traffic analysts to calculate passenger loads
7 Communication designers to inform and educate public during the early stages of adoption
8 Business managers to sort out the economics of system

Increasingly, more designers and design firms are aware of and appreciate such multi-disciplinary nature of today's work.

The above evolutionary analysis points toward a trend in which designers increasingly access other domains to combine their talents with unfamiliar expertise of these domains, and design knowledge becomes accessible to professionals from other disciplines. In the next section of the paper, we attempt to understand how barriers to such broad-based access to design knowledge can be removed.

3 Barriers to the Diffusion of Design Education

Fixed formats and rigid structures of design education are some of the major reasons behind design remaining elusive to a wider audience. In an age when design can give form to information, activity and material in any field, design competence remains largely under-appreciated, misunderstood or misrepresented. Management education by contrast, through trimmed versions and flexible formats, became relevant and accessible to a broader population of non-specialists.

The problem with current design education lies in the following areas:

1 The education intake mechanism
2 Curriculum content
3 Delivery methods.

We discuss these next.

3.1 The education intake mechanism

The intake mechanism for design education is usually based on a screening examination for the so-called 'creative' aptitude. This pre-condition poses two problems. First of all, it determines too early and unsatisfactorily between those 'who can' and those 'who cannot' be a part of design education. Secondly, it is antiquated and fraught with glaring omissions if applied to the expertise required of a present day designer. Professional education courses in other disciplines rarely exclude learners based on such a non-standard and hard to measure, prerequisite. While screening examinations might have facilitated a perfect fit for truly talented individuals in the past, they create and perpetuate the notion that design cannot be learnt by everyone. This effectively prevents lighter and partial versions of design education from emerging.

3.2 Curriculum content

Design is a very practice-oriented profession and relies on little or no subject matter of its own. The design curriculum is set in a practice that responds to artificially generated needs or situations. Students move from one problem to the next as teachers reinforce best practices. Design expertise is gained through a process of action and discovery. Hence, there are no widely accepted textbooks or reference works that could serve as a knowledge base for design education. Absence of a reliable and standardised subject matter for the discipline is a major stumbling block to popularising design education. Design education needs to generate theoretical material that can constitute a universal design curriculum. Other practice-oriented professions have done it successfully. In medicine, which is a very practice-oriented discipline like design, there are impressive volumes of textbooks. K. Krippendorff (1995) in his article, "Redesigning Design; An Invitation to a Responsible Future," calls this intertextuality:

> *Each addition to the textual matter of medicine responds to or builds upon prior texts and acknowledges findings as stepping-stones on one's own path to such additions. Consequently, in medicine, virtually every text is directly or indirectly connected to every other text.*

We believe that the main reason for the absence of such intertextuality in design is that it runs counter to the strong sense of individualism ingrained in the designer psyche. The craft and skills

imparted through the design curriculum lay emphasis on creating designers with a strong individual philosophy and outlook. Designers are driven to discover individual styles, subscribe to unique philosophical positions, and practice distinct methods. In this quest for individuality, universal common knowledge has little or no opportunity to emerge.

3.3 Delivery methods

As design expertise relies heavily on hands-on practice and feedback, the teaching methods demand a high level of one-to-one interaction with the tutor. Tutors disseminate design principles and rules through sustained interaction and feedback over a long period of time. Design education is seen as an experience created by the tutor, the environment, and the act of exploration. Design schools strive to create such experiences. This model of education is not scalable and therefore, it is either ineffective or impractical to extend the model to a wider population of learners.

4 Alternate Models for Design Education

Design education for non-designers should span wide, ranging from formal educational institutions such as schools, colleges and universities, to the informal educational sector such as continuing education courses, short courses, bridge courses, and online learning.

4.1 Formal education

It is widely recognised that the design principles can be applied by anyone to any subject and to problems of any scope or scale, in any context. This challenges the notion that design is a profession and implies that it should rather be regarded as a form of literacy and become a part of general education. The British education system has successfully integrated design into primary and secondary school curriculum. It has added 'Design' to the 'three Rs' — planning, creating, and visualising (drawing) and is considered as basic as Reading, wRiting, and aRithmetic.

The primary objective of any such design course at the school level should be to provide broad-based exposure to 'design' and the things 'designed.' This will create a society of good promoters, consumers and creators of design that is high on design awareness. Additionally, essential design skills such as identifying, investigating, and analysing problems; generating new ideas; proposing and realising new solutions; and evaluating outcomes, will benefit students in any kind of profession.

One major challenge in teaching such design courses at school-level is finding qualified tutors. To deal with design at such an elementary educational level demands a high degree of skill and sensitivity. This need can be addressed by creating design teaching certification programs like the Art Teachers Program. In order to make the curriculum continuously relevant, a combination of tutors supported by practising designers is needed. Another powerful mechanism is to infuse a design perspective into regular curriculum. Aspects of science, history, and geography can be taught with a design point of view.

Design at tertiary-level education faces similar problems in curriculum design and teaching methods. Unlike most fields of scholarship, design has no subject matter and exists merely as a practice. Much homework is required to generate written records of design practices and produce a teachable body of literature. Likewise, eLearning, decentralisation, use of new collaborative technologies, etc., need to be explored as alternatives to the traditional mode of education involving prolonged personal contact between tutor and student.

4.2 Informal education

Additional educational programs need to be built for those who do not fit within formal programmatic boundaries. These informal channels will provide awareness, continuing education and vocational design education to the non-design community.

4.2.1 Awareness education

Global corporations face the challenge of localizing products and services across different geographical and cultural contexts. In this scenario, design for a global community involves collaboration of designers who cut across such contexts. This customisation has moved from manufactured goods to content services and entertainment, especially online media. Sites like MSN and Yahoo have versions catering to the local populations of several countries. What is important here is the understanding of design not just by designers but stakeholders who influence management of such businesses. Today's managers have a hard time making decisions, as they do not have a clue as to what adaptation of a design means. In fact, they are handicapped with a lack of perspective as to what qualifies as the scope of a design job. Managing design seems both inevitable responsibility and unfamiliar territory, at the same time. A design curriculum that caters to this audience is an emerging need. The purpose in this case is to demystify design and the design process. Management and design schools could jointly offer both workshop-based programs and online certification programs, whose curriculum could provide a language for non-designers to understand and articulate their design needs.

4.2.2 Continuing education

Awareness programs need to be further strengthened by continuing education for the non-design community with a focus on greater engagement with design. The focus of the curriculum should be on educating the community on proven design models that influence specific business segments. One may compare this to quality models like Six Sigma that emerged from the quality process domain, and eventually became models of how businesses are run. The '360-degree feedback' from HR practice is another example of how a specific model from a specific domain becomes a universal model for various stakeholders. The user-centric model can do the same for design. Design practitioners should be encouraged to consciously develop design models that have a mass relevance. Design institutions should constantly be open to bringing out such models from the practitioners desk to a wider audience.

4.2.3 Vocational education

Outsourcing, as a model to scale up production, has become a norm in the digital content industry. For instance, animation business relies on outsourcing to handle the high volumes and drudgery part of the work. The outsourcing of products and services has opened up new challenges for large-scale implementation of design. The key design decisions are made at the place of sale (for instance, USA) and the style is communicated to production and execution teams (for instance, India) for large-scale replication. In India, which is a leader in global outsourcing supply, there is a severe dearth of people to execute design as per specifications. There are not enough trained designers, and the ones that are there, find working to foreign specifications, too low-key a job. Students trained at software training institutes eventually do this job. They are proficient at using the tools, but lack design sensitivity. There is a need to create a curriculum that teaches design basics to a class of 'talent force' that knows to implement design.

5 Case Study of IDEA

Innovation, Design & Enterprise in Action (IDEA) is a campus-wide design primer course at the Singapore Polytechnic (SP), offered across seven disciplines, to a population of 3,500 students every year. The IDEA course aims to develop the ability to express creativity, innovation and enterprise through an understanding of design. The semester long course was first offered in July 2004 and has just finished its first run. The impact and effectiveness of the course is not ascertainable at the time of writing this paper and might constitute the subject matter of a future paper. This section, therefore, will be limited to highlighting some of the challenges in the development and implementation of the course.

5.1 A design primer for engineering students

Singapore, a small island nation of four million people has had unprecedented economic success in the last few decades primarily due to its excellence and head start in manufacturing, financial and transportation services. This position, however, has changed dramatically in the past few years due to fierce competition from other countries around the world. The Singapore Economic Review Committee (2002), realising that the survival of its economy lies in the value addition of creativity, innovation and enterprise to its businesses, announced, "It is a national strategy to promote and leverage design excellence as a key driver of national competitiveness and creativity in an ideas-driven economy." The vision of the initiative is to establish Singapore as Asia's leading centre for design excellence, and to develop a vibrant design services culture. Supporting the national agenda is one of the reasons for introducing a design primer.

SP, which has supplied manpower for 50 years to the industrial economy of Singapore, finds itself having to reinvent itself over again, for the networked economy. The situation is not unique to SP, as technical education worldwide struggles to keep pace with the rapid growth of new technologies and the resulting business transformation. Mere possession of technical skills and knowledge in a single engineering domain is going to be woefully inadequate in the years to come. S. D. Sheppard and R. Jenison (1997) have identified the following design skills as important for a freshmen engineering curriculum:

1 The ability to exercise creative and intuitive instincts
2 The ability to work on ill-defined or under-defined problems
3 The ability to generate and evaluate alternate solutions
4 The ability to think with a systems orientation
5 The ability to consider economic, social and environmental aspects of a problem
6 The ability to communicate, negotiate and persuade
7 The ability to work effectively in teams

The objective of the IDEA course at SP is to develop some the above skills.

5.2 The implementation challenges

Implementing a campus-wide course in a large academic institution can be an administrative, logistic and pedagogic nightmare. This was especially so at SP where the seven academic schools (Business, Design & Environment, Chemical & Life Sciences, Electrical & Electronics Engineering, Info-Communications Technology, Mechanical & Manufacturing Engineering, and Singapore Maritime Academy) have distinct subject specialisation. Administratively, the schools operate autonomously with regards to creating, scheduling and running their courses. Furthermore, SP has had little earlier experience in promoting inter-disciplinary academic interaction between the seven schools. While it is impossible to list the myriad challenges in implementing the course, we will attempt to highlight some key challenges that will be of interest to others planning similar ventures.

5.2.1 Recruiting key stakeholders

Once the objective of developing the ability to express Creativity, Innovation and Enterprise (CIE) in the students, through an understanding of design was identified as the major strategic thrust for the entire institution, it was imperative that all stakeholders were brought into agreement on the idea of having a design primer to help meet the objective. Individual school management teams were presented the value proposition of the course and encouraged to contemplate on how their discipline can engage design meaningfully and benefit from it. Several design awareness-building measures were undertaken. For example, the annual education and teaching convention for the year 2002 was organised around the theme of CIE. Additionally, frequent talks by invited speakers, workshops on CIE, exhibitions, and design competitions were held all round the year to keep the conversation on design education going. The key takeaway of this experience was the need to inform, include, and engage the various stakeholders through a variety of means before launching an enterprise-

wide initiative, such as this one. *A top-down directive or an external consultancy can never have the same effect nor will be able to sustain the initiative on an extended basis*.

5.2.2 Setting up the IDEA Centre

To start with, the IDEA team at SP consisted of designers from the School of Design & Environment as they had the essential training and knowledge in the field of design. However, it was expanded to include representatives from other disciplines, who brought the necessary perspectives from their parent disciplines to make IDEA truly inter-disciplinary. A physical space - the IDEA Centre was built, for these individuals to meet and operate. The centre is a well-facilitated space containing an *Innovation Studio* that can accommodate up to 40 people which is used for brainstorming, idea development or lectures, a small Workshop to fabricate models and prototypes, and an *Exhibition Gallery*.

The centre coordinates and manages the IDEA course and helps the schools integrate it into their curriculum. In future, the centre will also coordinate inter-disciplinary projects between the schools, help the staff/students/alumni of SP commercialise their projects, and offer design consultancy to external clients. In other words, the IDEA Centre functions as a creative and enterprising business unit, very much like a commercial design office and unlike an academic outfit.

5.2.3 Designing the curriculum

Coming up with a common curriculum was a challenge as sufficient differentiation (or identification) of content for unique needs of various disciplines is crucial for ensuring that both lecturers and students perceive the relevance and usefulness of the course. The curriculum development team adopted two methods to meet this challenge. First of all, it involved lecturers from different schools, who brought in ideas of relevance to their disciplines by way of examples, products, and scenarios. Secondly, the content was abstracted to a level where subject-specific differentiations became less necessary. Considering the short duration of the course, and the level of prior design knowledge among both the students and their lecturers, the curriculum team arrived at the following set of objectives for the course (Jeffrey Ho Kiat et al., 2004):

a To develop an aptitude for and skills in basic design literacy through an understanding of the design process by experiential learning.
b To enable students to question preconceptions, see things from multiple perspectives and generate new ideas.
c To enable the students to make these new ideas work, with due consideration to human-centred use & experience.
d To enable the students to develop simple business proposals, and also visual and verbal presentations to sell and communicate their new ideas to others for new use, experience and enterprise.
e To provide students with the ability to work with others and communicate effectively for good teamwork and collaboration.
f To inculcate the core values for self-management, time management and personal development, among the students.

5.2.4 Training the trainers

As 3500 students have to be trained every year, it is not feasible to have them trained by designers. This has proven to be the most challenging aspect of the implementation. A four-day intensive training course was designed for the trainers to bring them up-to-speed on design. Additionally, the complete and detailed course materials were prepared for them. This is in marked contrast to the manner in which design is traditionally taught. If design is to reach more people, its subject matter needs to be more codified. The IDEA course is a small step in that direction.

6 Conclusion

The multi-disciplinary approach to design is here to stay. While designers seek out alien disciplines to improve and enrich their practice, design educators must work towards bringing design to non-designers. Just as we see 'how to' books in engineering for non-specialists, or crash courses in finance for beginners, we should soon see a variety of design education mechanisms catering to different audiences. The IDEA course at Singapore Polytechnic is a good illustration, that this is a feasible idea.

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Design Visions: Centers of Synergetic and Dynamic Interfaces between Education Centers and Society

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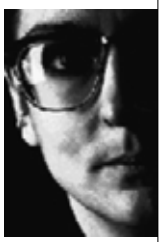

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The emergence of information technologies (IT) has been so significantly far-reaching that its influence is not limited to the addition of a new technology, such as computers in the classroom. Rather, it has created a new paradigm. The impact of the influence of IT as the medium of transference of information itself is felt in literally all the fields, and extends to wide-ranging social, political and economic changes globally. Knowledge seems to transcend the physical limits of mind-space into a free-for-all virtuality.

The new, emerging paradigm demands new approaches to schools of creations. A critical review of the present design education models foretells much is about to be influenced by the new IT paradigm. We anticipate that the dominant schools will be technologically-oriented, interdisciplinary schools where design will be so universally integrated that it will not exist as a separate profession. We also observe that such free-form practices have already begun to take shape in the New Media programmes that are emerging in technological institutes in the West.

Where does that leave us with design education, now and in the future? How do we define the future and change? We hold the view that education itself, both design and technical, needs a new approach. Institutions of a more dynamic nature need to be developed, as others have argued. We, however, argue for a specific vision, where technology and a systems approach are key.

Keywords: *design & technology, education systems*

1 Introduction

It was Aryabhatta, an Indian astronomer born in 476 A.D. who proved the importance of Zero in algebraic equations and other mathematical processes. Not in his wildest dreams would he have imagined that one of the binary numbers he helped to establish would combine with the other to telling effect, to engineer the digital revolution and change the way we live. The emergence of Information Technologies (IT) has been so significantly far-reaching that its influence is not limited to the addition of a new technology, such as computers in the classroom. It has created a new paradigm. The impact of the influence of IT as the medium of transference of knowledge itself is felt in literally all the fields, and extends to wide-ranging social, political and economic changes globally. This new paradigm promises to end boundaries, borders and artificial limits.

The media coverage during the Iraq war is a case in point. While the traditional television media went into overdrive justifying U.S. action against terror, a concurrent, decentralized roar was heard on the Internet through the medium of the World Wide Web. It expressed an opinion that the war was unjustified. This alternative voice could not be scuttled nor its opinion capped, as it was beyond boundaries and borders, presenting to the world the power of this new technological wonder, earlier unimaginable. However, misuse of this convergent technology has posed new challenges for our society to address. Countries like Singapore try to oversee and limit the Internet traffic that reaches its shores, just as some American companies monitor all online activities of their employees.

On the other hand, the use of web-enabled mobile phones to connect between fisherwomen communities with the market place in Dadar in Mumbai form an interesting instance of the use of technology by the people at large in a populous country like ours. Since technology is ultimately a creation of humankind, the uses to which it is put will vary according to the imaginations of billions, well beyond its original, intended purposes.

In the context of the last two decades, for example, IT and satellite-enabled communication technologies have reached the masses and transformed the way we live. The abbreviated language, comprising new signs and symbols that we see on the small screen every day is developed 'on the street' by youthful users. Digital language is the new medium that mediates among humans, their world, and their thinking, throwing up new challenges to understanding. In this new state of transition, adjusting to this dense information-enabled space, co-existing generations of people are being regrouped – those who have adjusted to this radical change and others who have not. In the process, a polarity in society has been created between those who are at the centre and others who are pushed to the periphery.

Information stands externalized and available in a free-for-all. Knowledge seems externalized from mind space into virtual space. In fact the transformation seems so dramatic that the virtual may seem more real than the real. At the same time, information becomes knowledge only when humans put information to use. The degree to which the virtual affects the real is often overlooked. For instance, the power of the virtual communities that develop through the Internet often remains invisible. The networking among the Indian diaspora, for example, can become something of an inversion, as Indians continually reconnect to those who remain at home, even while they simultaneously connect to other displaced Indians they may have never met at home.

Products as tangible entities are carriers of technology. They are now immersive and navigable, ubiquitously distributed and networked. Some are artificially intelligent or 'smart,' thereby re-emerging as new forms of animism. Although the scientific principles on which the technologies are built remain unchanged, the medium of the mediation of technology stands transformed. It has created vast, new challenges to the times we live in, to what we learn and how we learn.

2 Education Trends

A critical study of the domain of education will indicate that educational trends have been governed by the technological development of their times. The present practices and structures of technical

education have emerged in response to the requirements of the needs of the Industrial Age, thus preparing students who address the work required of the manufacturing sector. The new Communication Era requires still new approaches.

Graduate programs in technical education that are prevalent are primarily academic in spirit, with the objective to be able to describe and predict well-defined actions in well-defined circumstances. They promise an understanding of knowledge domains that are based on scientific, analytic, synthetic and mathematic principles. During the first phase, that is, the first two years of education, students are taught in the knowledge domains ending with **ICS**: Mathematics, Physics, Mechanics, Electronics, Acoustics, etc. This is followed by the **ING** phase, which helps the student to learn that engineering is done for use of people. It is imperative therefore that they be grounded in the study of the social sciences and humanities, although less of this ground is covered than many educators would hope to see. Coursework includes planning, designing, creating, developing, servicing, delivering, and optimizing. The final stage of learning includes the **TION** phase, which grounds the student in an understanding of the larger considerations — at the systems level of understanding — of operations required to support society. These include an understanding of systems of transportation, communication, habitation, sanitation, health protection, system of regulation and so on. Throughout this time, a student develops a specialization in an area, such as civil engineering, for example.

2.1 Design Education in Relation to Technical Education

We now analyse the design education trends against the above technical education model.

Design education in the United States generally follows the legacy model of the Bauhaus, though variations occur according to region and institution. The programs on the west coast, for example, have closer ties to the arts and crafts tradition than do programs in the east. The particularity of the institution that houses the design program has a much more of a significant effect. For example, design programs in large universities are almost always within Art departments. Because they are within universities, they provide students with more exposure to the Liberal Arts and Sciences than do design programs that are in private art schools, and are generally flexible enough to allow students to take classes in other departments. An example would be that a design student in a university could minor in HCI, Computer Science, or any number of other disciplines. A few design programs are in departments of Communications, along with Radio, Television, and Film studies. A few are also in medium-sized technology institutes, such as Carnegie Mellon and Georgia Tech. These technical institutes provide a distinctive context. For instance, technological enquiry is taken for granted, particularly in the domain of emerging technologies, and connections with other departments, such as Computer Science, are routinely explored. In addition, each type of institution and its particular mission determines, to some degree, how interdisciplinary a Design program can realistically become.

Perhaps the most pressing issue in the U.S. is the emergence of programs variously termed New Media or Information Technology, which threaten or ignore traditional design fields. Typically interdisciplinary in nature, these programs comprise various combinations of Computer Science, Library Science, Engineering, the Humanities, and sometimes Art and Design. What constitutes 'design' and who calls themselves designers is currently a highly contested free-for-all, which the traditional design communities too often ignore. The most productive area seems to be in Human-Computer Interaction (HCI) programs and professional organizations. Although dominated by computer scientists, cognitive scientists and psychologists, HCI communities nonetheless recognize that the roots of their domain are, in part, derived from Industrial Design. They also recognize that Graphic Design is an essential component, although it still remains in an uneasy position.

Finally, a significant factor in the ways design programs in the U.S. and the U.K. will change will result from the recent emergence of Ph.D. programs in Design. Despite the acknowledgement of the Masters of Fine Arts (M.F.A.) degree as the terminal degree (that is, equivalent to a Ph.D.) in the U.S., it has been problematic in many regards, especially in terms of supervising Ph.D. dissertations, interdisciplinary work and grants, and promotion to high-level administrative positions within

universities. It is beyond the scope of this paper to discuss the historical reasons for this, and the deep divide between theory and practice that still pervades academic circles.

Nevertheless, it is important to note that the methodologies that these Ph.D. programs adopt tend toward either the positivist (Social Sciences) or the Humanistic. The place of praxis, the issues of what constitute knowledge in design, and the ways such knowledge is legitimized are open-ended frontiers. It is important, therefore, that design in the U.S. urgently needs to both define its unique knowledge base within academia, and articulate that according to academic standards. Only then can it become equal players in interdisciplinary endeavours. Currently, it is the opinion of the author (Diane Gromala) that the field limits itself in its American context by its insularity and its insistence on defining design strictly in terms of professional practice. Instead, it has a responsibility; if it is to remain viable, to acknowledge its deep roots as a longstanding human practice and mode of inquiry, and with a mature, academic demeanour, articulate its value to other pertinent communities, such as HCI, at every opportunity.

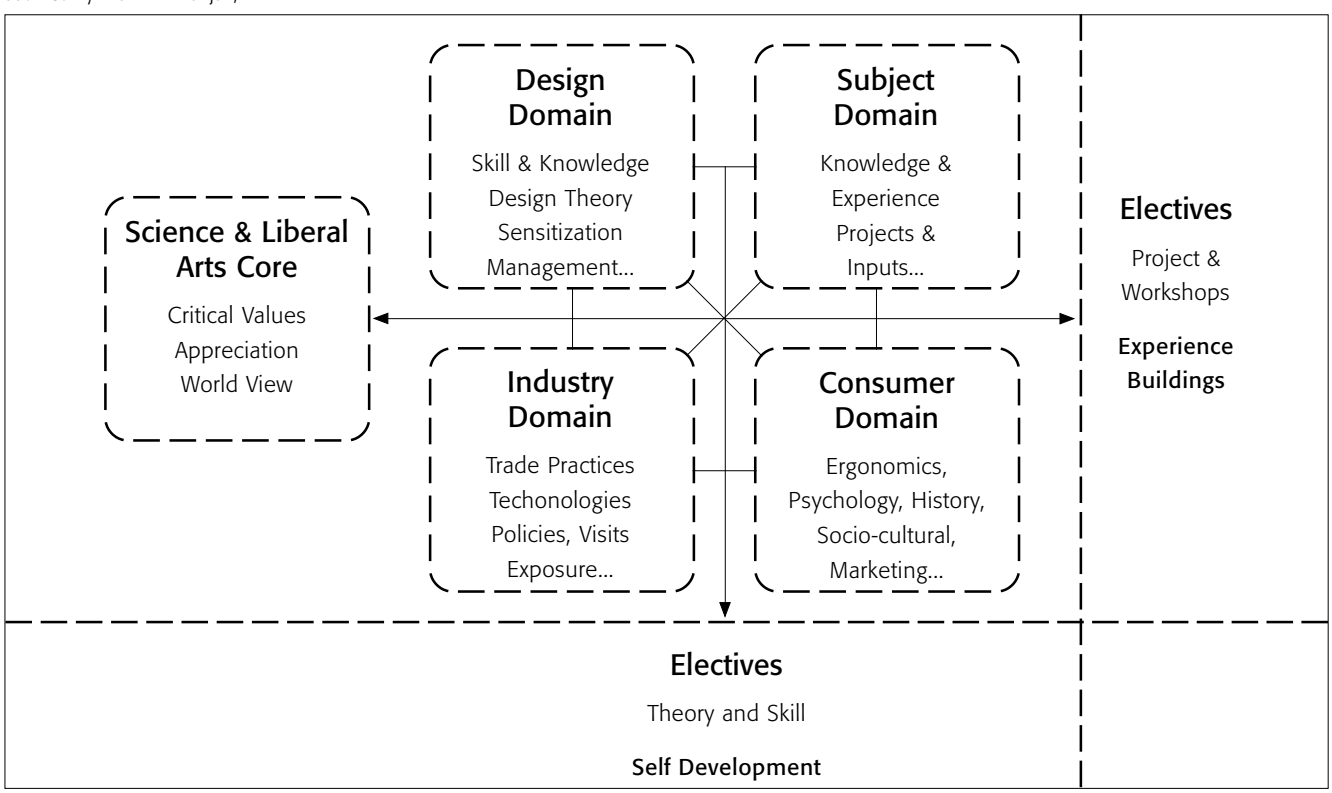
The model of design education in India, with which the author (Ravi Mokashi) is more familiar, stands tall and unique. It has reshaped itself drawing upon the spirit of the Ulm model but adapting itself to include the spirit of the learning traditions of Indian arts and crafts into its education. It prides itself of a spirit of design education, which encourages a 'spirit of learning by doing.' Prof. M.P Ranjan of NID has succinctly summarized this model as indicated in the diagram below.

The emergent results of these models of education need to be critically examined against a general model of education system proposed by Kira S. King and Theodore Frick [2]. They define:

> "A system is a group with at least one affect relation which has information." And "... teacher, student, content, and context are taken as forming a system of education" (Steiner, 1988, p107). Thus, the components or subsystems of an education system are teacher, student, content and context, and affect relations pertain to how these components are connected."

As proposed by them in Figure 2, the shaded area represents an education system, and the non-shaded area its negasystem. The negasystem comprises the local community – that is, parents, neighbours and other people in business, industry, and local government. The Universe of Discourse (U) is extended to include state and national levels, or for that matter global levels.

Figure 1: Curriculum Structure for Design Education at National Institute of Design (NID) Ahmedabad. Model outlined by Prof. M.P Ranjan, NID.



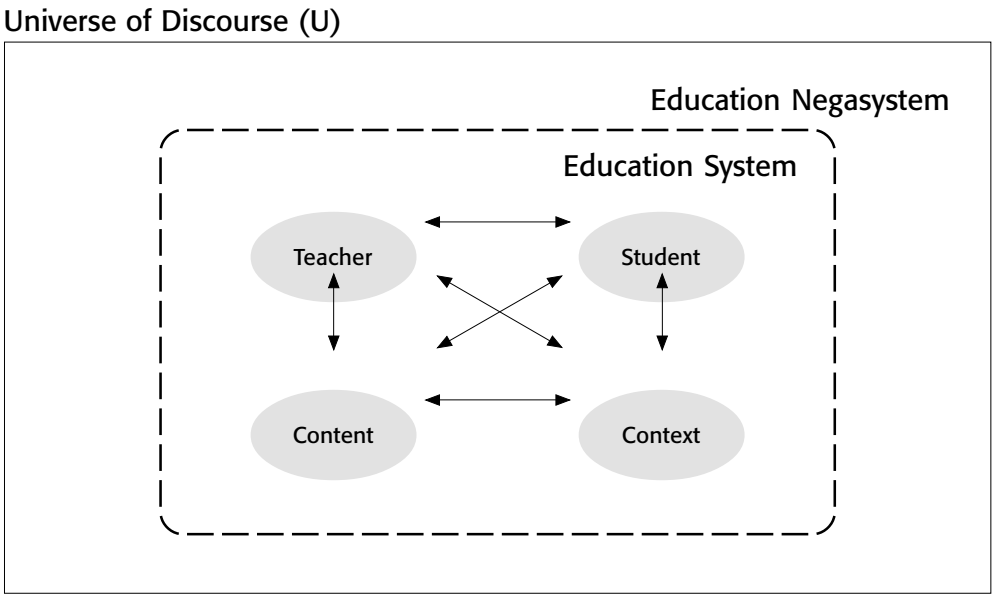


Figure 2: King & Frick; general model of education system.

Assuming that any education system should be modelled in the context of how it is relevant to the immediate society in which it exists and facilitates the overall growth of its peoples — be it economic, intellectual, spiritual, cultural, — it becomes pertinent to examine how the existing models have fared and what changes are expected in the context in the emerging Communication Era.

These two models of education — the technical and the design models — need to be examined against the affect relationship amongst its seven subsystems:

Teacher - Student relationships
Teacher - Content relationships
Teacher - Context relationships
Student - Content relationships
Student - Context relationships

Content – Context relationships

Educational System – Environment relationships

The technical education model presently has the following characteristics: It follows the traditional classroom model in which the connections tend to go from the teacher to the student; generally the teacher is active in the instructional process and the students are passive. Much of the time the students are dependent on the teacher's directions. The ratio of student-to-teacher is very high, resulting in a very large work force of educated people entering from the school into society. Administration is centralized, with the students contributing little in matters of what is to be learnt and how it has to be learnt.

In comparison to this technical education model, design schools tend to follow the Montessori school approach in which there is greater interaction between teacher and students and between students and students. As a result, the students enjoy more control over their learning. There are stronger relationships between students and their context, as the program encourages project work drawn from the immediate environment in which they exist. The students' levels of self-motivation are also relatively higher. However, the students-to-teacher ratio is relatively low, which results in a relatively low number of trained designers (in the Indian context). A decision of what is to be learnt and how it has to be learnt has been more participatory.

In both instances the educational model remains dependent on a centralized infrastructure facility. There seems to be a breakdown of the connection between the education system and the *negasystem* in which it exists. In fact, there is a disturbing trend amongst prestigious technical schools in India, where the stronger draw is towards going abroad. The term 'brain drain' sums up the overall

phenomenon in relation to the immediate environment in which these centres exists. Given the power of virtual communities and globalization, the question of the 'brain drain' requires serious reconsideration. How, for example, would it be possible for Indians who go abroad to contribute to the geographically defined, *Indian negasystem*? It may be possible, perhaps, to redirect the drain homeward, through virtual means.

3 The Design Education Model in the Communication Era – New Challenges

With the advent of the Information Age and the beginning of the Communication Era, these two models of education seem limiting (in different ways) for both the teacher and the taught to adapt to the new possibilities in the present age of communication technologies.

In an information-immersive and communication-enabled society, knowledge dissemination has to face new challenges. No single individual can hope to master all information that is available. A society has emerged where there are only learners. Collaborative work through teamwork is the new mantra. Virtual Reality, Usability, Human Computer Interface, and Artificial Intelligence are new knowledge domains that have emerged as trendy and fashionable today. Yet with the relentless rate of technological change, it is difficult to discern what is trendy from what is a necessary and serious area of inquiry. The rate of change has been so dramatic that 'knowledge workers' are forced to be on a steep curve of continuous learning. It has affected all spheres of our lives, be it home, work or leisure. It has affected our language and opened new channels for what and how we learn. The role of the teacher, popularly referred to as a 'sage on the stage,' has shifted to being a 'guide on the side.' The power of communications technologies offers immense possibilities of managing information in very many, new creative ways and by many people at the same time.

3.1 Design Education in the Communication Era – A Proposed Systems Model

In such a milieu, it is proposed that a systems model of education be considered to create centres of synergetic and dynamic interfaces between the education centres and society in which education and knowledge systems are only to be shared and experienced. The learned are also learners. As such, current models of education demand restructuring. Perhaps the most productive way to consider restructuring is on a continuum, from changes to existing structures on one hand, to radical, decentralized (or rhizomal) peripatetic entities on the other.

It is now feasible to think of education free of architectural space. Centuries ago, this was the more common method in Europe and other countries, as scholars had to travel great distances to access the few existing books. By travelling, they also shared and spread their specific knowledge. No longer confined to books or libraries, access to knowledge is now available in virtual space. Electronic libraries are a reality. The recent launch of educational courseware by MIT and the advent of numerous online, degree-granting programs (i.e., 'distance education') are only some indicators of an initiative in this new direction. Convergent technologies in the form of products that integrate a projector and a computer with features of net connectivity — such as the innovative product 'K-yan' designed by Prof. Kirti Trivedi — open new possibilities in making community learning free of architectural space a possibility.

Technology development has for too long focused on a 'person centric' point of view. How will new technologies be designed to bring communities together? What will be the new relationships among learners, geographical space, place, and presence?

3.2 Design Education in the Communication Era – A Systems Model for India

India boasts of being the largest democracy in the world. It is the second most populous country in the world. With a population of over a billion, its people worship different gods and speak different languages. It is the planet's most irrigated land. It has a robust economy. It has 41 million fixed

telephone connections and 17 million mobile phone connections. Two million telecom subscribers are added every month. It is the second largest emerging market in the world. The centres of higher education include seven Indian Institutes of Technology, one Indian Institute of Science, six Indian Institutes of Management, and two Indian Institutes of Information Technology. It has over 250 universities, 1,500 research institutions and 10,000 centres of higher education churn out 200,000 engineers and 300,000 non-engineering post-graduates each year.

Considering the Indian context, there are interesting challenges to be addressed. The factual considerations discussed above point toward what needs to be done to use information technology and information-enabled services: eradicating poverty, generating employment and raising levels of literacy through education for our society.[1] Primary education and health care sectors are domains where much still needs to be done.

How can the emergence of IT and IT-enabled services contribute to the growth of its people? What role does education — and education in the domain of design in specific — have to play for addressing these needs?

Education should therefore be modelled to meet this new expectation. Existing structures can be altered while new, systems models are concurrently developed. With regard to a systems model, the following are proposed:

i Education should bring an economic perspective into learning for it to be relevant for different levels of society. For example, the vast majority of the most skilled crafts workforce is still kept on the outer periphery, as they remain 'Unqualified' in the context of employment. How should the latent talent in these working hands be utilized? How can traditions be maintained, extended, and explored? Educational systems in India still are not able to resolve how to do this.

ii Education should be cross-disciplinary and multi-disciplinary by nature. It should enjoy autonomy to model itself in the context of the immediate environment in which it has to be relevant. Centralized models of educational systems are proving to be deterrents to their growth and the relevance to the society in which they operate. In the emergent communication era, decentralized models are a distinct possibility.

iii Education should be trans-generational in the context of IT-enabled learning. It is today possible to conceive of a society in which every one across generations has the freedom to learn. For this to happen, education should be and can be conceived of as free from a centralized architectural infrastructure in the new communication era.

iv Education should be independent of fixed location and space. It is proposed that if education is freed from centralized architecture, then it is possible to conceive of reversing the trend where students go to centres of learning. Rather, the centres of learning should be able to relocate themselves over planned periods of time, from one location to another. Numerous decentralized possibilities of organization are also possible and should be explored.

It is interesting to note that imaginative initiatives of the kind indicated above are being experimented with in different parts of India, initiated amongst the non-formal sectors. Notable amongst these are the experiments at the SWRC centre at Tillonia in Rajasthan. Here, the concept of a Barefoot University amongst the community of people of the region has been in operation for some time now. Another school directed by Dr.Kalbaugh at village Pabal near Pune has the local villagers trained in the assembly of computers. The school introduces practical and economically sustainable courseware that includes poultry maintenance, brick making and now the assembly of computers. This helps the local community to earn while they learn, giving a new dimension to education.

Large corporations operating from Indian soil have initiated a number of community-based research projects, focusing on software development in the 19 Indian languages. C-DAC, for example, is a leading government firm in this regard. Similarly, Microsoft launched its MS Office in Hindi. Rank

Xerox also initiated research studies in the use of computing-based interfaces amongst the rural folks in Rajasthan. 'Infarm' was a community-based, conceptual project that the author, along with colleagues at the NID was associated with, guiding a group of design students nearly six years ago. This project is now a reality in the state of Andhra Pradesh. Here, in the village's community centre, villagers network with agriculture scientists in research centres in the city to gain advice about pest control and the agricultural practices they need to follow for agricultural harvesting.

3.3 Design Education in the Communication Era – One Example of Systems Model in the U.S.

In the United States, the models of design education are very similar, though the negasystems may be different. Nonetheless, more immediate changes in design education are occurring, in ways that seem to anticipate the proposed systems model. At Georgia Institute of Technology (Georgia Tech), the home base of two of the authors, for example, design education has shifted from a traditional centre towards 'electives' and self-direction. The graduate program in Information Design and Technology is constructed so that students take a minimal number of required classes, and develop their own directions through electives. As a case in point, author Madhur Khandelwal has taken electives in the College of Computing that in essence are leading to a specialization in what is termed 'ubiquitous computing' or 'everyday computing' in scientific research communities.

In other examples, students take electives in Virtual Reality (VR) and work with Prof. Gromala on her immersive VR research projects. While some of this is coursework, some of it is also employment through research grants. This enables students to not only gain design skills in creating and programming interaction strategies in three-dimensional worlds, but to understand the major research questions in an interdisciplinary research group that continually exhibits and publishes. Because these projects are medically therapeutic, students must venture out to medical centres and work with people who suffer from a variety of illnesses. Further experience is gained in internships with, for example, companies such as Virtually Better.[2]

These are but two research projects that are part of much larger initiatives. Others, such as the Aware Home, are large, federally funded projects that involve the local community and a number of departments at Georgia Tech, all of whom work toward the goal of developing new technologies that will help the elderly. In the U.S., the so-called 'baby-boomers' who were born after World War II are quickly becoming a very large, elderly populace whose social and medical needs are a pressing political issue. The computer scientists who once dominated this initiative now understand and value the contributions that designers can make for a number of reasons. First, designers such as the authors work daily on research projects with computer scientists. Second, dual-degree programs at the graduate and now undergraduate levels have been developed. These resulted from the demand of students who do participate in such decision-making, though not in as direct a way as would be ideal. These dual-degree programs strengthen relations between designers and computer scientists, and have resulted in a skilled group of researchers who have an in-depth knowledge of each other's domains, and work toward the same goal. This emergence of interdisciplinarity is important, for if designers are have any say in the way technology is deployed, they must implicate themselves at one of the most significant points in which this can occur: the stage of research and development (R&D) Working as a team, these researchers can then direct their efforts toward improving their immediate communities, as well as address issues that extend beyond them.

Although the graduate program in Information Design and Technology (M.S.) and Digital Media (Ph.D.) at Georgia Tech are a combination of both technical and design models as outlined in this paper, its structure allows for some, albeit modest, changes that are advocated above. Students can and must be self-directed, must necessarily engage in interdisciplinary studies and research projects, range in age groups, and can participate in research that directly engages with the surrounding community. This is only a modest step forward, however. And although the programs are still confined to a centralized, architectural space, it is noteworthy that many graduate students are from India, and more often than not, explore issues that are directly relevant to India in their theses. Thus,

through IT, it would be possible to conceive of the negasystem as global. In doing so, what students learn and teach outside of India could, in fact, be directed and woven back to India — in essence, a virtual reversal of the brain drain. If regular connections were established, such a reversal could be possible on many levels.

A final issue to be raised, however, is how we are to determine the needs of our communities, and how we can organize education to address them. For example, in the U.S. in the 1960s, thousands of youths joined the Peace Corps and travelled to places that were in need of their support, both at home and abroad. However, the kinds of agricultural methods then employed, for example, though well-meaning, were not as suitable for the cultural practices of the area; thus, an unintentional form of colonialism was deployed. While this is no longer the case, the pedagogical methods of the Brazilian educator Paolo Friere should perhaps be revisited, so the communities themselves have as much a voice as possible. Similarly, the efforts of any design model of education would do well by employing the "critical, pedagogical' techniques of educators such as Henry Giroux. This is especially true in the United States, where designers are far too often seen as merely the stylists of corporate interests.

Conclusion

In the communication era, the impact of IT as the medium of transference of knowledge cannot be overstated. It has created a new paradigm that in turn demands a response and restructuring of models of design education.

It is only pertinent that a model for a new emergent Bauhaus, a new Ulm model, or a confluence of multiple strategies appropriate for the emergent communication era be debated and discussed in the context of system of formal education.

Notes

1 Currently at 52.21%, according to the official Indian census. http://www.censusindia.net/literates1.html, accessed January 2, 2004. This issue is a primary one regarding those who remain on the periphery.

2 Virtually Better treats patients who suffer from various psychological disorders through immersive virtual reality environments and psychiatrists. Refer to www.virtuallybetter.com.

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Design Research and Education for Sustainability in Emerging Countries

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The paper will explore the idea of the establishment of an agenda regarding education in design for sustainability in both industrialized and emerging contexts, taking as starting point the current potential but fragmentary local base. It will discuss the multi-polar network model as a means to contribute for the development of research and education in Design for Sustainability, triggering an international multi-lateral cooperation model, specially focused on radical innovation suggested by the concept of Product Service System. The multi-polar network model would contribute to strengthen local bases through the connection among different emerging contexts and industrialised contexts, a desirable but rarely explored kind of collaboration.

Keywords: *sustainability, multi-lateral education, network, emerging contexts, design*

1 Sustainability and Education

The perception that the current model of economic development is not sustainable has already been largely acknowledged. The degradation of the environment and the enlarging of the gap between rich and poor areas in the world are the irrefutable visible proofs. We know that 20% of the world population consumes 80% of the available resources. If the group that currently consumes less resource were to achieve the consumption levels of the first, then we would need the amount of resources equivalent to at least 4 planets. In the top of it, we observe fast growing economies e.g. China, India, Brazil, rapidly increasing the consumption power of its populations.

The necessity of a shift towards sustainability also creates new demands and opens new fronts for designer activity, including design education and research. In particular, we consider the establishment of an agenda regarding the design for sustainability in these fast-growing countries, or emerging countries, together with the industrialised ones to be of great relevance.

Sustainable development requires a change of production and consumption patterns in both highly industrialised and newly industrialised contexts. It is important to keep in mind that innovative solutions must be highly contextualised, and rooted in the local economic, organisational and cultural codes. In the same way, the establishment of an agenda regarding education in design for sustainability in emerging countries born from a local articulation should interact with growing global visions of a new educational paradigm.

In fact, the importance of the link between education and sustainability has been backed by the United Nations, which, through UNESCO, has established the Decade of Education for Sustainable Development. The programme makes explicit the fact that "there is no universal model of education for sustainable development," underlying the importance of the formation of localised agendas, highly focused on local "environmental, social and economic conditions in culturally appropriate ways" and has as one of the objectives to "facilitate links and networking, exchange and interaction among stakeholders in ESD."[1]

But what is or could be the role of the designer in the radical shift required by sustainability? And what are the specific implications of working upon this issue within the emerging countries? Designers can help create and disseminate methodologies that propose new kinds of system organisation that contributes to sustainability within the industrial and service sectors. Furthermore, designers can offer society a unique contribution in the construction of possible visions that can help create a picture of a sustainable life. Institutions of design education and research focused on design for sustainability are the locus where this kind of innovation can be proposed and structured.

2 The Design Discipline and Sustainability

Within a historical perspective, the design culture has been responding to sustainability debate and practice through an evolutionary path. We acknowledge that the debate around sustainability issues within design evolved from an end-of-the-pipe approach (focused on the last phases of the productive chain, recycling, disposal) to a broader systemic approach to the Life Cycle Design, and then to PSS (Product Service System) design.

Life Cycle Design of Products

In the second half of the 90s design of low environmental products began to be more clearly and exhaustively defined. There was better clarity about the environmental requirements of industrial products and the concept of Life Cycle Design was introduced.

The leading concepts of Life Cycle Design are (1) an extended design horizon (systemic) from product design to the design of the product life cycle stages; and (2) a new design "reference" from product design to product "function" design. Within this framework the product has to be designed considering all the stages of the life cycle – production of the materials, the product, its distribution, use and, finally, display.

The second criterion of Life Cycle Design is to design the function of the product rather than the physical product itself. In fact, it is in relation to this function (functional unit) that it is possible to assess whether the environmental impact has been reduced and how. The function, a fundamental theme in the historic culture and practice of design, acquires in this context a new meaning and a new vitality.

Sustainability Asks for System Innovation

In the last decade, we started to acknowledge that the entire production and consumption system would require a radical reorientation. Recently, it has become clear that such interventions must be more radical and must go beyond the re-designing of existing products in order to catalyse a transition towards a sustainable society. Aiming at radical sustainability improvements, higher level of innovation is required. And for higher level of innovation we have to move from product innovation to wider system innovation.

From "Functional" to "Satisfaction" Unit

To help achieving a wider system innovation, the conceptualisation design process has to move from a product function-based approach (typical of the Life Cycle Design of products) to a satisfaction-based approach. The term satisfaction is used to emphasise the enlargement of the design scope

from a single product to the system of products and services that together fulfil a given demand of needs and wants. In other terms it is a shift from product design to what is being called Product-Service System (PSS) design.

Product-Service System Innovation

"A Product-Service System (PSS) can be defined as the result of an innovation strategy, shifting the business focus from designing and selling physical products only, to selling a system of products and services which are jointly capable of fulfilling/satisfying specific client demands."[2]

Thus PSS introduces a new interpretation of the concept of product, moving from the product as the physical result of an industrial process of production, to a new meaning in which the product of a company (or an alliance of companies) is an integrated whole of mutually dependent products and services, that focus on meeting some specific customer demand (of satisfaction).

On the customer's side, the underlying assumption is that users do not really want a product or service per se, but rather what these products and services enable a user to achieve: the "satisfaction."

On the provider's side PSS requires the development of new relationships and forms of partnership. New interactions are mandated with the client, and innovative partnerships are needed with other producers/suppliers, public bodies or not for profit organisations. Thus with this approach, the producers or the service providers, extend their interests beyond their usual boundaries, in terms of both product life cycle phases (pre-production, production, distribution, use and end-of-life) and connections with other products and services, which, taken together, will result in an integrated solution for the customer satisfaction.

The Design of Sustainable PSS

In this framework, innovation has to be seen as a short-term strategic process, which has resulted in new forms of organisation – companies as flexible networks, new relationships between producers and users and innovative forms of co-production of value. In other terms, the uniqueness of their innovation does not lie in the area of technology (process or product), but in the way these more or less existing technologies can be systemised. A systemisation, which relies upon the different stakeholders involved in the value production system, in the innovative partnerships among producer/suppliers, public bodies or volunteer association and finally the customers, whether other businesses or final consumers. Hence, introducing PSS is the fruit of a "strategic design" activity.[3]

This has been defined as the capability of promoting new forms of organisation based on new systems of values and able to create new market opportunities and develop an integrated system of products, services and communications, while at the same time, being economically feasible and socially appreciable. In our context the new criteria of quality and the new market opportunities are those coherent with the medium-long term perspective of sustainability. By this we mean a design capability of (a) promoting new forms of partnerships/organisations (new actors roles), based on new sustainable satisfaction-based criteria of value and (b) designing integrated system of products and services dematerialised on a multiple life cycle scale.

In synthesis we could say that designing a sustainable PSS means to move from product Life Cycle Design to a strategic design approach to sustainability: a strategic design for sustainability.

Sustainable Consumption and Patterns

Another critical issue of sustainability that relates directly with design practice is consumption.[4] The designer's role in this matter can be established on two fronts. The first relies upon the designer's capability of interpreting the context of use, as an antenna of societies trends. The second relates to designers visualisation competencies through which new kinds of consumption can be rendered more attractive, thus contributing to establish a new perception of well being.[5]

3 Design for Sustainability in Emerging Contexts

Historically, a country like Brazil, has built up its own design culture somewhat divorced from the society's broader necessities, reflecting society's deep inequity. Since the formal implementation of the design discipline within Brazilian context 40 years ago, there have been intermittent attempts to define a broader design policy, fragmented according to political circumstances.

In recent years, however, awareness about the strategic importance of the design discipline seems to have been amplified, through more undergraduate design courses and with efforts to establish postgraduate programmes in design in some institutions. Besides, the National Research Agency also provides incentives to designers to pursue a PhD degree in international design institutions (mainly in Europe and the US), so that a critical mass can be formed with highly skilled design teachers and researches to operate back in local universities and design schools.[7]

The critical issue is that though design activity has spread in Brazil, it is not corresponded by a critical disciplinary mass derived from design research. Only research activity allows in depth reflection, consolidation and expansion of any knowledge area.

Focusing our attention on the Brazilian context, the first step would be establishing the discipline of Design for Sustainability in universities and design schools. At the moment, individual researchers and teachers carry out the theme through isolated research but there is not yet a formal didactic or research discipline that embraces all aspects of sustainability established in any design education institution in that country. There are also a few design centres working mostly with eco-design rather than design for sustainability.[8] Those are eventually linked to universities, industries federation or governmental bodies.

The picture is thus of a fragmented but potential base, lacking a network able to connect the isolated initiatives around a stronger disciplinary ground. The establishment of this disciplinary ground must combine a contextualised set of values and necessities enabling convergence of the fragmentary local expertise and at the same time take advantage of consolidated experiences and methodologies from the industrialised countries.

In this sense, it is worthwhile exploring the hypothesis of a network model as an effective way to strengthen the process for reaching this goal.

4 Multilateral Network: A Mature Experience

The DIS research unit at the Politecnico Milano University has been involved in developing an informal educational network of design schools with an experimental approach dealing with innovation through sustainable Product Service System design. It involves six universities from emerging countries: India, China, Brazil, Turkey and South Korea. Its way of networking reflects an explorative approach in which advanced research themes are studied and developed through experimental didactics.

In 2002/2003, the building of this expert informal network (then named DECOS) of design high education and research institutes was started, through a didactic experience involving universities from emerging countries, i.e. designing sustainable Product-Service Systems concepts for their campuses. The aim was not only to have the universities/institutes as contexts for which sustainable ideas could be designed, but also to open an exchange of knowledge with those centres, focused on sustainable PSS. That year an educational pilot project was carried out involving the students of the Faculty of Design of the Politecnico di Milano together with the Industrial Design Program of the Indian Institute of Technology, Delhi.

In 2003/2004 the following universities joined Politecnico di Milano and Indian Institute of Technology opening the network: the School of Architecture and Urbanism, Universidade de São Paulo (Brazil); the Academy of Art and Design, Tsinghua University, (China); School of Design, Hong Kong Polytechnic University, (China); Dept. of Industrial Product Design, Istanbul Technical University, (Turkey). In

2004 Ewha Womans University from South Korea became a new member.[9] During 2005 a couple of other universities are expected to take part to it.[10]

Generally speaking the DECOS' scope is to work on novel research branches by networking with education/research institutes of industrialised and emerging contexts, in a multi-lateral learning process linked to the curricula. In other terms, DECOS aims at linking newly open-front research issues directly to the didactics, throughout the design of proper courses, and an expert research community to work on it.

The educational "curricula" has been re-designed introducing experimental courses "used" in order to explore the research area. This integration is aimed at producing a cross-fertilisation between research issues and didactic projects. If initially it is the research that gives the first input to the educational process, it is the didactics that provides other inputs and feedback to the research. This osmotic exchange creates a continuous flow that contributes to develop and verify the new hypothesis on design roles, methods and tools for sustainability.[11]

Furthermore, students are asked to design sustainable PSS concepts and ideas for other countries. This creates a multilateral and multicultural learning process because of the exchange and feedback guaranteed by the network. In the first phase teachers and assistants from the mentioned universities collect and send preliminary data. In an intermediate phase, the students develop their projects within Politecnico di Milano. In the third phase their projects are submitted to the international teachers and assistants who criticise and comment on them. In the last phase students then re-elaborate their projects according to this input.

This mechanism creates a dynamic debate among participants and helps creating a shared know-how regarding sustainable design. Results so far have been encouraging and have incited us to consider possible further improvements of this experience.

5 Evolution Towards a Multi-polar Platform for Exchange and Cross Fertilisation

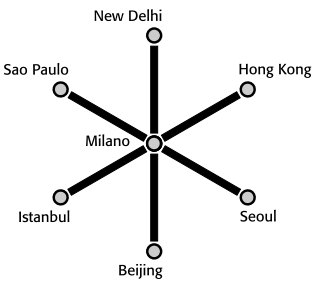

Figure 1:
Current multilateral **radial** network

So far, the structure has been a radial kind of network (Fig. 1), with the actual exercise being developed by the Politecnico di Milano students fed by the experts from the universities of the emerging contexts.

However, it is believed that a positive evolution of this network radial model could be a multi-polar network (Fig. 2) in such a way that each participant can act as both provider of background data and evaluation and participant of the design phase. In this case the students from each of the seven or more universities could participate in parallel design exercises focused on sustainability.

We believe, this improved multi-polar network could release a process of "positive design contamination" with each of the participants able to think sustainable solutions for a context different from its own. The idea is that each university would design a sustainable PSS concept for another campus. Innovative thinking can be triggered in many ways and perhaps a student from one university would bring into his/her project elements from his/her context, elements that are new to this diverse context, configuring a process that can bring rich fertilisation for all.

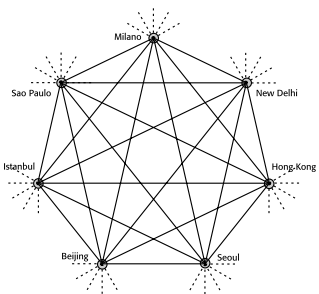

Figure 2: Proposed multilateral **multi-polar** network

A positive consequence of an operation of this sort would be the activation of "South-South" collaborations, through the connection of different emerging contexts. This is a desirable but rarely explored kind of collaboration that can be extremely fruitful due to both similarities (in terms of infrastructure and social demands and aspirations) and differences (in terms of tradition, culture or social practices) to be found among different emerging contexts.

In this sense it is worthwhile to search for feasible "mechanisms" to make this new model of network operative. A promising path is that of taking advantage from the existing programmes for research of the European Commission that are of bi-regional nature.[12]

6 Conclusions

The proposed model of a multilateral multi-polar network can be a mechanism that contributes for the local disciplinary consolidation of Design for Sustainability in emerging contexts. While promoting a multi lateral kind of collaboration, innovative thinking can emerge, which is an imperative for the research on sustainable solutions.

A major challenge to achieve this aim is the search for mechanisms that can make it operative, i.e. funding. Research programmes financed by the European Community can be a starting point. The EU offers programmes with a bi-regional nature that foresee cooperation between Europe and Latin America or between Europe and Asia. These existing programmes can offer a starting point that deserves to be further explored.

Notes

1 UNESCO Decade of Education for Sustainable Development (2005-2014). http://portal.unesco.org/education/en/ev.php-URL_ID=23279&URL_DO=DO_TOPIC&URL_SECTION=201.html

2 UNEP (2002) Free download at: http://www.uneptie.org/pc/sustain/reports/pss/pss-imp-7.pdf

3 UNEP (2002)

4 The UNEP has created in 2000 the unity of Sustainable Consumption. For details: http://www.uneptie.org/pc/sustain/

5 An interesting example of this approach in the European context is the research EMUDE (Emerging User Demands for Sustainable Solutions), supported by the EU. In this project, design schools have a clear role of observer of innovative sustainable behaviours in society that have a potential to be further developed and up-scaled. The final aim is to amplify these "promising signals" and re-propose them back to society, through a communication strategy.

6 Denis (2000), pp. 203

7 The referred agency is the CNPq Conselho Nacional de Desenvovimento Cientìfico e Tecnològico http://www.cnpq.br/

8 See Nùcleo de Eco-Design of the Centro Sao Paulo Design and Design and Sustainability Research Centre of Federal University of Paranà, Department of Design, http://www.cspd.com.br/home.asp and http://www.design.ufpr.br/nucleo/ .

9 The programme coordinators in each university are as follows: IIT New Delhi: Prof. Dr Amrit Srinivasan, Prof. G.V. Soumitri, Prof. Parag Anand, USP University, Brazil: Prof. Dr. Maria Cecilia Loschiavo dos Santos, André Luiz Teixeira dos Santos. Academy of Arts & Design, Tsinghua University, China: Prof. Cai Jun; Hong Kong Polytechnic University: Prof. Benny Ding Leong; Istanbul Technical University, Turkey: prof. H. Alpay Er, Ceyda Vatan; Ewha Womans University, South Korea: Prof. Cho Young-sik and Sooyun Ahn.

10 Some examples of the didactic results can be seen at http://pcsiwa12.rett.polimi.it/~rapirete/

11 Vezzoli, Penin (2004)

12 The referred EU bi-regional research programmes are Asia Links (for Asia) http://europa.eu.int/comm/europeaid/projects/asia-link/index_en.htm and Alfa Programme (for Latin America) http://europa.eu.int/comm/europeaid/projects/alfa/information_en.htm

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Design and the *Creative Society:* New Roles and Competencies

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Two assumptions represent the background of the paper: the existence of a knowledge-based economy and the rise of creativity in our economy. How these two issues are linked to the growing role of designers is briefly summarised below and will be the focus of the paper. The contemporary global scenario implies, and calls for, renewed professional roles and competencies that are able to adapt to the new economic paradigm, in which the generation of knowledge is one of the most important tools to compete among companies, organisations and countries. The shift to the 'knowledge' economy, and shift occurring in the realm of society at large, where a new class of creative individuals is considered the new key factor for innovation and change. The rise of this 'creative class' has significant effects both at the workplace and in society and has become a decisive source of competitive advantage by adding economic value through.

Though, 'way to create meaningful new forms' within the reach of a growing number of individuals, designers have to acquire a renewed role as 'professionals of design'. Designers have the knowledge and the tools to transform visions into real solutions and to orient the system of production and consumption. The paper will present these specificities of the design by also referring to a Specific Support Action funded by the European Commission and developed by a consortium of 10 European and 8 European Schools of Design. The name of this ongoing programme of activities is EMUDE and it is based on the work of the schools of design considered as Antennas, or detectors, of promising cases of social innovation. In this framework, designers will work to give visibility to the promising cases, to interpret the changes in the demand, to make scenarios of possible futures and to conceive more efficient systems of products and services.

Keywords: *knowledge economy, creative class, professionals of design, sustainable solutions, social innovations*

Introduction

1 Knowledge and creativity: two sources of productivity and competitiveness

The new paradigm of our times has been described as the *knowledge-based economy*, where one of the major sources of productivity and growth is represented by the capability of companies, institutions and countries to produce knowledge.

Today many key authors identify knowledge, education and intellectual capital as the most important factors of production for the creation of wealth and for the development of our economies. Hence human capital plays a key role and represents a high source of competitive advantage among

nations. From the perspective of Manuel Castells, competitiveness in the *Information Age* is given by the generation and the exploitation of information, shaped on knowledge (Castells M., 2000).

The existence of such a *knowledge-driven economy* constitutes an important background for the understanding of the renewed role that designers have to acquire and for any discussion on design education. In fact, to cope with the new structure of actual economies and societies, the competencies, the methods and the tools of design have to be adapted to this intrinsic change. A new generation of designers needs to be trained to read the complexity of our society and to interact with the technical and productive systems in order to orient them according to the most urgent and pressing problems.

Another significantly important factor in modern economies is creativity, which is very much linked to the rise in the importance of knowledge and human capital. What Richard Florida calls the 'Creative Class' has become a key factor of innovation and change. According to Florida, the choices of this leading class are reshaping our way of living, working and producing, by acting on many frontlines and by "producing transferable, widely usable new forms" (Florida R., 2002).

Considering the two pivotal shifts resulting in *knowledge* and *creativity*, we can advance the idea that designers will be more and more consistently part of such a people-driven system, where the capacity to "create meaningful new forms" is fundamental for the change that our society needs to face.

2 Creativity and sustainability: fostering change for the transition

Among the many urgent issues that are currently part of the global agenda, the transition towards more sustainable patterns of consumption is one of the most debated. *Innovative solutions* can persuade people to change their consumption habits and to turn their lifestyles into more sustainable ones. Together with this process from the top, *a social learning* process has to begin from the bottom and has to originate from the society itself.

These two aspects of the transition - providing innovative sustainable solutions on one side, and learning how to change the consumption habits on the other - are very much linked to the role of designers and to their intervention in this sphere. In fact, designers can contribute to both the processes, not only by working out strategies for '*how it can happen*' but also by producing visions of '*what it could be*.' Such an effort is part of the overall creative process that is already going on in our society and has to be further developed and enhanced. For this reason, as part of the 'creative class' that Florida delineates, the *design community* is called upon to facilitate the global shift and to orient the change that is taking place more and more rapidly.

It is inside such a complex scenario of our socio-technical systems that designers are called to operate, with the purpose of promoting innovation (notably the innovation towards sustainability), which appears to be social instead of technological, bottom-up instead of top-down and driven by a network of actors instead of one single institution (Manzini E., 2004).

Discussion

3 The 'creative society' and the designers

All over the world there are examples of *social innovations* carried out by individuals or communities to improve their conditions of life or in response to the call for more sustainable patterns of consumption. Such actions are performed independently by individuals, who aim at finding new solutions to everyday life needs related to daily functions such as eating, commuting, working, shopping, house holding, etc. These people are not necessarily engaged in sustainable consumption but the solutions they produce can be potentially sustainable.

It is at that point that design might legitimately enter, contribute with its methods and tools and deliver its specific knowledge. In fact, as creativity has become one of the driving forces of our time and is increasingly shaping economy, especially the global informal economy, designers have to

strengthen the creative process that is now within the reach of a growing number of individuals. Moreover, taking into consideration this wave of creativity that is shaping our society, designers are called upon to renew their role as 'professionals of design' and to rethink how they contribute to the shift.

We can classify as *creative society* those segments in the society that stimulate the learning process towards sustainability by doing it in a *self-organised way*, with a *bottom-up approach* and on a *context/community base*. Examples are represented by the following few cases:

- mutual purchase communities (groups of people that organise themselves to shop in turn in order to reduce costs by buying at wholesale);
- local exchange trade systems (LETS) (groups of people that exchange services instead of money);
- walking buses to school (groups of parents who walk to school their children, in turns);
- home micro-nurseries (mothers who take care of a number of children in their own homes together with their own children).

We call the above examples 'forms of social innovations' and we wish to point out that they are springing up, in many different forms, throughout the world[1] as an evidence of the global creative process that is moving society from the bottom-line.

4 Facilitating the 'virtuous cycle of social innovation'

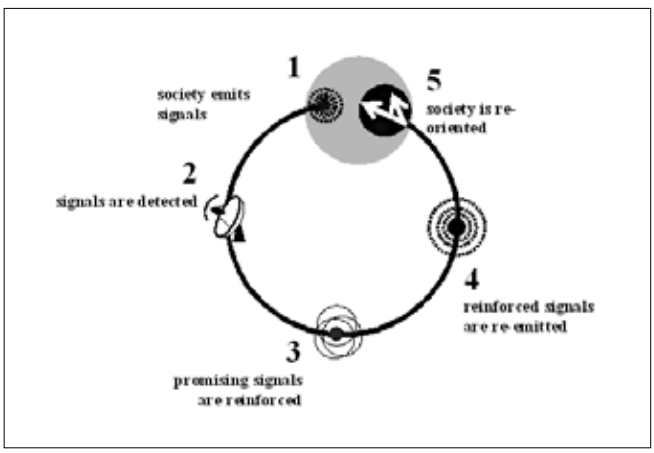

Fig. 1 Scheme of social innovation virtuous cycle

How design can enter this global creative process is explained in the following scheme, which represents the 'virtuous cycle of social innovation.'

The above scheme represents the model through which positive signals emitted by the society are detected, reinforced and then communicated to the society to trigger a change.

The contribution of design appears in all the operative steps of the cycle as explained hereafter:

- Step 2: due to their specific training, designers are able to look at the phenomena that are occurring in the society (and, those that are not within everybody's reach). They are able to filter them and extract the most interesting to be further developed into solutions;
- Step 3: thanks to some specific design tools, such as the *design oriented scenarios* methodology, the positive phenomena are analysed and, when possible, expanded into potentially interesting solutions;
- Step 4: scenarios of innovative solutions are conveyed to the society in a visual and synthetic form.

Such a process starts from the *forms of social innovation* that originate from some groups of the *creative society* and it is boosted by the action of design. In other words, the designer acts as a system facilitator and his strategic role creates a platform of common knowledge, tools and partnerships to develop a given solution.

The renewed role of 'professionals of design' is closely linked with the above-described rise of creativity and with the new structure of society that comes from it: a structure that is, first of all, based on the new social and productive networks that are being created. It is to those networks that a designer can relate in order to:

- develop non-conventional solutions on the base of real cases emerging from the signals that the society emits;
- realise prototypes or propose ideas that can be further implemented;
- collaborate on the construction of scenarios, by generating visions of possible worlds (Manzini E., Jegou F., 2004).

5 EMUDE: a new role for design schools and for young designers

From the above discussion, the society appears as a big laboratory of ideas to which designers should refer. The forms of social innovations express the willingness of the people to get solutions to their needs. In other words, they represent the users demands, on which designers could work.

On the basis of this assumption, EMUDE (Emerging Users Demands for Sustainable Solutions) started in June 2004 within the 6th Framework Programme as a Specific Support Action. The theoretical background of EMUDE takes origin from the '*virtuous cycle of social innovation*', which also represent the EMUDE project outline. Two groups of actors are involved in it: a consortium of 10 European partners and a network of the so-called *Antennas*.

The *Antennas* are the innovative side of the project and they include a number of design schools (so far 8 schools have been assigned), disseminated all over Europe and engaged in the 'info hunting' activities.

The 'info hunting' is a detection process of *promising cases* of social innovation, from which a catalogue will be produced and will be the working base for the other steps of the 'virtuous cycle.' All the work of the Antennas corresponds to the first step and is based on a field activity operated by the young designers of the schools. The designers are trained to explore society and to root out the most promising cases.

Such a methodology represents an innovative way to look at the society with a privileged eye, as designers are potentially able to recognise what is more interesting to be developed, what is more feasible and reproducible on a larger scale.

Conclusions

The final intention of the EMUDE activities is to search for isolated cases and to make them mainstream in order to give consistence and support to the transition towards sustainability, which so far has been happening slowly but which actually requires a radical discontinuity. And this radical discontinuity can be promoted and prompted by the new generation of designers, who will be able to work with the new conditions that the knowledge economy produced and with the new emerging value of widespread creativity.

Note

1 For many other examples, see Manzini E., Jegou F. (2003). *Sustainable Everyday. Scenarios of Urban Life* and www.indaco.polimi.it/emude

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The Relevance of Introducing Design Education in Schools

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Gayatri has been teaching Toy Design and Product Design students. The courses include toy design, game design, systems design, nature and form, design for special needs, design for craft development and design methodology. She has also been involved in the development of course structure for the newly initiated Toy Design program.

She has published articles on various aspects of toys and presented papers in international conferences. Gayatri has been conducting workshops on therapeutic toys, educational toys and make it yourself toys in various parts of India and abroad. She has also worked on the UNIDO sponsored programmes for the capability building of the Indian toy industry as the project head.

She has participated as a tutor in the international creativity workshops on toys held in Italy, Germany and UK and in toy making workshops in Japan and toy design workshop in S. Africa.

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Is design education meant only for students who aspire to be designers at a graduate or postgraduate level? What is the role of design thinking and doing for society in general and children in particular? Can design thinking help in the overall development of children? These are some of the questions which come to mind while thinking about design education for schools

What makes design education relevant for schools? Some of the salient features of design education and pedagogy includes learning through experience, learning by doing, holistic perspective, questioning, curious attitude, empathy for user, understanding of society and culture, acceptance of technology and media etc. Design for schools needs to be seen both in terms of its content and method.

How should design education be introduced? Should it be a separate course or an integral part of the overall education curriculum? The process of introducing design education for children has been introduced in countries like UK and Singapore. The paper discusses some of the issues and concerns regarding the approach of introducing design in Indian schools.

The paper also gives an overview of the national design and creativity camp 2004 organized at NID for teachers and children from all over India. Examples and case studies from the experience of this workshop will be discussed.

In order to make design education an integral part of school education various factors including developing teachers training module etc. needs to be introduced. Design institutions also need to introduce more designers to work with children and other community concerns. Examples and case studies of introducing industrial design students to work with children at NID, India and TWR, S. Africa are also discussed.

Keywords: *children, learning by doing, education curriculum, teacher training, community concerns*

School Education: Reality and Vision

"Happiness is when what you think, what you say and what you do are in harmony." – Mahatma Gandhi.

Our education system today seems to be too detached from real life issues and concerns. What sort of education do children need for their overall growth and development? Is the current system of education providing it? In a nation having more than 40 percent population of children below 18, the development and education of children will play a very important role in the overall growth of the country. What is the role of design in this context?

Why don't most children look forward to going to school for studies? Why has education become such a burden for all — students, parents and teachers? The activity of learning, thinking and developing is such an integral part of the child's psyche that it seems strange when they do not want to learn.

One of the reasons could be the fragmentation in the learning process and its distancing from the real life. Education today in most of the schools, colleges and universities seems to be uninteresting and purposeless in the real context of life. We find a great deal of fragmentation in the learning of socio-cultural aspects, science, humanities, arts etc. Education has become a mad rush for certificates and degrees and not for learning.

This approach in our educational system also has a very detrimental long-term effect on society. Paulo Freire, who has worked a lot in the area of education sociology talks about the 'Culture of Silence,' wherein the education system makes people complacent and nullifies critical awareness of their surroundings instead of encouraging and equipping them to know and respond to the concrete realities of the world. Here the role of education becomes limited to facilitate the integration of the younger generation to the present existing social system and thinking and makes them conform to the same standards and values. Education in a true sense needs to liberate the spirit, a practice of freedom through which the educated people are enabled to deal critically and creatively with reality and discover how to participate and bring about a positive change in the world around them.

Some three decades ago it was Ivan Illich who had brought forth the idea of education in any society being a part and parcel of its socio cultural environment. We find that the many illnesses and degradations of our society are directly reflected in our educational environment. But the interesting fact is that this educational environment in turn also contributes to further degeneration of the society as a whole. And it is this vicious circle that needs to be broken.

"I work, and working I transform the world,' says a Brazilian labourer educated by Paulo Freire. If each and very educated individual were to work accordingly what a positive change it could bring about in the world!

Design Pedagogy and Creative Thinking

There are some salient features of design pedagogy that make learning interesting and meaningful. The emphasis in design pedagogy is on synergetic understanding and purposeful creativity. Design by its very nature seeks to 'transform' and change things for the better. It responds sensitively to changes happening in real life – in terms of socio-cultural issues, technological changes, market forces, living patterns etc. Design requires inputs from diverse fields of knowledge and needs to bring about a holistic understanding and perspective. The challenge is to translate this understanding into a tangible reality — a new design. This involves lateral thinking, creative processes and execution. Together they constitute the core of design – purposeful creativity, holistic understanding and approach, lateral thinking, and most importantly 'learning by thinking, learning by doing.'

Today, in most schools, understanding is substituted by 'knowledge' and rote learning. Creativity has been reduced to art and craft classes where the emphasis is more on developing skills /techniques than on creative thinking. Risk taking experimental approach is minimized due to the pressure of competitive exams and educational activities themselves are in most cases far removed from real life situations. Some of the fundamental principles of learning, such as understanding real life contexts before moving onto abstract concepts and notions, understanding of immediate issues to more complex ones and initiation of the learning process based on the interest of the students are often completely ignored.

Learning by experience should be an integral part of education. If a child reads something he might forget it but if he does something he remembers it for life because he has gone through the experience of doing. This doing in turn will lead the child to curiosity and further thinking. "Learning by doing and learning by thinking" should become an integral part of education, especially in the primary schooling.

Creativity Workshops: Making Learning Playful and Fun

"We the children are experts on being 8, 12 or 17 years old in the societies of today… to consult us would make your work more effective and give better results for children. My proposal is that you make us part of your team." — Heidi Grande, 17, The State of the World's Children 2003, UN Special Session

Mr. Sudarshan Khanna, Head, Toy Centre and I have been conducting creativity workshops with the objective of making learning playful and fun for teachers and children. While conducting workshops, our main aim is not just to teach them to make toys, which can be used as educational aids, but to imbibe the spirit. During the workshops the teachers are encouraged to take up basic play and toy principles based on the activities a child would enjoy. Learning aspect like colours, alphabets, numbers, concept of inside-outside, body parts etc. are creatively interwoven with playful activities individually by each teacher during the creative brainstorming session.

The resulting toys of this one day workshop might be crude models but they can be directly used as part of the education process and it opens a door to 'make learning fun' an intrinsic part of the education system. The idea is not to "teach" the teachers how to make toys but to empower them to make such playful educational material for their own customized purposes.

A learning process that is built on playful activity, the natural curiosity of the student and from his environmental surroundings cannot be anything but fun. Take the example of the elephant and bird toy designed by us at NID. It is simple enough to be made with day-to-day materials by children. Children enjoy playing with it and even more so enjoy the story behind it as to how the big elephant is lifted up by the tiny sparrow. But our story does not stop at that. The child finds it curious as to how this happens and his discovery into the science and principles behind it begins. What is the force that lifts the elephant up?

We also conduct workshops for children based on such toys. The children have to make the toy themselves. In one such workshop instead of taking materials with us we told the children to collect materials from their surroundings. They came back with twigs from different trees and found that some worked and others did not because some twigs were heavy and some were light. The moisture content and density of each tree twig was different. This was a good lesson in ecological and environmental understanding and all through a simple toy. Making a toy is often a far bigger learning than playing with a toy.

The bird flies and lifts the elephant up! This is exactly how the education process ought to be: a process of learning how to fly. Learning is not a body of knowledge to be gulped down and vomited but the process of getting the wings to fly.

Such workshops did help in bringing about awareness for the need of making learning a creative process. It also made us understand and appreciate working in a participatory manner with teachers than children rather than designing 'for' them. However it was also felt that some long-term initiative needs to be taken in this area.

National Design and Creativity Camp 2004

National Design and Creativity Camp was conducted from 21st to 30th October 2004 as a joint initiative by the National Institute of Design and the British Council. This pilot workshop explored possibilities of introducing design and creativity module in schools.

Background and approach

"…Education in the true sense is the understanding of oneself, for it is within each one of us that the whole of existence is gathered." — J.Krishnamurthy

The national camp was envisaged as a pilot workshop that explores the relevance of introducing design and creativity module in schools and the ways and means of doing the same. The camp was meant to be experience based and sought to initiate a dialogue with children and teachers from

select schools all over the country while introducing them to design and creativity in everyday life and initiating the process of self-learning and discovery learning.

Design education module has been introduced in countries like Singapore and UK. In Britain, design and technology has been introduced in school education through the government initiative. Schools can opt to offer design and technology course to students who would study it as one more subject in the school curriculum. It was found to be more effective to introduce design along with technology because of the quantifiable nature of learning in technology and because of the possibility of linking with the technical workshops already existing in schools. The pilot workshop conducted in Singapore was titled 'Ways of Looking' and was meant to sensitize children to the visual vocabulary of design.

Our objective and approach to conducting this camp has been slightly different. The idea was not to introduce it as one of the subjects but to integrate it within the overall education system with due emphasis given to understanding the socio-cultural diversity of India and link the traditional with the modern. The main theme was to expose children to the generation and realization of creative ideas individually as well as in a team. The method would be experience and discussion based and may involve working with materials, media etc. Schools were invited from four cities: Delhi, Mumbai, Ahmedabad and Coimbatore. 13 teachers and 17 children from 11schools participated in the camp.

As already discussed, the approach of introducing design in schools was not to make more children take up design studies and become designers but to sensitise the children and to strengthen education through design pedagogy.

How to Introduce Design and Creativity Module in Schools

Most schools in India today are highly competitive and the emphasis is more on knowledge (often rote learning) than on understanding and creative thinking. We believe that introducing design and creativity module in schools can make a significant difference in the way children learn. Different scenarios were put forth to understand how to introduce the module in the existing education structure.

Scenario 1: Most schools do have art and craft periods but the emphasis is more on developing of skills than on creativity and purposeful expressions.
Scenario 2: Introducing design and creativity as part of field visits.
Scenario 3: Introducing design and creativity as a separate course in the syllabus.
Scenario 4: Introducing design and creativity as part of current educational syllabus.

These different scenarios were worked out so that it would help in decision making, planning and defining the future scope of this pilot project. The objective of the camp was to introduce both teachers and children to purposeful creative activities based on real life experiences. Accordingly assignments and activities were worked out around sensitization of materials and media, socio-cultural understanding and creative idea generation and lateral thinking.

Sensitisation to Materials and Media

a Purposeful creative expressions

The objective of this exercise was to inculcate sensitivity and understanding rather than the mere use of skills and techniques. Different assignments to enhance perception included a sense of composition based on surroundings, material exploration, visualization in colour and black-white, and personality and caricature explorations.

- Participants had to visualize and select a suitable background for composition of their own photograph according to his/her wishes.
- Exploring paper and its qualities without using any tools.
- Visualization of events and expressing the same in abstract.
- Understanding the nature of paper and charcoal and work on positive and negative imagery accordingly.

- Making the caricature of self and that of partner seated in front, with emphasis on observation and understanding of personality

b Film appreciation

The workshop and presentation were introduced to enrich the understanding and sensitivity towards media. Two films were shown: "A Bag of Rice," a child oriented Iranian film in which the participants had to enact the imaginary end of the film after seeing the first half. This helped the participants to get involved in the context of the film, understand the characters and think of an appropriate ending accordingly. "Hirok Rajar Deshe," a Bengali film by Satyajit Ray was also shown in which they had to represent their ideas through a collage.

The gist of the film was told before watching it and then the participants were divided into groups. These groups had to focus on different aspects of the film to sensitise them to various aspects of the media such as authority and oppression; fantasy and reality; the use of sets; costume and colour symbolism; music, dialogues and sound effect, etc. Each group then represented their theme in the form of a collage.

Understanding The Social Context

a Living patterns of a community

The assignments given during this day related to the understanding of the social and cultural context of the rural society, taking inspiration from the surroundings to bring forth creative expressions in a participatory manner.

The participants were taken on field trip to Nal Sarovar to interact with villagers and students studying in Gantar which is an organization looking after children of villagers who migrate to the cities and towns for jobs. In the villages, the children go to school but after school they come to Gantar, which is their home without parents. Here the teacher, called Bal Dost — "Friend of the Child" takes care of them.

The participants went to two villages where they observed the different living patterns of villagers. The visit and interaction helped in understanding their way of living — clothing, house structures, traditions, food and other aspects of daily living. The participants, along with children and Bal Dost from Gantar, were divided into mixed groups and a different theme was given to each of the six groups: 1 – learning, 2 — family life, 3 – environment, 4 — aspirations, 5 — children and work, 6 — play and entertainment. Based on the interaction each group came up with expressive models and charts to depict their learning and understanding of the given topic. Models/charts were presented at the community gathering and the observations of each group were shared.

b Visualisation and Mapping

The exercise helped the participants to be more observant of their environment and surroundings, and to enhance their visualisation abilities and depict the same through maps. The participants were taken for the Heritage Walk through the walled city of Ahmedabad to get inspired by its forms, colours, while bearing in mind the passage of time and light, weathering and the quality. After coming back to NID, they were introduced to similar work done in UK highlighting different geographical mapping notions such as cross sections, levels, aerial view, maps, horizontal plans etc. The participants were encouraged to represent their maps in a non-figurative form on aspect of the walled city laying stress on their emotions/feelings. Accordingly, models and charts based on impressions and feelings were made and presented.

Creative Idea Generation

a Enhancing experiences

The objective of the assignments given was to introduce the participants to creative problem solving

and idea generating methods and to provide them with a hands-on experience. They were distributed into 6 groups and those 6 groups were divided into two themes —waking up and journey to school. The participants had to understand their own common experiences, feelings, moods of waking up and then come up with different creative ideas on enhancing the experience for themselves. Piggybacking of ideas, sharing experiences and acceptance of wacky ideas was encouraged.

Edward de Bono's idea generating methods were introduced and used. Each group came up with a creative 3D model for making waking up/going to school an enjoyable experience.

b Education through play

The objective of the assignments given was to build and enhance the link between regular subjects like science, history, etc. and creative design related activities through play.

The participants were introduced to simple traditional toys from various parts of the world. These toys involved application of scientific principles and the participants were encouraged to deduce the scientific principles used in the making of these toys. Explorations on sound creation through the use of a small piece of paper also encouraged the idea of creativity through minimum resources.

The participants were divided into six groups and each of the group made two toys: 'flip flop' based on the principle of hinges, and the magical 'stop and go' toy based on dynamic motion. The challenge for the groups was to see how these toys could be applied in a classroom context, making it on a larger scale. The results were very diverse, interesting and impressive and ranged from stage props for teaching Egyptian civilization in history classes to story telling, poster making and alphabet learning.

Feedback Sessions

The teachers and the students worked separately and discussed their feelings and impressions of the camp. The teachers focused on how design could be introduced in their classrooms. They were more interested on how to apply the techniques learnt. The students also had a feedback session where they shared their feelings and impressions.

Teachers' Feedback

- The process is as important as the end product.
- Group exercises and resulting synergy is important.
- Sensitising different senses is important for overall development.
- Creativity in classrooms breaks monotony and makes learning more interesting.
- A positive approach should be taken to bring out the best from the students.
- Some exercises could be more easily introduced than others due to lack of resources and time in schools.

Students' Feedback

- Teaching method is as important as the content.

Methods

- Participatory group activities and team work was enjoyable.
- Encouraging positive attitude without any comparisons.
- Element of surprise and discovery.
- No performance pressure/fear of non-performance.
- Developing confidence through presentations.
- Personal attention given and opinions heard.

Contents

- Hands on experience.
- Creativity is much more than art and craft.
- Observing and making extraordinary things from ordinary objects.
- Exposure to a wide variety of materials and media.
- Understanding and learning from different communities.

The results of the National Design and Creativity Camp were exhibited and the participating teachers and children got a chance to explain their work to a larger audience. Some preliminary discussions were also conducted with government officials. Although it was a pilot project, it did give some indications on how to enhance the scope of work and carry forward this activity. The enthusiasm and interest of children was especially encouraging. The teachers promised to carry forward this activity in their respective schools and send the results of their experiences back to us within the next 3 months.

Could design be introduced in schools in a way so that the activity carried out during this period could directly be connected to learning of other topics like science, social studies etc. so that it can result in the process of integrated experiential learning? How open will schools be to carry out these activities in the highly competitive exam oriented system? What about the training required for a large number of teachers who will need to be trained and oriented to design thinking? How many designers are oriented to working with children? These are some of the questions that have no immediate answer but the process itself could lead to definite solutions.

Training Designers to Work in the Area of Designing for Children

One of the most crucial requirements would that be of trained teachers who could take design pedagogy to schools. Teachers are facilitators and guides in the wonderful journey of learning for a child. It will only be through their endeavour and commitment that it could be made possible to introduce some of these modules and methods in the existing school system. It also brought forth another significant query. Are there enough designers who are working in the area of designing for children? Are design institutions ready to take up this area as an important area of intervention for designers?

I would like to summarise the experience of structuring courses and guiding students of postgraduate toy design program at NID, India and final year industrial design students of TWR, South Africa in the area of designing for children.

In 2001, NID started a specialisation PG program in Toy Design and Development, the first of its kind in Asia. Courses like Toy Design and Systems Design offered new directions and approaches to design methodology for toys. Designing toys for children offers some unique challenges in this respect. Children will play with toys only if they find it playful and fun. Logical explanations of its worth and flashy presentations does not make a young child change her mind regarding the toy. Children's play behaviour inspires ideas for new toys, their imagination and innovation in playing with rough models helps in improving the worth of a toy. It is this participatory nature of designing with children that helps in coming up with unique user-centric design methodologies. Designers may start looking at users not just as people for whom services are to be offered/sold but also as intelligent, creative people with whom designs can be made.

I have been guiding students on various projects and courses which include drawing inspiration from nature for designing for children, designing for industry sponsored projects, designing for community needs and craftspeople, developing game strategies, and making toys from do-it-yourself methods to hi-tech electronic toys.

Many of our students have shown great interest and worked a lot on toys and games. Although seemingly small and insignificant compared to many other educational media, toys are a rich resource of tradition and crafts, science and technology, socio-cultural aspects and represent the collective creative energy of the past and the present people.

While structuring the course for the students of Technikon Witwatersrand, TWR, South Africa, many thoughts came to my mind. What is the role of a designer in multi-faceted nations like India and South Africa? How can design education equip designers to deal with a broad spectrum of problems and opportunities? How can the aspect of user-centric design methodologies and practices be incorporated and integrated as part of design education? Are designers, like other professionals, becoming more isolated from the society? Design can be a powerful tool to make a positive impact in the society. How can designers react to the social-environmental set up around them and make a positive difference in this respect?

The second paradigm of today's times is the focus on mass manufacturing. Coming from a country where one finds multiple cultures and layers of social and economic strata, one learns to understand and appreciate the differences in the ways of living and thinking. What is the role of designers in bringing about a positive intervention for the society – the environment of which he is a part? This is something that, although of great significance, has not got received attention from the international design community. How do you design for a heterogeneous population? Design that does not involve and benefit the vast majority of diverse people in countries like India and South Africa will remain an elitist phenomenon not affecting the vast majority of people.

Toy design offers some unique opportunities and challenges. Can user-centric design be integrated as part of design methodology and practices? Can design development possibilities be explored for different scenarios – whether industrial or social — with equal ease and competence?

Conclusion

Education and learning needs to be a voyage of discovery and fun. The starting of such modules in mainstream education could be the first small but significant step in the direction of a participatory and playful approach to education and to the revival of the mainstream education system. We know it is not possible to make radical changes in the existing educational systems but some much needed inputs in this area, even in a small measure, can be a good beginning. Introducing a module on playful activity and thinking based education, coming up with creative design solutions for real life situations as well as a module on making the process of learning fun can be easily done.

Industrial designers can make a difference not just to the typical industrial and corporate set-ups but also for the society in which they live. Active involvement of designers in the area of education system could bring about a significant change in the future scenario!

"Your children are not your children.
They are the sons and daughters of life's longing for itself…
Their souls dwell in the house of tomorrow, which you cannot visit…
You are the bows from which your children as living arrows are sent forth."
— Khalil Gibran

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Torn between Tradition and Modernity: the Future of Design Education Directions of China

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The rapid economic development of the People's Republic of China (PRC) in the past two decades has transformed commercial design for promoting consumption in the country. Design is no longer viewed as the evil it was once considered to be. The ensuing expansion of design activities and design programs has been phenomenal. China is a craft rich country with a long-standing tradition in arts and crafts. The new modern medium – design, combined with a touch of arts and crafts, technology and marketing – is considered a Western import. This study addresses the development of modern design education from a historical perspective with a focus on the interactions between tradition and modernity in China. The paper reviews the formative years of modern design education development during the Republican period (1911-1945) and the most recent rapid expansion following three decades of isolation from the outside world. The author argues that the pattern of the development of the last decade was very similar between these two periods. Although the 1978 Open Door policy of market economy reform gave a much clearer concept of what design is to society than in the past, design educational reform in China is yet to be defined. This study aims at initiating further discussion especially on the interaction between modernity and tradition in design educational development in China. Instead of providing a hasty remedy for the present or the future, this paper will provide a basic understanding of the development Chinese design education so far, while providing future direction for continued growth in this area.

Keywords: *tradition, modernity, design education history, China, Chinese culture*

1 Introduction

In the foreseeable future, China is expecting to become one of the world's biggest economic players. With the open market economic policy, commercial design with the purpose of promoting consumption is no longer viewed as the evil it was once considered to be. The ensuing expansion of design activities, such as design competitions, establishment of designers' associations and design publications, has been phenomenal since the mid-1990s. Among these activities, graphic design was the most prominent area that received attention from both local students and the international design community. Although China has endorsed the Open Door Policy and is implementing market economy reforms since 1979, it was only in the 1990's that graphic design activities started to take off thanks to the increasing business opportunities available to local Chinese graphic designers. The 1990's not only witnessed the growth of Chinese graphic design, but also marked a very important era in the art and design education history of China. The economic boom in the early 1990s provided business opportunities to the local talent with art skills, enabling them to demonstrate their ability through commercial work. It also required a rapid expansion of design programmes in the higher education sector of China to meet the demands of a growing market.

These developments meant that graphic design work was all of sudden receiving a lot of attention from people from all walks of life, ranging from young students, business people, government

officials and academic personnel. This was particularly evident at the initial stages in Shenzhen, a small village adjacent to the border of Hong Kong. Under the economic reforms led by Deng Xiaoping, Shenzhen became the first Special Economic Zone with market economy privileges like those enjoyed in a capitalist system. Due to the geographic proximity of Shenzhen to Hong Kong, Shenzhen was able to attract a good number of investors from overseas and within the country, and soon became a magnet for workers with different skills from all over the nation. Among them were graduates from art and design schools, recruited to work for the newly established private companies on commercial jobs. Within several years, this group of university trained graphic designers accumulated work experience and self-confidence. In the early 1990's they struck out on their own, establishing their professional reputations in society.

It was in Shenzhen that a group of graphic designers from different provinces formed the first professional graphic designers' association in China under the communist regime. The Shenzhen Graphic Design Association was established in 1996. Many of its founding members met each other while they were key participants in the first intra-regional competitive show, *Graphic Design in China '92*. It was also the Shenzhen Graphic Design Association that first initiated the intra-regional thematic poster design show — *Communication*, in corporation with designers associations from Taiwan, Hong Kong and Macau in 1996. This event generated a fad of thematic poster show frenzy in various cities in the following years. The poster exhibitions were important because they introduced international design to the local Chinese graphic design community, finally bringing them up to date with international design developments during China's years of isolation. In 1999, thematic poster exhibitions reached its height with exhibitions such as Opening of Design Museum in Beijing, Shanghai International Poster Invitational Exhibition, and International Fashion and Culture Poster Exhibition in Ningbo (Wong, 2001).

The trend of poster design exhibitions also resulted in the publication of numerous exhibition catalogues in high quality offset printing. China had been isolated from the outside world for almost three decades and the flow of information from the outside had been very limited. Now that was soon to change. For the first time, publications printed in China were able to achieve high quality with an affordable price for local readers. The investment and experience from Hong Kong was transferred from Hong Kong printing companies to the Mainland branches. Areas such as Shenzhen and the Pearl River Delta region benefited the most. Within a short period, many major publishers (including university publishers) rushed to publish design books, hoping to profit from the trend. Although most portfolio books on world design masters seldom have analytical comments or basic informational text, for the Chinese audience, they helped fill the gaps in knowledge of what had happened in the international design world during China's decades of isolation.

Thus, increased commercial opportunities and availability of the glossy design books were two main forces that contributed to the rapid expansion of design programmes within the higher education sector. Actually under the surface, the "Outline for the Reform and Development of China's Education" reform policy introduced in 1994 by the Chinese Central Government (Ding, 2001) played an important role. Here I argue that the government reform policies on economy and education together with the external commercial forces and publishing phenomenon of design books contributed to the rapid development of design programmes. If the commercial force represents the "modern" force and the old design education represents the "traditional" force, it was a confrontation between these two forces once again. The friction between tradition and modernity marks the history of art and design education in China. In order to discuss the current and the future direction of design education, it is necessary to go back to its past and examine how historical developments contributed to the present and how it affects future developments. However, the objective of this study is not to provide a remedy in any form for the design education reform in China but rather to deliver better understanding of the development of design education in China and point towards future directions.

2 Phase One: The Formative Years of Modern Design Education in China

China is one of the four ancient civilizations and over its 5000 years has developed a rich tradition of history and heritage. The four ancient inventions of China — compass, gunpowder, paper and printing — belong to the glory of the old Chinese civilization. However, the inward looking policy implemented by the Ming Dynasty in the early 1400s made China suffer greatly in self-isolation for centuries. The proud kingdom was forced open by the Western powers in the mid-1800s, suffering through a century of foreign invasions, civil unrest and wars. During this period, after centuries as a leading civilization, the ancient Chinese culture finally encountered the newly evolved advanced Western technology. So began a new era of Chinese interaction between tradition and modernity. The impact of the modernity that foreign powers brought to China is very important in the context of contemporary Chinese history.

Modern design is considered a Western import in China. The "term 'design' does not have a natural equivalent or a directly translatable term in most Asian languages" as pointed out by Rajeshwari Ghose (1990, p. 3) in 'Studies of Design and Development in South and Southeast Asia.' China is a craft rich country with a long tradition of arts and crafts. Many Chinese scholars of art and design education and history will argue that China has a long tradition of modern graphic design equivalent arts and craft work (see Yuan, 2003; Wang, 1995) or the work of "gongyi". Indeed we can easily find ancient graphic work samples, such as the yin-yang and I Ching symbols created in ancient times are the classic examples. Minick and Ping (1990) claim those examples are the creation of balance "within the discipline of Chinese design" and "is deeply rooted in the Confucian conception of the artist-scholar" (p. 11). They point out that the "Confucian tradition defined artistic excellence through the mastery of poetry, music, calligraphy and painting" and so "[I]t is also a key by which the Chinese designer develops a broad interdisciplinary understanding of the design process and is able to form a strong and unifying link between concept and creation" (p. 12).

What Minick and Ping said may make a perfect sense in today's understanding of design education. However, to the late Qing government, at the turn of the 20th century, the modern design brought by the Western powers was about advanced technology and technical skills training. The term "gongyi" no longer refers exclusively to wide range of ancient arts and folk handicrafts but also to the semi-machine made handicrafts in a modern manufacturing context based on the traditional handicrafts. This term was first incorporated in the early education system for the training on handicraft skills by the late Qing government in 1903. The extension of this term, "gongyi meishu" was borrowed from the Japanese kanji in the late 1920s as a reference to the applied arts (Yuan, 2003).

During that period, the Japanese arts and crafts education model influenced the early gongyi education in late Qing period (Yuan, 2003). With the success of economic and modernization reforms in Japan, the late Qing government found the Japanese model had more relevance to its culture than the Western one. The skills and drawing based vocational gongyi education was slowly picked up in the early 1900s. At the same time, there was a heated debate about whether the training of arts and craft should be the enhancement of individual tastes or a practical skill based subject as was already started among Chinese educators. However, with the urgent needs for industrialized development, the skill-based training was in high demand.

During the early 1900s, the commonly used terms were gongyi meishu jiaoyu or meishu jiaoyu (arts and craft education). Other terms such as satyong meishu jiaoyu (applied art education) and tuan jiaoyu (pattern education) were generally used during the Republican period (1911-49). "Tu" means diagram, chart, picture and portrait and can refer to intention, plan and purpose. "An" means a physical object of a narrow long table, bench or a legal record. "Tuan" (pattern) was a phrase that used in Japan to refer to design and the Chinese borrowed it for use in a similar context. In the 1920s, Japanese education had a great influence in China in many disciplines (Ding, 2001) including art and design. Students were sent to Japan to learn and study. Among the overseas Chinese students, the early art and design educator – Chen Zhifat was the first graduate from Japan specialized in gongyi tuan. Chen gave a clearer definition of tuan as a drawing and plan for the purpose of producing

of artefacts (Yuan, 2003). This general definition of tuan indicated a modern approach of design education in China, and the potential of its practical implications. During this period, all the above terms were used interchangeably to refer to modern design that we understand it today. Apart from the major influence of Japan, new modern Chinese art and design schools often used a mixed pedagogy from other Western countries such as Germany, United Kingdom, France and America (Yuan, 2003).

In April 1918, the first government funded art school with a design (tuan) department, National Beijing Arts School, was established under the advocacy of Cai Yuanpei, an important educational reformer in the history of China. Later the school was renamed the National Beijing Specialized Art School and put under the directorship of a newly returned French educated artist Lin Fengmian (CAFA, 2004). Lin was an important modern Chinese artist with a painting style that integrated Western flavours and Chinese spirit. He advocated a revival Chinese art through a process of understanding Western art, researching Chinese traditional art, and then balancing Chinese and Western art to create the new Chinese art with a contemporary touch. His voice was not alone. Examples of the practice of both Chinese and Western theory can be found in the commercial work in the industry during this period.

In the spring of 1934 the first professional design organization in Shanghai, Zhonggong Gongshang Meishu Zuojia Xiehui (China Commercial Artists Association) was established (Yuan, 2003) to promote commerce and business in China (ZGMZX, 1937). The establishment of this professional body marked the early development of "modern design" in China, and the transition of ancient gongyi activities to a modern profession, commercial art and design. In the catalogue of the show organized by the Association, one of their members criticizes the mainstream gongshang meishu in China, which at that time was full of "Western style" imitation work, and there was a lack of studies on how ancient gongyi can adapt to the modern context (ZGMZX, 1937). From the comments of this early pioneer, we can see that the word and concept of "design" in modern China did not stop at the terminology of profession and activity, but rather, as a signifier that reflects the national identity.

According to the studies by design education scholar Yuan Xiyang (2003), the formative years of arts and design education during the Republican period suffered from the restriction of a weak social and economic environment, unstable political climate, poor social status of gongyi meishu and inadequate education funding. Although from the year 1911 to 1927 had a small boom of both government and privately funded arts and design schools in Shanghai and other cities, most of them were short lived and suffered from a lack of qualified teachers. Students in general lacked interest in research and study of arts and design theories. And the influence of the traditional Confucian teaching and practices continued to have an effect on the society and individuals. Yuan's observations are evidence of the failure of early Chinese modern education reform where reformers call for the "cultural task of moulding a 'modern' Chinese 'person'" (Borevskaya, 2001). The promotion of "Chinese learning as the essence and Western learning for its usefulness" (Zhong and Hayhoe, 2001), a slogan originating in the late Qing dynasty, was never successful. Similarly, Lin Fengmin and many pioneers advocated a new direction of Chinese arts and design movement and education, one integrating the best essence of Western and Chinese arts in the 1930s. Unfortunately, all the new developments were disrupted because of the Second Sino-Japanese War from 1937 to 1945. I argue that the development during the Republican period was the first example of the tear between tradition and modernity in the history of design education in China.

3 Phase Two: The Great Expansion and the Immense Confusion in the New Era

The formative years of modern design education in the Chinese language played a very important role in the history of modern design and education in China. The early art and design education during the Republican period was more than just finding a way to teach a modern profession to an

ancient civilization; it was the process of modernization and progress, which required time. The Second World War was followed by three years of civil war with the Chinese Communist Party, and led to the end of the Republican period headed by the National Party. The National Party was defeated and fled to Taiwan. Under the communist regime, arts and design education faced a brand new direction and an ideology opposing capitalism. As locally trained scholar Wang Shouzhi (1995) emphasizes, design activity under the communists before the introduction of the Open Door policy in 1979, was mostly to service party propaganda. In the period between 1950s through to1970s, China was isolated from the outside world, except for a short diplomatic relationship with the Soviet Union from the early to mid-1950s.

Under the new communist government, all aspects of the Chinese society including education were ruled under a system of centralized administration. By the time the People's Republic of China was established in 1949, it had twelve arts and design schools nationwide. Like all other disciplines in education, the arts and design schools were reorganized and developed centrally copying the Soviet model. All arts and design schools were under the tight control of the government and pedagogy was skills based after the Soviet model (Lin, 2000). During this isolation period, the Soviet model was the only direct influence from the outside world. Some scholars argue that China's experience "was not a matter of simply copying the Soviet Union without any critical reflection" (Ding, 2001, p. 173). However, without creative freedom and a market driven economy, the arts and design education suffered greatly together with the whole nation.

When the nation opened up again to the world in 1978, China was lagging behind the industrialized world in all aspects and the nation was desperate to know what had happened to the outside world. Shortly after the announcement of the Open Door policy, some arts and design institutions started to interact with overseas organizations with activities such as Guangzhou Academy of Fine Arts inviting international designers and educators to give lectures to its students. American-trained Chinese educator, Wong introduced his two design textbooks at his lecture, *Principles of Two-Dimensional Design and Principles of Three-Dimensional Design*. This had a strong impact on the design foundation curriculum reform in China at that time. Within a short period, textbooks on fundamental Bauhaus design principles were introduced indirectly from Hong Kong, Taiwan and Japan and published widely throughout the country (Yuan, 2003).

According to the survey by Yuan (2003), in the beginning of 1980, China had about 2,100 students majoring in arts and design subjects with approximately 750 specialized teachers. The academy was virtually without any updated teaching materials and any information from the outside world. Guided by Deng Xiaoping, education reform was on the way to the new direction of facing "modernization, the world, and the future" (Ding, 2001, p. 174). The cultural exchanges and publishing of overseas design textbooks were evidence of the "conscious effort to both nationalize and internationalize Chinese education" (Ding, 2001, p. 172) under the new era of economic system reform. Ding (2001) points out, "[d]uring this period educators were very active in researching foreign education systems" (p. 177) and their effort contributed greatly to the first major education reform document announced by the Central government in May 1985. This policy document gave higher education institutions greater autonomy over academic planning and administration.

The 1980s can be considered a decade of China's effort to catching up with the rest of the world. It was a period of learning what they had missed, and searching overseas for appropriate models to reference the new modernization reform. This decade marked a very important nurturing era for a new generation of designers, who later on generated a wave of attention from both national and international audiences. Prominent designers such as Wang Xu, Chen Fang, Chen Shaohua, and Han Jiaoying who became known to the international design sphere in the 1990s, all received their education locally during that period. From 1981 to 1987, the expansion of arts and design education was rapid. In 1989 there were about 1,100 arts students and 686 design students graduating in that year alone (Yuan, 2003). Students majoring in arts and design were at least four times more than the numbers in the early 1980s. The 1990s marked the emergence of the modern Chinese graphic

design. Like the Republican period Chinese design, the new Chinese graphic design merged traditional Chinese design principles with Western sensibilities, making it a perfect match for the global economy that China was entering. However, due to the lack of understanding of the contemporary value of design education among young students and traditional arts schools, the numbers of design graduates failed to meet the emerging commercial needs for the market economy reform.

In 1993, the launch of another important central educational policy, "Outline for the Reform and Development of China's Education" finally gave greater autonomy to universities and colleges. Zhong and Hayhoe (2001) summarized this policy as one that "urged universities and colleges to establish mechanisms of self-regulation and responsibility" and gave them rights to "govern themselves under their charter." Starting mid 1990's, this policy contributed to major educational reform among the academia, including the discipline of art and design.

Armed with the new Central policy, art and design schools and departments within the university now have the autonomy needed to develop according to the market needs. With the academics finally caught up with the emerging commercial demands of economic development in the mid-1990s, design education expanded at an extraordinary speed. Among the many newly emerged schools and programmes, Wuxi University of Light Industry (later became part of Southern Yangtze University) established the first School of Design in1995 (Yuan, 2003). In the same year, a new department of design was set up at the Central Academy of Fine Arts and the number of students enrolled soon surpassed other departments. Graphic design was officially renamed as "yishy sheji" (or Design Arts). By 1998, it has about 270 design related academic programmes established all over the nation. Since then, design programmes at various levels continue to expand rapidly.

The *Design Online China* website, lists 119 industrial design programmes offered by universities and colleges prior to 2000. In 2001, 30 more new industrial design programmes were added (NIC, 2004). Industrial design programme was the hottest area of study emerging in late 1990s after the boom in graphic design programmes in the mid-1990s. As Yuan (2003) critiques in his studies, the rapid expansion of design education created a lot of problems such as lack of quality assurance in the programmes, teaching quality, facilities and even overlap of the same programmes within the same institutions. The landscape of arts and design education in China at present is full of confusion and chaos. The pattern of development of the last decade was very similar to the period before the outbreak of the Second Sino-Japanese War in 1937. Although the Open Door policy of market economy reform gave a much clearer concept of what design is to the society as compared to the past, the reform in design education in China is still yet to be defined. The core issue is still the interaction between modernization and tradition as Lin Fengmin and other educational reformers from the Republican period once pointed out. The current development of design education is another example of a new rip between tradition and modernity with similar problems that were experienced in the past.

4 The Search for Future Directions

The ensuing expansion of design activities and design programmes — first graphic design and then industrial design — has been phenomenal. Discussions on the future directions of design education in China are heated. For example, Lin Jiayang (2000), former Dean of the School of Design at the Wuxi University of Light Industry, advocated change from the outdated Soviet skill-based curriculum model. Since then, the curriculum on graphic design has improved, as evidenced by the various textbooks available in the market. The design education reforms came in many forms including hiring "foreign experts" to lead or as visiting professors. The school was restructured from the previous Fine Arts Department in January 2004 under the deanship of Kan Tai-keung, the internationally renowned Hong Kong designer. Scholars with extensive working experience with renowned western institutions were appointed to key academic posts.

In fact, in the past fifteen years, China has had no shortage of faculty trained abroad or academic exchanges with overseas institutions. While this has benefits, it also has drawbacks. Very often, foreign academic scholars offer their insights after a brief encounter with China. In the First Doctoral

Education in Design Conference held in 1998, former Chair of the School of Design at the Hong Kong Polytechnic University recommended China to offer design degrees at the doctoral level (Clark, 1998). In fact, China already had a doctoral program established in 1984 at the Central Academy of Arts and Design. Fung and Lo (2001) proposed that China address the "endemic problems" for their future design education development without acknowledging the struggles of traditional arts and crafts heritage with the modern education system throughout decades. Indeed the issues of design education that China is confronting are enormous and require well-rounded contextual in-depth research.

This study aims at initiating further discussion especially on the interaction between modernity and tradition in the development of design education in China rather than providing a hasty remedy for the present and the future. The Academy of Arts and Design at the Tsinghua University (formerly The Central Academy of Arts and Design) initiated the studies of the Chinese arts and crafts tradition about 15 years ago. There is a strong call for studies of traditional craft into the modern application of design so as to develop the national identity of Chinese design (see Yuan, 2003; Jiang, 2003). In 1993, at the First Industry Design Meeting in China, Matthew Turner (1993), design historian who once taught in Hong Kong, suggested, "Imitation is not necessarily a 'stage' on the road to originality" (p. 20). He reminded us that identity "is produced through a combination of the distinctions we draw between ourselves and others, and others draw between themselves and us" (p. 21). Precisely, there is a problem, as quite a large gap exists between these two perceptions.

Most of the Western friends that I encounter expect to see a match of their concept of "Chineseness" from Chinese design and contemporary everyday life. Academics such as Clive Dilnot (2003) call for "the invention and development of an authentically modern Chinese culture" (p. 16) in China. But what is his definition of authentic modern Chinese? Most of Chinese designers that I know, are not interested to cater to the "Chinese" taste of Westerners. They are driven by a desire to live the same material life enjoyed in most Western countries. Where will be the meeting point of these two perceptions, if there is any? The question of the future directions of design education and design national identity will be positioned on the modern self-image of China to its people, the consciousness of preservation of cultural heritage and the cultural understanding of the Western world about contemporary China. To conclude, a lot of studies still need to be conducted in order to obtain a well-rounded understanding on the future of design directions of China.

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Changing Imperatives of Fashion Education in India

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India has a tag of being the manufacturer of fashion and not a provider of 'Design Service' for international markets. With the rapid changes in the post quota phase, the country needs to be prepared on all fronts of services, productivity, quality control and delivery to be competitive. The fashion training institutes need to bring in these exigencies into classroom to prepare future designers for such a scenario.

At Pearl Academy of Fashion the Fashion Design programme has evolved closely with industry over last ten years; growing from one year of learning, to two years, to three and a half years, and since last year to four levels of learning. Until the last change the educational development matched with industry requirement within the MFA paradigm. However, as the liberalized trade regime now in place began to come closer it was considered necessary to reorient the education to foster greater degree of creativity over and above technical expertise. The four levels guide the learner through a gradual phase of developing skills, which is directed at conceptual, visual and technical progression. The levels mature to independent learning and initiative based assignment briefs to chart out guidelines for individual development and thus make a pathway for the professional to seek and establish a niche in the competitive market.

The post quota phase offers ample scope for fashion designers to take up challenges in potential areas, one of them being providing outsourcing design services from India. This requires an understanding of the international market and comprehension of trends, lifestyle and development of foresight to needs of the international consumers. Designers need to be equipped with ability to adapt to new technology, access information and resources and interpret uniquely for specific needs. As fashion and its industry is constantly evolving so should its training to adapt to the changing paradigm.

Keywords: *post quota phase, visual and technical progression, outsourcing design services, changing paradigm*

Fashion Industry – an Overview

The fashion industry in India is around 12 years old and is a tiny Rs. 250 crores in the Rs. 125,000 crore textile and garment industry. The industry has an ambitious target of achieving Rs. 360,000/- crores ($80 billion) turnover by 2010 with impetus being provided by the Ministry of Textiles, which in turn is going to boost the specialist fashion industry as well. In effect it means the industry has to be prepared to support the surge, with expertise in all areas. The global textile paradigm has undergone changes resulting in new potential and opportunities, creating immediate opportunities particularly for design service arising out of the growing need for improvement of standards, productivity, etc.

In this context the paper traces the evolution of fashion education from earlier times to present, and highlights potential for developments to address the changing scenario.

Fashion Education in India

The first fashion institute in a holistic sense came into existence as recent as 15 years ago. Besides the national institute and its centres set up by the Government of India to address specific needs of the burgeoning garment industry there were several private initiatives to bring in fashion education. The pace and nature of developments in the industry and need for trained professionals could not be met by these institutes alone. This gap was addressed by some non-government enterprises and led to setting up of fashion academies, polytechnics and technical training centres. Now many equally competent schools serve as training grounds for much needed design professionals for the industry. As in other global fashion schools, fashion education in India has matured and developed into a systematic, well defined and focused course curriculum.

Earlier fashion education (as we understand in modern context to include inputs of design conceptualization, technical and market understanding) was constrained to post-school option, which trained professionals to support industry at minimal level. At present there are approximately 50 institutes offering fashion design courses at various levels ranging from BA (Hons.) degree or its equivalent to diploma programmes, to short-term certificate programmes. Fashion Design, as a vocational option, was not available at school level; however, this year onwards fashion design curriculum has been introduced in 50 schools across Delhi alone at Higher Secondary level.

Fashion design is already one of the most popular, ironically not yet well-understood applied design streams that have seen high school graders clamouring for admissions. Foremost stands out the perception that it is a glamorous field (every upwardly mobile Indian's dream), offers easy opportunities and is suitable for any body who likes to dress well.

Development of Fashion Education over the Decade of 90s

Fashion education has been constantly evolving and keeping pace with the requirements of the industry for both exports and domestic sector. The early 90s experienced a boom in the export sector and consequently trained professionals coveted placement in an export-oriented industry as it provided a structured system and opportunities for growth.

The role of a designer, however, was limited to that of an interpreter of designs, which were sent by foreign buyers for foreign markets. The Job profile designated the designers to be a fashion or sampling coordinator or even a merchandiser. As a result training provided by the fashion institutes mainly focussed on technical and business understanding with some measure of fashion communication imparted over Diploma level education. With the pressures of the new paradigm, curricula in many institutes have evolved to suit the requirements of the environment.

At Pearl Academy of Fashion too, the Fashion Design programme has evolved closely with industry over last ten years; from being a vocational, diploma-level programme of one year of learning, to two years; to 3 ½ years, and since last year to four levels of learning. Until the last change the educational development matched with industry requirement within the MFA paradigm.

The Fashion Design programme commenced as a 1 year certificate programme to train professionals with design understanding who could be fashion co-ordinators. Based on feedback for a preferential fashion design program at the undergraduate level and to facilitate a broader intake of students, the programme was further expanded into a two-year undergraduate diploma program.

As the liberalized trade regime now in place began to come closer it was considered necessary to reorient the education to foster greater degree of creativity over and above technical expertise. There was an increasing pressure on the exporting countries, such as India, for original design inputs. With the integration of the domestic / export markets in 2005, under WTO charter, the industry's need for design professionals with more in-depth and broad base of knowledge and skills relating to design innovation and technology was acute. Increasing market / product fragmentation resulted in need for specialist knowledge and understanding in specific fashion product categories.

This presented challenges for the upcoming design professionals to demonstrate their personal design philosophy, design intelligence, and perpetuate innovation and creativity along with understanding the global market and adapting technology.

To address the above issues and provide adequate width and depth to the program, as per the requirements of the current and future industry, the Academy expanded the Programme to 3 ½ Year B A (Honours) Degree.

Our experience over four years with 3 ½ year Fashion programme revealed that the students admitted to the Design programmes need an extensive and uniform grounding in design concepts and skills. The programme needed to provide a strong foundation to a varied group of students to bring them to a platform of a core common set of skills, it became imperative to provide a "foundation level" phase in order to achieve this. Thus the programme was modified to a 4-yr duration course planned at four levels.

The four levels guide the learner through a gradual phase of developing skills, which are directed at conceptual, visual and technical progression. The first level is planned as foundation studies with introductions to core design and technical skills, liberal arts and cognitive developments. Level two and three are phases for mainly application of learning with introduction to business understanding. The levels mature to independent learning at level four and initiative based assignment briefs to chart out guidelines for individual development and thus make a pathway for the professional to seek and establish a niche in the competitive market.

The learning till level 2 and 3 is confined to conceptual development and technical parameters similar to all other institutes; however, subsequently a gradual foray into understanding of the industry, the economics of garment industry and its needs bring into focus the realities of the market. This exposes the students to the changes that are taking place in the industry that is preparing for the post quota phase.

The final level offers students opportunities to develop professional acumen through projects and presentations of fashion collections.

Graduates with thus prepared skills are empowered to cope with changing times and better equipped to service the post MFA industry. Their exposure to the industry with its constrained specific social, cultural and market parameters form a base for their market suaveness.

Fashion education in India in its nascent stages has already been through upheavals to cope with – firstly, meeting global standards for design education, secondly, catering to the burgeoning domestic upwardly mobile fashion conscious population and thirdly, gearing up for the post quota phase.

Evolving Fashion Scenario

The Indian domestic fashion scenario evolved with changing lifestyle, expansion of media, TV, Internet, exposure to stylish and fashionable revelations that seemed much evident in the 90's. Fashion moved from ambit of grandeur to ambit of style, and expressed itself through individual expressions.

Earlier designer labels were available to a limited social stratum and found quick acceptance, as it was an immense, untapped market thirsting for variations. Nonetheless exposure to various experiences and affordability of the upwardly mobile society presented immense opportunities, arousing aspirations for a wider section of society. This led to a widespread demand for designer prêt clothing. The surge in the industry is evident in the growth from Rs. 40 crores to Rs. 250 crores in the last decade.

Over the years, Internet, access to global market, has provided tremendous exposure to Indian designers and given them the confidence to foray onto international retail scene. All this has gone hand in hand with development of India's strength in IT, other manufacturing sectors and perception of India as an economic and political strength as well.

Issues and Opportunities in Fashion Education in India

- India has a tag of being the manufacturer of fashion and not a provider of 'Design Service' for international markets. With the rapid changes in the post quota phase, the country needs to be prepared on all fronts of services, productivity, quality control and delivery to be competitive. The fashion training institutes need to bring in these exigencies into classroom to prepare future designers for such a scenario. The country could do with more design institutes with planned programmes to deal with changes.

- Globalization of fashion has flattened any regional flavour that is generally an essence of expression. Worldwide networking and crossover of servicing, manufacturing and retailing has diluted most of the local USP and is giving rise to 'clones.' Fashion in India needs to establish its identity that is rooted in its unique image, yet be global.

- Craft skills / traditional skills / embroidery, handloom have been the predominant and current USP and capabilities of India, and have spawned across all aspects of domestic ethnic wear industry, export and Indian fashion label. However due to its inherent disorganized nature, it is plagued by poor work systems and inability to realize its potential for large orders with consistent quality.

  This aspect needs to be streamlined into a sustainable model. The institutes can play a role in identifying and training people who can organize, manage and develop such clusters. There has been an attempt at such initiatives by the Government of India along with national and international developmental agencies. The nuances of traditional craft / skills and regional acumen in the fashion direction understood by regional designers need to be tapped and translated for realization into success.

- The industry's understanding and utilization of design potential, an understanding of hierarchical job profiling for design operations need to be upgraded.

  Academic initiatives could gather industry around them structuring, implementing initiatives. Fashion institute could provide the platform to form an interface between industry, designers and future developments / prospects

- The post quota phase offers ample scope for fashion designers to take up challenges in potential areas, one of them being providing outsourcing design services from India. This requires an understanding of the international market and comprehension of trends, lifestyle and development of foresight to needs of international consumers.

The future designers will have to be aware of trends in interrelated fields, its influences and to be equipped with ability to adapt new technology, access information, resources and interpret uniquely for specific needs.

To this date design intelligence for future trends and directions is available from external sources. There is an urgent need for institutes to address capabilities for such discernment. After all Indian domestic market is considerable and could benefit from regional broad based lifestyle trend intelligence. Institutes must develop, create and equip through their training professionals who could be the intelligence providers. As fashion environment and industry is constantly evolving so should fashion education and its training adapt to the changing paradigm.

Future of Design Education

The New Disruption: Graphic Design vs Marketing

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Since 2000 he is a lecturer of Graphic Design at Higher Institute of Fine Arts, Sousse, Tunisia. Currently he is working on the research 'Graphic Design as a tool in the Intercultural Communications'. He has many articles, researches and presentations on Graphic Design, Advertising and Visual Communications presented in the mass-media or in different events to his credit. The last participation was in 'The Icograda Design Week' 'Building Bridges international seminar' in Istanbul, Turkey, 2004.

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1 The Design Education (as a Graphic Design) is on different levels in different regions and different countries because of different cultural, economic and political aspects.

2 Till recently the education of Graphic Design has been dedicated to serve in general the goals of business and marketing communications (in fact via advertising and visual communications)'. Milton Glaser said in the 90s: The design process has now been integrated into a client's control system (Glaser, Milton, Eye Magazine). On the other hand, we can mark off some depletion into the system of integrated marketing communications (IMC) and the beginning of creating the new conceptual points of view – disruptions (Jean-Marie Dru, Disruptions). These circumstances actually are significant and they make seriously influence on the Bulgarian design situation and reflect on the present and on the future of education.

3 The Bulgarian perspective into higher graphic design education for now is based on the four 'elephants':

- good and stable art and national traditions and practice (the first Bulgarian high school of art was opened in 1896)
- new marketing situation (open and free market after socialism)
- x-cultural design influence
- to establish professionals design standards and terms

4 The result of this situation is not evolutionary 'step by step' in the Graphic Design Education but revolutionary 'jump by jump'.

5 The Bulgarian education of Graphic design now is between the 'Two Myths about Design Education' (Salchow, Gordon): 'Myth #1:That schools should avoid their own 'look' and provide a broad education, and Myth #2: That practising designers are the best design educators'.

6 Will the future of Graphic Design education be defined as an aesthetic reaction of the marketing pressure or will be synchronized by corporate needs the next 5-10 years? What will be the next Bulgarian Myth #3?

Keywords: *future of design education, Bulgarian perspectives*

1 The Bulgarian Situation

1.1 Preface

Contemporary Graphic Design has various functions in modern society. One of them is as a tool of communication tool. Another, as an extension of art. The status of Graphic Design, however, differs across regions, countries, companies or agencies. So, from the global point of view we can mark practically the same functions but different priorities. At the local stage, there are specific differences

concerning design management and management of design; comprehension of the term 'Graphic Design' and its place in the creative process of visual or integrated communications. This situation arises because of different cultural, economic or political aspects. In this context it is important to analyse the basic role of Graphic Design education and its influence on the design theory and practice as a resource.

Till recent times, Graphic Design education served in general the goals of business and marketing communications (actually via advertising and visual communications). Milton Glaser said in the 90's: "*The design process has now been integrated into a client's control system, so that instead of going outside for people who had more understanding about how to communicate effectively, they now make their determinations from a marketing point of view and then, more often that not, go outside to implement those ideas… Clients now have a much greater preconception of what they want. The briefings are very different. The determinations of what is appropriate are very often those of a marketing department as opposed to the somewhat casual and random solutions that occurred when people didn't know better*' (Glaser, Milton, *Eye Magazine*). We can make a comment about the links between cultural diversities and Graphic Design evaluation. For example, the cultural diversities *reflect the visual structure of messages* into visual communications; the economic diversities *reflect priority on the control (evaluation) systems of design* and integrated communications in general. When we look for meaning and influence of intercultural differences in communications we have to consider the relations between the above links.

1.2 Bulgarian Design: A Special (Specific) Way for a Specific Audience

What is the situation in the Bulgarian field of design and what are the expectations of the Bulgarian audience? You can see some figures below (GfK research 'Five most liked elements per country, 2001). In Europe Omnibus is available in Bulgaria and others 31 countries. There is simple question to illustrate the differences in audience preferences: what is liked in advertising: '*When thinking about TV commercials in general, what are the elements you like most*?'

Bulgaria has a small, young but fast moving underdeveloped market. We have to distinguish between the influence of advertising images on local visual stereotypes, and creative interpretation of the global Graphic Design principles. 'There is a worldwide belief that all designers have a responsibility to investigate the unique characteristics of their audience, including ones that reflect cultural differences' (*AIGA, Cross-cultural Design Manifesto*).

The GfK research on the 'Five most liked elements per country' considered various elements – from digital computer images via animals, flowers, urban sets or local settings to humour and good looking people. The research suggests that preferences become more important in developed advertising environment, emotional involvement affects perception of product attributes, and that the likes and dislikes influence the commercial's persuasion score stronger if the commercial involves 'mood' or emotional appeal.

1.1 What is the Stage of Graphic Design in Bulgaria?

Recognition: Good statement, art and creative traditions.
Achievements: Expositions, local and international awards, two advertising festivals (Graphic Design and Visual Communication sections).
Professional fees: Not professional standards yet; agency fee, negotiation fee, agency for professional fees and copyright.
Professional developments: Fast-moving higher education, press and print medias, Graphic Design into new medias and new communication platform.
Difficulties: Client's press, Marketing press, unclear professional fee, ambiguous role of the Graphic Design as a conceptual tool and speculation of it.
Problems: 'Disruption' of the graphic design process by non professionals computer freelancers, conceptual problems, design piece up, chaotic advertising visual ambience.

Challenges: Open market (competitions), big clients ('Big Brothers') and marketing and communication challenges, new social and cultural needs, more socialized challenges (*Serezliev, Stefan, Icograda Design Week, Istanbul, 2004*).

From another side, we can mark off some depletion into the system of integrated marketing communications (IMC) and the beginning of the creation of new conceptual points of view – the disruption. The disruption of the marketing point of view changes 'a method, a way of thinking, and a state of mind.' 'The foundation of Disruption is a three-step reasoning process: Convention, Disruption and Vision' (Dru, Jean-Marie, *Disruptions*). The contemporary Graphic Designer works in a team and use new strategic tools not only at the conceptual level but also throughout the process of communication. The designer not only visualizes and communicates an idea, but also analyzes the 'semantic fields' into the communication process in advance and establishes a new perspective of thinking (Kaftandjief, Christo, *Harmony in Advertising Communications*). If we consider the global-local relations on a small communication stage like Bulgaria we can find the next opposite positions: **Global creative standards versus local conceptual clichés;** and **local creative disruption versus global communication clichés.**

All these circumstances significantly influence the Bulgarian design situation and reflect on the present and on the future of design education in Bulgaria. What will be the guideline(s) for the next 5-10 years for Bulgarian Graphic Design education? Must the Bulgarian Graphic Design follow the victors, or will it find its proper way of development? Finally: is it important and why?

2 Bulgarian Graphic Design Educations – the Field and the Horizon.

'Your **field** of vision or your vision **field** is the area that you can see without turning your head.' 'The **Horizon** is the line in the far where the sky seems to meet the land or the sea.' 'If something is on the **horizon**, it is almost certainly going to happen or be done quit soon.' (*Collins Dictionary*)

2.1 History and the Present

The history of design education in Bulgaria does not exist in a special way. With a long tradition of the fine and applied art education, we could mark some historical periods:

1896 - World Art Influence, Higher Institute of fine Arts, Sofia, Bulgaria
1945 – 1989: Political (socialism) influence; State economy; Political Myths; Portfolio a broad educational programs, National Academy of Arts
1989 – 2007: New Europe, New World, New Design Goals, New Design Tools, New Myths, New Bulgarian University
2007 – New Marketing and Political Situation, New social and cultural needs, New Design Responsibility, X-Cultural Design, New Horizon, New Strategies

During this period, Bulgarian professional designers, educators, researchers and lecturers made efforts to define the area of design and to clarify the terminology about *Graphic Design* – from 'Applied Arts' to 'Applied Graphic' (from the German term 'Gebrausgrafik' or 'Commercial Art'- *Heller, Steven*), 'Poster and Applied Arts' and 'Graphic Art'.

The New Bulgarian University (NBU) at the present offers Basic Program in 'Visual Arts,' Bachelor Program in 'Graphic Design,' 'Artistic Design,' Masters Program in 'Graphic and Spatial Design,' 'Computer Technologies in Book and Poster Design' and Doctoral Program in 'Computer System and Technologies in Graphic Design.' It is very significant to mention the system of quality and evaluation at NBU by credits.

We can now see organized efforts in the field of terminology about Graphic Design – Visual Communication, Communication Design and so on. Russell Kennedy, Vice-President, Icograda, said in November 2004: "Icograda recently opened discussion on a name change for the profession. We acknowledged that there seemed to be a move away from the term 'graphic design.' Many educational

institutions around the world - including my institution, Monash University - have already made the change to visual communication. The term 'visual communication' or 'communication design' appears to be the preferred replacement to graphic design. The impact of a new name for our profession will be minimal because it is a reaction to a change, which has already occurred. The graphic design industry will continue to adjust and accommodate change as it has always done. Graphic design education will continue to respond to the changing demands of the profession while also challenging its conventions and pushing its boundaries even wider. It is not only the boundaries of the disciplines that are blurring, but also the borders between countries and cultures" (*Encuadre Volume 2, Number 5, October 2004, p. 50-55*).

2.2 Bulgarian Mythological Outlook

The Bulgarian outlook is highly valued for the future activities in the field of education to *determinate the terms*. After 2007 (when Bulgaria joins EU), the role and influence of Integrated Marketing Communications (IMC) on the Bulgarian economic, cultural and communication market will increase. The Bulgarian 'mode d'emploi' could be repeating – at a conceptual level, the relation between *Graphic Design* and *IMC* (2007-2010) would be similar to that of *Applied Graphic* (*Gebrauhsgraphik*) and *Marketing* (1960-1980).

It is easy to understand why the future of Graphic Design education is associated with sharp terminology: *it is a question of domination at the conceptual level in communication business and culture*. The new 'disruption' of IMC will try to acquire the conceptual mechanism of design – that mechanism can update itself independently (Serezliev, Stefan, *Media World*).

The first steps in this area of Graphic Design are the control systems in advertising and communication structures concerning creative strategic planning in general and art direction, creative briefs, design briefs, different workflow diagram, organization of creative teams and evaluation system (*BSB Dorland, London*). *I think the idolizing of control systems like above provoke the myths in education of graphic design by the emphasizing of conceptual and technical criteria from marketing point of view*.

Graphic Design education in Bulgaria is now is between the 'Two Myths about Design Education:' Myth #1:That schools should avoid their own 'look' and provide a broad education, and Myth #2: That practising designers are the best design educators. (Salchow, Gordon, MK *Graphic Design*). In Bulgarian practice '*a broad education*' means '*to cover all professional areas' after school graduation*. Myth #2 linked with understanding of the client's way of thinking and guiding the 'real world.' It is logically that Gordon Salchow concludes: "By the way, I have never met an intelligent design educator who is not also a fine (if slow because of his deliberateness) designer and unwilling to abandon practice. My stance, then, is that good designers are not always good teachers but good teachers are always good designers. This is because extended intimacy with higher education rigorously clarifies and nourishes individual professional insight" (Salchow, Gordon, MK *Graphic Design*).

The Bulgarian perspective into higher graphic design education for now is based on the four elephants:

- art traditions and practice (the first Bulgarian high school of art was opened in 1891)
- fast moving marketing situation (open and free market after socialism)
- x-cultural design influence
- process of establishment of professionals design standards.

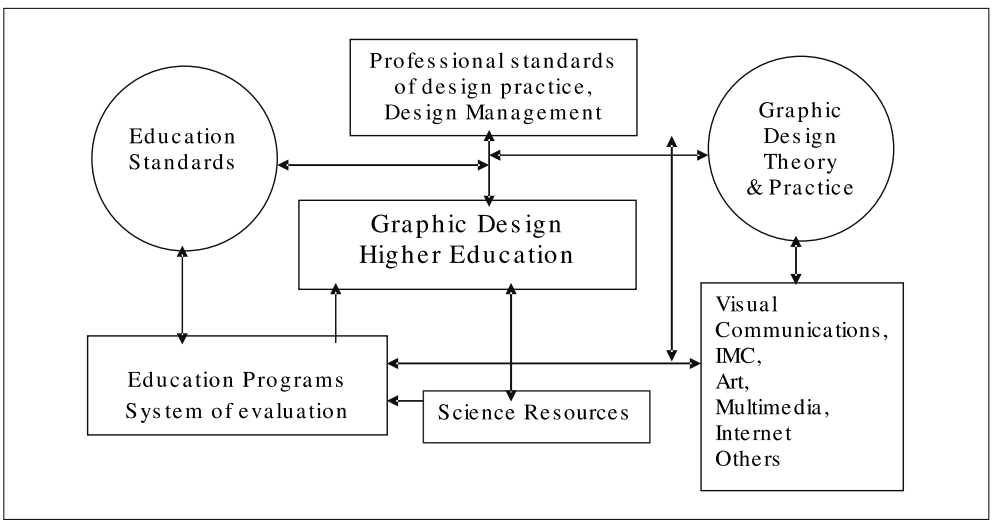
3 Educational Clusterization and Future of Design Education

I think, in the near future (3-5 years), it will be possible to observe the initial process of *clusterization of educational system* in Bulgaria under the influence of global IMC and postmodern visual communications. Two potential groups of clusters are possible:

A The group of art principles
B The group of strategic communication principles

Both these groups will establish two generic directions of Graphic Design education in Bulgaria, perhaps even in the World. The first is an aesthetic and artistic reaction to the marketing pressure – the 'Pure Independent Design.' 'Management of Design' will cover the management needs with proper control systems to control the client's activities into a creative process. We can spot the possible problems on the coordination level that are generated yet. For example, in Bulgaria most design (creative) briefs are with different priorities and specific forms of evaluation criteria. Sometimes the briefs are oral (over the phone) that gives possibilities of trouble speculations after (for ex. the principle of Client's approval 'Likes and Dislikes'). From educational point of view, it means to focus on creative inspirations just by Design Brief and post-interpretation via art and computer skills. In other words, the students must be involved into circle 'Problem-solving' – the mechanism of advertising action. Neville Brody said: "What college teaches you is design as problem-solving, in the sense of design needing to please rather than to invent. You are taught to solve a problem, which is to take the short cut of satisfying expectations, and this is not the same as meeting your public halfway. Design is no different from art, or chairs for that matter. As a means of communication, it cannot remain neutral" (Wozencroft, Jon, *The Graphic Language of Neville Brody*).

Table 1: Bulgarian model of Graphic Design Education 2010



It is important to remember how a designer works now – in a team (accounts executives, copywriters, art directors, photographers etc.). Normally a designer has to create visual communications. He must be able to "look for the unique selling point (USP). If the product or service does not have one, create it. Maybe the product has something in its history that your client has overlooked, simply because he sees it as mundane or it does not accord with his own personal interests" (Swann, Alan, *Design & Marketing*, Quarto Publishing plc, London, 1990, p.92).

The designer needs to not only defend his work but also work calmly. The model 'portfolio' where the students worked on the 'problem-solving' as a conceptual tool was typical for 70's and 80's at the National Academy of Fine Arts, Sofia. The same model will try for revitalize the programs of Graphic Design.

The group B of strategic principles will generate the process of synchronized education close to the corporate needs and strategic management. Design Management sees Design is as a resource and as a strategic potential system. For now, Bulgarian educational and professional practitioners face the problem of its definition. Many designers and managers think that Design Management shows how to create and follow the practical standards. This circumstance actually reflects the philosophy of design education. "Design management is not the process of managing a design consultancy or practice, either within or outside a corporation. It is not the education of designers about the importance of the management world; or the reverse: educating managers about design. All these are important activities; indeed they are relevant, preliminary, and necessary to the effective practice of design management. But they are something else"(Gorb, Peter, *Design Management*).

The both tendencies will create the Bulgarian Myth#3: the field of Graphic Design is unlimited. Because they illuminate the process of design from two basic points of view: creativity and management (See below Table 1 'Bulgarian model of Graphic Design Education').

4 Conclusion

Normally it has to combine the both tendencies above into one strategy and one philosophy of educational program. On the other hand, the main problem is not how many different courses are in one program but which are the references with the Bulgarian and international theory and practice. It is very easy to arrange one contemporary structure of education abroad but the real problems will come later in the practice but 'Do you consider design education in your country to be up-to-date? Yes, absolutely 11%; In some segments 19%; **Not at all 70%** (Icograda *eNews* 20/02).

Till nowadays the history is like 'get and go' to the horizon – not by the evolutionary 'step by step' but by the revolutionary 'jump by jump.' From scientific point of view, will the model of educational 'jumping' work or not? It needs time and resources to estimate it. I could only try making prognosis about the near future of Bulgarian educational model in Graphic Design:

1 The first result of combination between creative and communications clusters on Graphic Design field will be establishment of new term: **Integrated Visual Communications (IVC)**. The IVC can incorporate the mechanism of management from Integrated Marketing Communications (IMC) (ergo the initial post-modern phase **Graphic Design vs. Marketing**).
2 The 'pure' Art Design will be an independent part of IVC on the cultural and intercultural level. Its education program could determine and develop conceptual tools and art skills, and will keep contacting other Arts and Art practice.
3 IVC will assimilate most of the areas of Design Management (under newest standards of ISO) via more conceptual possibilities and organization potential.
4 In 5-10-15 years, the process of educational clusterization will replace the communication focal point because of new segmentation of society.
5 The 'small' Bulgarian model of educational and professional clusterization might be utilized on an analytical level as a 'Case Study'

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Intent Statement for Design Education - Ahmedabad 2005

We the delegates from 27 countries met, shared and discussed on Design Education, Tradition and Modernity. The power of this diversity of experience created a common ground to make a statement for Design Education.

We reaffirm that,

- Today, the profession of Design has manifested our capability to shape its natural, built and social environment. It is a valuable and living cultural resource. It has constantly evolved to benefit from advancement of knowledge and technology and in humanising the opportunities offered by these advancements for the benefit of all.
- Governments across the world would increasingly focus on quality of delivery and quality of life aspects; design can be an important driver for change. The other partners like industries, development organizations and institutions should collaborate for the promotion of design.
- Design is a creative activity where logic and intuition interact to develop opportunities, thereby initiating desirable change and facilitate innovations.
- Design recognizes variety and diversity as valuable stimuli in achieving both individual, collective growth with meaningful sustainable outcomes.
- Design is more than just about products, communications, or services and includes the creation of holistic experiences and systemic innovations for the quality of life and environment.

Design Education

- Design education must include ways to partner with community, industry development organizations and government to promote value-based design. Design education should address effective ways to collaborate with the community and the potential users to ensure the positive adoption of the design solutions. Educational institutions must create collaborative networks to exchange ideas and design education initiatives.
- There is a need to augment education of design and related human resources in all countries including different means of collaborations and "team" based creative methods and delivery systems. Design education must prepare students to be culturally sensitive and respect the local and other contexts – specific lives of people and the ecosystem as a whole.
- Design education must draw upon multi-disciplinary and cross-cultural sources to facilitate originality and innovation. It should embrace valuable teaching methods like peer learning, self-learning, shared learning, and group learning to foster teamwork developing a student and user centred approach and creating awareness of markets.
- Design embraces all disciplines in its concern with innovation of forms, configurations, patterns and relationships that shape the human-made environment, responsive to our aspirations.
- Design education should be geared to improve the quality of our lives through a careful consideration of physical, cognitive, social, cultural, emotional, economical and other real needs.
- Design regards research as a process for empowering designers in assuring quality and achieving leadership in both cultural and global contexts. It enables bridging the gap between vision and action, to respect cultural actualisations and take responsibility for its solutions.

- Design education needs a clear formalization of a flexible and updateable design curriculum with emphasis on theory, research, analysis, and synthesis ready for "realization" and "making". We recognize the need for a balancing of analogue and digital approaches to problem solving depending upon the context of design.

The above points and common concerns are in concurrence to the UN declaration of the years 2005 AD to 2015 AD as the "Decade of Education and Sustainability." We the design educators and delegates resolved to understand the key drivers of the future of design and facilitate their incorporation into a responsible design education framework including "life long" learning through these discussions.

In order to facilitate further dialogue on a regular basis on design education, it is proposed to have "Bi-annual international conference on Design Education." This can be hosted in rotation by the institutions of design. For this, it is proposed to have an "International Forum for Design Education," the objective of which would be integration and dissemination of design knowledge by creating confluence of academicians, designers, students and other stakeholders. This would have a virtual as well as a physical platform of communication for sharing this knowledge and experience. The virtual platform would be through website interactions and other digital means while the physical interaction should be through a rotational bi-annual conference which shall be hosted by the concerned member institutions and the conference office set up would take care of the support to this International Forum on a regular basis.