DRS CUMULUS Oslo 2013

Design Learning for Tomorrow

Design Education from Kindergarten to PhD

Proceedings from
the 2nd International Conference
for Design Education Researchers,
14-17 May 2013, Oslo, Norway

Vol. 1-4

Reds.: Janne Beate Reitan, Peter Lloyd,
Erik Bohemia, Liv Merete Nielsen
Ingvild Digranes and Eva Lutnæs

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Volume 1

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Introductions

DRS // CUMULUS 2013
2nd International Conference for Design Education Researchers
Oslo, 14–17 May 2013

Design Learning for Tomorrow – Design Education from Kindergarten to PhD

Many thanks to the Design Research Society (DRS) and Cumulus for giving the Oslo and Akershus University College of Applied Sciences the confidence to chair and organise this 2nd international conference for design education researchers in Oslo May 14–17, 2013. Researchers from more than 74 universities have undertaken a rigorous double blind review process used to select papers for inclusion in these conference proceedings. We received 225 full papers and of these 165 were selected and included in the conference proceedings and presented at the conference. Thanks to all, and a special thank to professor Peter Lloyd of the Open University, who served as chair of the scientific review committee and to dr. Janne Reitan of the Oslo and Akershus University College of Applied Sciences who chaired the committee with him.

The 2nd international conference for design education researchers in Oslo May 14–17, 2013 on the theme of 'Design learning for tomorrow – Design education from Kindergarten to PhD' received an overwhelming response. This is gratifying for us, the organisers, as we see design in a broad interdisciplinary perspective in support for a *better tomorrow*. For years we have promoted the idea that sustainable design solutions should include more than 'professional' designers; they should also include a general public as 'conscious' consumers and decision makers with responsibility for quality and longevity, as opposed to a "throw-away" society.

This is also the reason why we as the conference hosts have chosen to focus on design education from Kindergarten to PhD. This perspective was put forward as a contrast to most design education conferences where there is either a focus on design education for professionals or general education for children and non-designers. In the call the conference papers we have argued for a longitudinal perspective on design education where the education of professional designers is seen in *relation* to general education of a people. This is becoming increasingly relevant as more and more decisions are being made on the basis of visual representation. With this conference we have the ambition to see education at many different levels in securing a sustainable future for the design of everyday life solutions. For that we need qualified and reflective decision makers with a consciousness for quality of design and solutions.

Why are these issues of concern for Norwegian researchers in this field? The answer goes back to the 1960 National Curriculum for primary and lower secondary schools in Norway, when art and crafts were merged into one subject. Currently this subject includes art, architecture, design and visual communication. No other Nordic–or European–country seems to have developed a model similar to this and today we see

the benefit of this merger where design is at the core of the subject for youngsters – building upon the best from art and the best from craft to become creative problem solvers and critical consumers. I am looking forward to the day when UNESCO, or other organisations with responsibility for funding research, recognise that we need more research and knowledge on what impact design education from Kindergarten to PhD have on consumer habits and sustainable development at large. I hope that such projects are not far away. Politicians have far too long been told that advanced mathematics is the main way to stimulate youngsters to abstract thinking. The designerly way of solving problems can be even more suitable in training abstract thinking, and it will also include ethical aspects of sustainable development and ecology. A design literate general public would therefore be a step forward in supporting the statement of commitment by the members of Cumulus; the 'Kyoto Design Declaration 2008'.

For this DRS//cumulus Oslo 2013 conference we are happy to continue our international cooperation for design education research. In advance of the conference we have cooperated on editing the conference proceedings at level 1 in the Norwegian system. After the conference we will cooperate for special issues of the following academic journals; *Art, Design & Communication in Higher Education*, *TechneA*, *Design and Technology Education*, *Studies in Material Thinking* and *FORMakademisk*. The role of journals as an arena for design education research is essential for the advancement of knowledge production within the field. For the Nordic design and design education research field, *FORMakademisk* has played a crucial role in its five years of existence, as a digital open-access journal for both design and design education research. Its first editorial wrote that:

> The aim of the journal is to provide a venue for research in design and design education, and thereby develop an interest and working community of scholars in the field. The editorial team perceives design as a generic term that includes creative and performing activities in the great span of the artefacts 'from the spoon to the city'. The editorial team relates to design education as a field that includes the dissemination of design in society and the teaching of design at all levels general education, vocational preparation, professional education and research education - from kindergarten to doctorate.(www.formakademisk.org)

The Norwegian design education community includes design education for professional designers and teacher training for design educators. The teacher training is mainly developed through two master programmes–one in Oslo (Institute of Art, Design and Drama, Faculty of Technology, Art and Design, Oslo and Akershus University College of Applied Sciences - HiOA) and one in Notodden (Department of Art Education, Telemark University College - HiT). Two PhD-programmes; Oslo School of Architecture and Design (AHO) and Cultural Studies at the Telemark University College, have a focus on both design and design education. The AHO programme was chaired by professor Halina Dunin-Woyseth, who has played a key role in developing research within the 'making disciplines'. From the AHO programme the research network *DesignDialog* was established in 2002 with research focus on three themes; 1) Studies of dialogues of design in context, 2) Studies of design education, and 3) Studies of public dialogues on design.

I see this conference as a further step to international collaboration in design education research. Thanks to all those at HiOA, Faculty of Technology, art and design, who have supported this conference; Dean Petter Øyan and institute leaders Åshild

Vethal – Institute of Art, Design and Drama, Gunnar H. Gundersen – Institute of Product Design, and Laurence Habib – Institute of Computer Science. Without their support this conference would not have been possible. Thanks are also due to the leaders of Oslo and Akershus University College of Applied Sciences, rector Kari Toverud Jensen and head of research Frode Eika Sandnes, for general support to the internationalisation of design education research at HiOA, including this conference.

It is an honour for us that the DRS-Cumulus partnership will be signed in Oslo by DRS chair professor Seymour Roworth-Stokes and Cumulus vice-president professor Luisa Collina. Professor Michael Tovey and co-chair of this conference Erik Bohemia have played a central role in preparing for this partnership and this 2nd conference for design education researchers.

Warm thanks to the Scientific review committee, the Scientific review panel, the Programme Committee, the Organising committee, and the rest of the Editorial team; Janne Beate Reitan, Peter Lloyd, Erik Bohemia, Ingvild Digranes and Eva Lutnæs. Thanks also to colleagues and students for valuable contributions.

We are also grateful to our supporters and sponsors; the National Museum, the Research Council of Norway, the musicians and designers Peter Opsvik and Svein Gusrud, the furniture companies SAVO, HÅG, STOKKE and Variér for generously providing display chairs for the exhibition, and all the other supporters and cooperation partners.

We hope, as the organizers, that the conference will promote design and design education as a field of practice and inquiry. We hope that it will create a fertile context for establishing new networks of future co-operation, nationally and internationally, and that design education research in its broad context will be recognized both inside and outside the design research community. The general public's interest for design and quality is developed from the kindergarten, through primary and secondary education and the public's attitude is central for professional activities and a broad democratic design participation.

Liv Merete NIELSEN
Professor, designer
Chair of the conference

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Design Pedagogy Special Interest Group of DRS

This is the second symposium organised jointly by the Design Research Society and CUMULUS. The two organizations complement each other. CUMULUS is the International Association of Universities and Colleges of Art, Design and Media. It is a non-profit organization consisting of 165 universities and colleges of art, design and media from 43 countries. Cumulus was founded in 1990 and since then has been acting as an umbrella for many purposes and numerous projects for education and research of art, design and media. The Design Research Society is a multi-disciplinary learned society for the design research community worldwide. The DRS was founded in 1966 and facilitates an international design research network in around 40 countries.

The Design Research Society has three main aims. It focuses on recognising design as a creative act, common to many disciplines. It has the intention of understanding research and its relationship with education and practice. Then there is the overall aim of advancing the theory and practice of design. The membership of DRS is international.

The Society's Special Interest Group in Design Pedagogy is one of five in the society. It aims to bring together design researchers, teachers and practitioners, and others responsible for the delivery of design education, and to clarify and develop the role of design research in providing the theoretical underpinning for design education. These aims are not directed simply at one type of design education, but are intended to include all ages. However as the current membership of DRS is predominantly from universities inevitably the conference stream has concentrated on design education at that level.

The first DRS/CUMULUS Symposium was held in Paris in 2011. Its overarching aim was to explore how innovation in education is informed by and is informing design research. The symposium focused on design education, innovation in general education through design, and on innovation in business and engineering education through design integration. There was a particular emphasis on developing research in the area of Design Pedagogy. It was successful and it marked the point at which the Design Pedagogy Special Interest Group became could be said to be established as an effective force in design research.

This was consolidated at the DRS Biennial Conference in July 2012 in Bangkok. Papers aligned with SIGs were streamed through the conference programme. The Design Pedagogy stream consisted of 24 papers which was a strong representation within the conference. They focused on teaching and assessment, education and learning, design methods and processes, design approaches, cognition and creativity, and design culture, with papers grouped accordingly. Attendance at the sessions was good with informed and lively discussion.

In recognition of the strength of the papers at the conference, 8 of them were selected to form the basis of a special issue of the Design and Technology Education Journal. It was edited by Erik Bohemia and Mike Tovey and it included a review of the conference and an editorial which related the developments in design pedagogy in

higher education which the papers focused upon, to the wider issues of design teaching at the school level.

This second DRS/CUMULUS conference builds on these developments and develops them into new areas. Its theme of design learning for tomorrow encompassing design education from kindergarten to PhD is large and ambitious. The conference is intended to be an international springboard for sharing ideas and concepts about contemporary design education research. It is open to different facets of contemporary approaches to such research in any aspect and discipline of design education.

The context for this is set well by the organizers who say:

'Designed artefacts and solutions influence our lives and values, both from a personal and societal perspective. Designers, decision makers, investors and consumers hold different positions in the design process, but they all make choices that will influence our future visual and material culture. To promote sustainability and meet global challenges for the future, professional designers are dependent on critical consumers and a design literate general public. For this purpose design education is important for all. We propose that design education in general education represents both a foundation for professional design education and a vital requirement for developing the general public competence for informed decision making.'

This is a powerful and energising assertion for all of us involved in research in design pedagogy. It is possible that you could argue that this is what is needed, for despite a richness of activity, the number of journal papers on design pedagogy research could be higher. In a ranking of design research journals (Gemser et al, 2012) Design Studies was placed first. In the last year it has published only three papers on design pedagogy. This is better than the second placed journal, Design Issues, which has none, or another highly rated publication, The Design Journal which also has none. A challenge for scholars of research in design pedagogy is to achieve a greater impact amongst our journals.

Design research is not the same as research in some other disciplines. (Ref) In a fundamental science such as physics if research stops then effectively the discipline comes to a halt. If there is no physics research then there is no physics. Design is not like that. If design research were to stop then design would continue, more or less regardless. Designers would continue designing things, and probably the world would notice no difference. It would seem that design research is not central to design practice.

Design research is an activity which is directed to exploring and understanding the nature of design, its processes and methods. It has loftier academic aspirations than the data gathering part of the design process. It is usually undertaken by academics, and it is expected to conform to conventional standards of academic scholarship and rigour. Design research is clearly necessary for the academic respectability of the discipline.

One of the purposes of design education within schools is to equip students with the information and capabilities they need if they are to apply to study design at a university. It is an intention which probably applies to a minority of the students, but it is important nonetheless. In schools design education overall has to achieve much more and its broader reach is extremely important. It is important that research into design pedagogy should also have this wider relevance.

The recently published 'Design and Designing: a Critical Introduction' (editors S. Garner and C. Evans) is intended to provide an overview of design for those at school who are considering embarking on a university or college education in design. It

consists of a collection of essays from a large number of contributors each concerned with a different aspect of design. In the first chapter for example Tovey asserts that the purpose of design education at this level is to provide students with a passport to enter the community of practice of professional design (Tovey 2012). For a significant time this has been the intention of practice based design education. Many students have the ambition of achieving a level of capability to function as designers in the professional world. In order to reach this standard they need to demonstrate a level of professional 'polish' and presentation to match that of the practising designer. However Tovey also argues that the most fundamental quality they need is one of creativity. The key to their achieving this lies in their abilities to think in a solution focused way employing visuo-spatial intellectual abilities. The ability to engage in creative thinking, and more particularly the creative synthesising of ideas through design thinking, is the most important capability required to enter the community of professional practice.

These are capabilities which need development from an early age. Abilities such as tackling problems with a solution focus, and thinking visuo-spatially are not developed ab intitio at university and college level. It has been argued that spatial ability is a fundamental form of intelligence along with others such a numerical and literary abilities.(Gardner, 1984) Cross has gone further in suggesting that designerly thinking might be a basic form of intelligence (Cross, 2006). Although the case for such a view is not proven, it is a productive stance to take as it helps to identify and clarify features of the nature of design ability and it offers a framework for understanding and developing it. What seems to be generally agreed is that these underlying capabilities are ones which need to be nurtured early and developed, not only as the basis for studying design but also to equip students with abilities needed across a range of occupations. As the organizers of this conference propose design education can make a vital contribution to the development of the general public competence for informed decision making. Thus design education can be seen to have a wide remit in both providing the next generation of designers, and developing competence in decision making more generally. If it is to meet these challenges then research into design pedagogy has a crucial role in supporting the development of innovative and effective design teaching.

Michael TOVEY
Convenor of the DSR Design Pedagogy Special Interest Group (PedSIG)

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About the Design Research Society

Design Research Society (DRS) is commending time, effort and energy and having already been investing these over the past 40 years to give rise to the most astute and relevant research in design.

When asked on numerous occasions to comment on design and design research, I've always been very careful, if not harsh, with regards to certain research projects whose content and/or approach seemed to fall short on the front of the relevant things in design. My reaction hit even closer to home in France where design is absent from academic disciplines, and design research has yet to really take off. I have to admit, nonetheless, that the strides undertaken by several universities abroad and continued by DRS have swayed me into believing that there really is an area that craves further learning and discovery, and cultivates fresh, relevance-hungry skills and competencies. Conferences and DRS-published works reflect a tremendous proliferation of new ideas, new projects and new ways to breed knowledge.

In 2010, and after having sat in on a conference in Seoul organized by the International Association of Societies of Design Research, I wrote the following: "Taking advantage of design's coming out and its lack of visibility research-wise for the purposes of Sociology, Psychology, Education Science, or even hard science, and playing them off as "design research" can only prove beneficial to design in the end. Employing the design research notion loosely, when, in reality, its usage is clearly career-geared, does not seem all that fitting to me either.

The scope of research needs to be clearly outlined in a category of its own, and based on a language that both captures and communicates the knowledge from all fields spanning social and hard science, not to mention the socio-economic challenges that riddle our everyday. Design is a language doubling as an interface that connects people, ideas and knowledge, and imagines them in a better tomorrow. We could come up with our own scientific version of it as long as we don't get carried away and throw everything together haphazardly merely because design is omnipresent, and it suffices to get the intellectual juices flowing every now and then."

Time may have elapsed since these thoughts first emerged, but the issue remains the same. This text reflected the questions that crossed my mind following the various presentations I had attended. One presentation, in particular, caught my attention. It was given by a doctoral student who claimed that the work he was doing on the design of a bicycle was research. Twenty years ago, designing a bike was considered design. Today, that same bicycle now aspires to fall under the category of "design research." Let's try and refrain from wanting to label any idea, even the most relevant, "research." Despite their efforts to make a hard science out of Marketing, business schools are

busy filling in the gaps left behind by research done in the Marketing field. Every business owner and retailer in the world will tell you that Marketing is not a science, and wanting it to be one is just as futile as deciphering the gender of angels.

Design research is alive and well, and several universities have incorporated it into their agendas. It means nurturing a different kind of knowledge and insight at a time when other research fields lack the necessary to go head-to-head with the problems facing Mankind. There within is the incredible opportunity to truly, once and for all, set the fields of social and hard science apart. Kudos to DRS for being vigilant in choosing projects that are apt to map out a new direction between the two.

Just as design, creation and innovation are being positioned as solutions to problems in a world whose paradigms are crumbling, it would be, without a doubt, counterproductive for design research to cut ties with design practice. From an academic standpoint, it would also be a shame for design research to appear more virtuous and prestigious than design itself. That said, the loss would be just as great to reduce design to nothing other than a technique or representation. What design can offer goes beyond practicality. Design research goes beyond the designer. Their interconnectedness does not impede their individuality.

Design research and design itself are complementary. While loyal to the fundamental principles specific to each, both strive to find common ground and engage in a healthy give-and-take relationship to ensure balance and difference. With Mankind and its uses at the center of these issues, design gives impetus to an ideal or a potential, and not only pushes the limits of creativity and optimism to new heights, but seeks to defy them. At a time when science and technology are encountering a wary public, and where wealth and welfare are hitting glass ceilings, design provides an alternative future, and enables us to imagine it through a new lens. One thing is sure: Design researchers have their work cut out for them!

Christian GUELLERIN
President of Cumulus, International Association of Universities and Schools of Design, Art and Media

— Volume 1 —

Design Curriculum

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ICT, ideation pedagogy and Innovation Education: setting a new paradigm in graphic design education.

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Abstract: The introduction of ICT into graphic design education has also brought in some challenges as far as the pedagogy is concerned, as it requires relearning, training and upgrading. Whereas modern practices and education is flouted with ICT, the pedagogy of graphic design education, especially in the developing economies, which is an adaptation of the Bauhaus theory, is in variance with current practices in both the profession and in its education. As part of an going stuHAGENdy, we discusses the literature of current graphic design practices as a contribution to the adaptation of Innovation Education (IE) in a specific Virtual Reality Learning Environment (VRLE) technology as way of looking at the paradigm shift due to the introduction of ICT in the developing countries. Some educational theories in the context of ICT and graphic design education are discussed. These discussions align with current ICT practices in the developing countries that call for a review of pedagogy that allows students to develop ideas digitally. It concludes with a call for an exploration of current ICT practices in graphic design education, that concern ideation and its pedagogy. We believe that if the much-touted potential of ICT to transform design education is to be realized, especially in the developing countries, then design educators will have to pay more attention to learning issues and the pedagogy.

Keywords: ideation, pedagogy, graphic design, innovation education

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Introduction

In the last two decades, learning has undergone tremendous shift in paradigm. These changes are mainly as a result of developments in information and communication technology (ICT), the commercialization and globalization of education, social changes and the pursuit of quality (Brown 2006: 109). Having realised the influence and the indispensability of information and communication technologies, graphic design educators are supporting the teaching and learning with ICT in one way or the other. This has resulted in new ideas and possibilities in the design education and its practices. Available literature shows that the online studio was advocated a decade ago in developed countries, as support for learning and teaching (Kvan 2001, Bennett 2000). Blended learning, which involves both traditional face-to-face instruction and asynchronous and/or synchronous communication via the Internet, is being introduced (Bender & Vredevoogd 2006:114). Latest courses are being designed in response to growing needs of ICT in design education (Bender 2005:4; Ranjan 2005:2) while collaborations in design projects are springing up due to the establishment of *virtual design studios* (VDS) especially in the developed economies.

Little attention is paid to graphic design pedagogy as it relates to ICT and ideation especially in the developing economies. Ideation, which is the process of brainstorming with images, letters, figures and sketches, plays a critical role in coming out with a design concept. Traditionally, ideation is viewed as paper-based activity and as ICT wages into the teaching and learning of graphic design, there seems to be disturbances in the practices as students veered into the use of ICT in their ideation process. While graphic design educators in the developing countries still hold on to the Bauhaus principles of design, which calls for identifying the processes of idea development in ideation on paper with its studio practices, students in their development seem to gain ideas on the use of ICT as they interact with technology. Should educators continue to strictly apply the same principles that characterised the Bauhaus pedagogy in this era of ICT? Moreover, with developing countries admitting more students in class, culminating in large classes, contrary to the Bauhaus principles that allow for few 'apprentices' to studio masters, can such pedagogy be applied in the current situation of ICT integration? With the introduction of ICT, what methods of ICT are there for the teaching and learning processes of ideation in graphic design and how effective are they for the educator and the learner in the developing economy?

Contradictions of current pedagogy

The Bauhaus principle, though out-dated, still informed the pedagogy of graphic design education, especially in the developing countries and continues to be the most famous ideas in design education in contemporary times (Franciscono 1971; Wallis, Williams & Ostwald, 2010). Anecdotal evidence suggest that this principle is still impacting on the teaching of graphic design, especially in developing economies. Its style of teaching has also influenced the pedagogy of design and is still widely accepted in the design education, if not art education in general. Its project-based pedagogy and ideology of studio method still include students hands-on practice skills, with the instructor observing and critiquing their work as they progress (Ellmers 2006).

Among the aims and ambitions of the establishment of the original Bauhaus was to tailor its teaching to the demands of the industry and therefore sought 'to establish contact with the leaders of the craft and industries (Whitford 1984:12). Such desire made the founders called teachers, 'masters' and students, 'apprentice' and

'journeymen' to signify that the school was to be part of real, working world (Whitford 1984:30). Moreover, workshop was to provide the basis of teaching, instead of studios with workshop – teaching as the tandem system. It has been suggested that the master/apprenticeship model shares a number of similarities with the 'studio' concept in today's design pedagogy in terms of the working environment, the use of projects and one-on-one interaction (Wallis et al. 2010:1). These similarities and achievements not withstanding, there still exist a dearth of issues on technological and pedagogical gaps that require some re-directions and these call for pedagogical review in the current educational paradigm (Kowaltowski et al. 2010; Ehmann 2005; Yeoh 2002).

Lovett (2010) discusses the challenges and opportunities facing studio delivery in integrating art and design programmes under a new studio structure, typical of studio practices in the developing countries. Lovett's study is framed against the understanding that what is at stake in the attempt of the interdisciplinary studio delivery model is the preservation of a differencing of material, critical and cultural positions within design studio practices. Such interdisciplinary idea was the concept and principles of the Bauhaus studio model. The principle recognizes the facts of industrial production and distribution that artists and designers do mingle to produce commodities, albeit specialized ones (Lovett 2010:3). The reason for Lovett using the Bauhaus studio model which this present paper partially agree, is to recognize the potential for development through knowledge transfer. It is also to emphasise the need for rational and objective analysis in the design process, later referred to as a self-conscious process that starts with a problem in the actual world (Anon 2011:3). However, since current definition of graphic design now work across a variety of disciplines and media, what similarities of the Bauhaus do feature with current graphic design with ICT and its studio practices?

In the "workshop" or studio model, the Bauhaus introduced the design process based on model-making and encouraged experimentation and exploration (Gu 2003, in Sintusingha & Wu 2010:6). It also allowed for exploration of the real-world situation in the studios by developing experimental prototypes, to solve real world situations (Gu 2003:6). While Lovett's study strongly aligns with this argument especially with learners finding solutions to design problems using real-world scenario, it does not see the pedagogical inappropriateness with today's educational practices. The Bauhaus typifies the teacher-centred pedagogy, which allows for learners looking and following their 'masters' in the production of ideas to solutions. Current educational paradigm requires self-directed learning that plays such an important role in effective learner-centred education systems (Wang 2011; Wang 2009; Stensaker et al. 2007).

The other positive aspect that aligns with Lovett's study is the Bauhaus principle that embraced the interplay between technical and artistic idea of bipolar workshop structure. In the workshop structure each student had a *Master of Form* and a *Master of Craft* acting as mentors (Bennett n.d.); a tandem system of workshop teaching that equip learners with as much technical expertise as theoretical and creative. 'Apprentices' were instructed by masters of each particular craft (Workshop Masters) as well as by practicing fine artists (Masters of Form) (Broadfoot & Bennett, 1991:3). These however are informed by small class sizes against large class of students that typifies developing countries currently. This situation makes the 'master/apprentice' system of model highly ineffective as far as ideation by students are concerned in the studios within developing countries.

This paper agree with the assertion that before any progress can really be made concerning the process of ideation in graphic design, there should be a harmonious

relationship between technical and artistic ideas as both clearly contribute essential elements in the design process (Bennett n.d:8). But to the best of the author's knowledge, there is no research done to show that graphic design educators are really practicing professional designers and whose professional expertise and technical ideas clearly impart on their 'apprentices/students', at least not within scope. For architectural design education, there may be such.

Design institutions in the developing countries might have based their pedagogy on the Bauhaus in the wake that such studios had started with small classes allowing for the 'interplay between technical and artistic idea of bipolar workshop structure in which each student had a *Master of Form* and a *Master of Craft* acting as mentors' (Bennett n.d.). This paper makes an assumption that students will show some attitude of sidestepping and will distort the process of ideation as long as educator/learner interaction in ICT and studio activity is not guaranteed. This assumption is in reaction to large class sizes that characterize current graphic design studios in the developing economies. Indeed such a situation has called for this current discussion within this paper, in an effort to sensitise discussion and apply the suitable pedagogy for such studio classes with the advent of ICT.

Even though traditional methods of teaching allow teachers to play several active roles in the design courses, such as lecturing, setting out exercises, critiques to guide students through given design problems, conducting evaluation and assessment, and guiding discussions, they do not offer clear and active participation of students. The traditional methods make students' involvement so passive as listening, note-taking, following instructions and practicing the design skills discussed in critiques (Sagun et al. 2001:334).

Bender and Vredevoogd (2006) advocate for pedagogy that supports blended learning that will seek to support large studio courses. Bender and Vredevoogd (2006) argument supports the idea that since studios are unique learning environments embedded in a historical context, educators cannot do away with the traditional aspects. Bender and Vredevoogd (2006) therefore advocate the infusion of the traditional studio with online technologies that will serve as best practices. This paper agrees with their argument that today's studios have become more technological as the profession and it therefore require digital integration (Bender & Vredevoogd 2006).

Anecdotal evidence indicates that educators see these tensions as disturbing issues and a deviation of the learning outcomes of the pedagogy. The creative process and problem-solving strategies based on technological education are important because they enhance quality of solutions based on real-life problems. Ideation in graphic design is geared towards finding a solution, not only to studio works, but also to real-life challenges as far as design is concerned. Indeed, it is an essential part of the design process, both in education and in practice (Broadbent, in Jonson 2005: 613). The Bauhaus principles which call for the learner opening up to issues solely from the master might not be the most appropriate educational paradigm when it comes to ICT integration. Such a paradigm might be that of behaviourism and constructivism.

Behaviourism versus Constructivism

In educational settings, behaviourism implies the dominance of the teacher, as in behaviour modification programmes. It can, however, be applied to an understanding of unintended learning. Perhaps because behaviourists describe experiments in which

they structure learning for their subjects, attention tends to fall on ideas such as **behaviour modification** and the technology of behaviourism.

Behaviourism itself is more about a description of how learning occurs in the mind, as it were, than about how to make it happen, and when it is approached from this perspective that it gets most interesting (Atherton, 2011). What this means is that, in the learning process of behaviourism, the mind is excluded from the learning processes. The behavioural laws, according to Jonassen (1991), was a primary theoretical cause of the paradigm shift in learning psychology (Jonassen, 1991:6). In his discussion on instructional system technology in the field of learning psychology, Jonassen (1991) debunked this assertion and explained the role of the mind as 'a material entity that controls the actions of the knower' (Jonassen, 1991:7).

Jonassen (1991) went further to attack the theory of objective reality by posing that, 'if our learning theory assumes that we construct meaning for objects and events by interpreting our perceptions of them in terms of our past experiences, beliefs, and biases, then each of us mentally represents our own personal reality'. Such idea inference means, there will always be differences in the way we give meaning to a situation. In ideation in graphic design, it can be accepted as the basis for which educators cannot prescribe a lay-down approach for learners to gain ideas to achieve their design outcomes. This is because in graphic design, every design problem may have a different approach to its solution.

Jonassen (1991) advocates the need for objectivism and constructivism as the new philosophical paradigm for learning and education. He justifies the role of objectivism – that there is an objective reality – as what learners assimilate. And since the role of design educators is to help students learn about the real world it is the role of the teacher or the instructor to interpret events for them (p. 10). Juxtaposing this to constructivism, he conceded that perhaps 'what is transferred to the student is learned by the student without interpretation or reconstruction'. 'Rather than attempting to map the structure of an external reality onto learners, constructivists recommend that we help them to construct their own meaningful and conceptually functional representations of the external world'. This he supported and quotes 'objectivism and constructivism represent alternative conceptions of learning and thinking, much like the artist-scientist, two-world dialectic (Snow, 1960 in Jonassen 1991: p. 12). Constructivist pedagogy holds the promise of transforming the relationship between teachers and students in the direction of empowering learners to be much more active and interactive in the classroom (Means & Olson 1997 in Wang 2009:208)

Wang (2009) thinks constructivism is not new. Quoting von Glasersfeld (1989) and Hawkins (1994), he justifies this existence;

The fact is that this epistemological and educational paradigm resides at the heart of Western civilization in the teaching method of Socrates who elicited knowledge from students by asking them carefully- chosen questions. Human reason, leading to the discovery of eternal ideas beyond individual experience, after the manner of the ancient Greek philosophers Plato and Aristotle, was glorified during the European Renaissance, culminating in the philosophical writings of Descartes and the founding of modern science by Newton. Nevertheless, beginning in the seventeenth century European philosophers started to question what humans can actually know through the senses and rationality. Locke, Hume, and later Kant all argued that objective reality, independent of the person experiencing it, is unknowable. Once this sceptical attitude became fairly well established among intellectuals, the development of constructivism as an epistemological and educational theory was inevitable (Wang 2009:206).

According to Wang (2009), the strongest progenitor of constructivism should be the early twentieth century American philosopher John Dewey whose teachings, he believes is pragmatism. Wang (2009) refer to Dewey's philosophy as pragmatism because of its intellectual inquiry, which is not to understand reality apart from experience, but to learn how to function in the best possible way within any given situation. This, according to Wang (2009), Dewey called 'a theory of epistemology instrumentalism, a term that has virtually the same meaning as constructivism' (Field, 2007 in Wang 2009). Such teachings undoubtedly are known as pragmatism.

ICT and Constructivism

The introduction of ICT in design – its interactive and explorative nature – typifies the epistemology of constructivism in the educational theory. Wang (2009) in his discussions on the transformational promise of ICT for professional educators in architectural education comes out with the idea that ICTs have the potential for radically transforming educational practice. He also agrees that ICTs promote the constructivist paradigm of epistemology (Wang, 2009:206). 'If constructivism had not already existed, it seems likely that ICTs would have invented it to explain how they operate' (Wang, 2009). Quoting Murphy, Wang (2009) emphasised technology as being touted as an optimal medium for the application of constructivist principles of learning (Murphy, 1999 in Wang 2009).

Significantly, educators are rooting for learner-centred theory of learning which allows the student to gain knowledge in his discovery process, often quoted, as "students should construct their own knowledge". In graphic design, students need to make informed decisions as to the visuals and ideas that will communicate well with their thoughts. Using ICT allows students to search and apply their own creative thoughts, together with principles acquired in earlier projects. This help in transforming them from being passive and uncritical receptacles of past knowledge into being active and creative learners (Wang 2009:208). Such is Wang support for ICT in design education as being emphasised in this statement.

Wang (2009) bemoans the issue of pedagogy when it comes to ICT in design and questions why educators struggle to embrace technology while the necessary groundwork is not done in terms of getting enough pedagogical preparation to work with it. Accordingly,

"certain questions about implementing ICT for pedagogical purposes will not go away. Why is there such a gap between promise and practice? Who is to blame for the gap? Is ICT being forced upon the education system by enthusiasts and policy makers eager to be up to date and to compete in the global marketplace? Is constructivism, the educational paradigm that is always associated with ICT, appropriate for any level lower than postgraduate studies" (Wang (2009:210)?

He therefore advocates the need for scholars to continue examining these issues carefully together with other issues like the cultural context of ICT. Wang conclude his submissions with the statement that the "principal problems associated with using ICT for educational purposes appear to be a persistent failure to find a link between theory and practice and the difficulty of training teachers to use ICT creatively"(p. 211).

In her contribution to Foucault's 'Limit-experience', Thompson (2010) advocates a strong connection of learning to the concept of transformation.

'In learning, the learner gains a new perspective on the world as well as on herself. Learning means change and transformation.... Learning brings the individual in contact

with a different view of the world, and it is impossible for the learner to the viewpoint as it was maintained before (Thompson 2010).

At any point in time, one must see a change in the learning process. And this is even more significant with the introduction and use of information and communication technologies. What used to be working yesterday, might lead to a new knowledge today, which can also change the mode of learning and teaching tomorrow. With such knowledge, learners are able to construct new ideas and meanings in their studies. Such change might cause a paradigm shift in the pedagogy.

Discussing the use, updating and integration of ICT in higher education, Stensaker et al. (2007) assert that 'current teaching and learning schemes have, so far, not been adjusted to the technological development' as far as ICT in design education is concern (Stensaker et al. 2007:427). The pedagogy of most of the design courses in the developing countries in Africa are still rooted in the Bauhaus principles of the 19th century, even though design educators are struggling to embrace today's technology of ICT. In the studio method of graphic design education, students practice hands-on skills with the instructor observing and critiquing their work as they progress (Ellmers 2006). Wang (2009) believes that this 'hands-on, exploratory, interactive nature of ICTs, particularly the Internet, causes them (students) to gravitate toward the postmodern epistemology and educational theory of constructivism' (Wang 2009).

One of the arguments against the use of ICT in the ideation process of graphic design is that it eliminates the learner/educator studio interactions. Technology affords the same academic interaction, however the introduction of ICT requires 'a different approach for social interaction such as online chats, virtual office hours, group projects and interactive software with live video and audio' (Dale 2006:4). If ICT can make any meaningful impact in the teaching and learning of graphic design, then the pedagogy should be re-defined. Quoting Bates (2000), Stensaker et al. (2007) argue that 'the main intention behind the use and integration of ICT in teaching and learning is often to change how teaching and learning are conducted in the sense of putting more emphasis on interaction, flexibility and innovation' (Bates 2000 in Stensaker et al. 2007:431). Stensaker et al. (2007) are therefore convinced that if such intentions are to be realised, it should 'be in the link between purpose, people and pedagogy that much can be gained' (Stensaker et al. 2007:431).

Making a case for a carefully consideration of ICTs implementation in university programmes for the education of design professionals, Wang (2011) argues for constructivism;

Traditional instructivist models emphasise learning as assimilating, while constructivist models regard learning as a combination of diverging, converging and accommodating. All things considered, constructivism, with its emphasis on student-centred, collaborative problem solving and its vision of the teacher/professor as a coach or a facilitator, instead of a disseminator of knowledge, seems to be very well suited to the education of professionals.

ICT and Experiential Learning

Linked to constructivism is the experiential learning theory, which draws on the work of prominent 20th century scholars like John Dewey, Kurt Lewis, Jean Piget and others. One of the pillars of the experiential learning theory (ELT), according to Kolb and Kolb is that ELT proposes constructivist learning (Kolb & Kolb 2005), where knowledge is created and recreated in the personal knowledge of the learner. Kolb and

Kolb (2005) define ELT as a situation 'whereby knowledge is created through the transformation of experience and ... results from the combination of grasping and transforming the experience. 'Not only does ELT combine cognitive and behavioural learning theories, but it also allows for affective changes to be recognised as learning' (Wang, 2011:191). Through experience, learners also create their own knowledge of ideas that hitherto had not been conceived either by neither the learner nor the teacher.

ICT is allowing design students gain more knowledge in their ideation process than before and thus their 'traditional idea capturing' seems to be discarded. Not only are they seeking for better ways to capture their ideas, but also the fastest way to make them real. Conceptualization from the digital point of view also means focusing on the entire spectrum of design challenges. If learning is an active process of constructing rather than acquiring knowledge, and instruction is a process of supporting that construction rather than communicating knowledge (Duffy & Cunningham, 1996), then ICT is helping students to create knowledge when they engaged with the various ICT tools in the ideation process. What seem not to be clear are what, how and where the instruction should be aligned, with the introduction of ICT. Perhaps it is about time design educators and researchers look at emerging theory of 'navigationism'.

Navigationism in the era of ICT

Brown (2006) in discussing the paradigm shift in education finds it difficult to accept that teachers and educationists still continuing to work within our "content-driven" paradigms of constructivism. In his article 'Beyond constructivism: navigationism in the knowledge era", he discusses how ICT is impacting on education and the shifts in the educational system for the past decade. Quoting Restak (2003:57) he indicated that, "within the modern age, we must be able to rapidly process information, function amidst chaotic surroundings, always remain prepared to shift rapidly from one activity to another and redirect attention between competing tasks without losing time" (Brown 2006:109). Accordingly, "providing our learners with preselected and carefully designed and developed content" in the current situation of changes in educational environment, especially with ICT means "we are heading for a disaster, if we are not willing to take the leap out of this fatal paradigm"(Brown 2006:116).

Brown therefore strongly argued for 'navigationism' as "the new learning paradigm that lies beyond constructivism". He define navigationism as a learning paradigm where "learners should be able to find, identify, manipulate and evaluate information and knowledge, to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others"(Brown, 2006:116). ICT is allowing graphic design students to locate the appropriate ideas within the virtual environment and studios, manipulate them for the development and execution of their desired objective as far as the design process of ideation is concern. Students might have gone through the stages in ideation using the traditional pedagogy but working within the virtual environment will make it difficult for them to trace and document these stages as required by the traditional methods of ideation.

Brown exhorts design educators to coach learners to identify, manipulate and evaluate information and knowledge, and to integrate this knowledge in their world of work and life, to solve problems and to communicate this knowledge to others. "Teachers and educators should become the source of how to navigate in the ocean of available information and knowledge. We should become coaches and mentors within the knowledge era". (Brown 2006:116)

What is needed and which will be much appreciated is 'a paradigm that is underpinned by different principles, 'based not on the acquisition of isolated facts and knowledge, but on the development of multidisciplinary connections with global networks and participation in communities of practice, together with reformed teacher roles, and greater autonomy and agency for students'. Educators should therefore adopt 'pedagogies that move beyond instruction to creativity, innovation and generative thinking' (Mcloughlin & Lee 2008:647).

New media and social software

Mcloughlin & Lee (2008) also takes the argument beyond constructivism. They propose a paradigm that blends social software, constructivism, connectivism and navigationism.

In an increasingly digital world, where ubiquitous computing and demand-driven learning are the trends, there is a need to expand our vision of pedagogy so that learners become active participants and co-producers rather than passive consumers of content and learning processes are participatory and social, supportive of personal life goals and needs.

The concept of studio activity is to allow for interactive participation of students and their peers to discuss and critiquing their works. In other words, studio teaching is seen as a "model of interaction" and for "assimilation of real-life situations".

Mcloughlin & Lee envision that;

the affordances of these technologies, coupled with a paradigm of learning focused on knowledge creation and networking, offer the potential for transformational shifts in teaching and learning practices, whereby learners can access peers, experts, the wider community and digital media in ways that enable reflective, self-directed learning (Mcloughlin & Lee 2008:649).

Implications for graphic design pedagogy

With the introduction of ICT, there seems to be pedagogical disturbances calling for a shift in paradigms informed by the introduction of ICT as far as ideation and ICT in graphic design education is concern.

The field of graphic design is much broader now than in the past and now includes disciplines such as motion graphics, environmental commodities, and new media. It has evolved from the pre-historic abstract geometric shapes to include a spectrum of ideas for film and TV and all manner of visual communication and design. It also involves understanding human engagement in an effort to useful and pleasing artefacts.

It is now almost impossible to talk about graphic design without the use of technological resources from idea development to final execution of the design solution. Computer technology has become one of the tools of ideation, in other words, a 'thinking tool' (Dorst and Cross 2001). It is a fact that professional designers and student designers will rely very heavily upon technological tools like ICT and its techniques to make sense of their ideation within their respective design tasks.

Current educational pedagogy cannot fully rely on the Bauhaus principles that defined the process of design as an object-centred process, which has to produce an artefact or environment that solves a problem. Moreover, the pedagogy that includes the issue of ideation - fundamental to the design process - but still viewed in the traditional model of professional graphic design does not accommodate ICT. We need an educational paradigm that encourages cognitive learning that comes with ICT and

therefore encourages the issue of pedagogy that use technology to facilitate such learning paradigms.

Methods of ICT for the ideation process

With the introduction of ICT in ideation in graphic design, educators need to ask themselves; what methods of ICT are there for the teaching and learning processes of ideation in graphic design? Graphic design educators are encourage to adopt pedagogies that move beyond instruction but that which encourage creativity, innovation and generative thinking (Mcloughlin & Lee 2008:647). Contemporary goals in education, particularly graphic design education will mean giving students the required tools to stimulate the search for creative solutions to problems, as well as a solid scientific basis for decision-making processes, especially in ideation. These are possible currently with ICT and researches have proved them to be successful. Through "digitisation" – ICT as a digital design tool – a student may render a word in sketches that will lead to further idea development of ideas and thus create a required solution (Wang 2011; Wang 2009; Stones and Cassidy 2007).

Thorsteinsson et al. (2010) in their studies on *Adoption of ICT in Supporting Ideation Skills in Conventional Classroom Settings* makes a contribution of ICT in idea development. In their studies, Thorsteinsson et al. (2010) show that ICT with ideation is possible digitally, through Virtual Reality Learning Environment (VRLE) technology. With Innovation Education (IE) there is the possibility that one could use the VRLE tool for ideation in many course, including open and distance educational (Thorsteinsson et al. 2010:314). Page et al (2009) advocate that 'individual must be able to adapt to novelty through Innovation Education (IE) environment which is increasingly relevant for ideation and collaboration, based on the notion that 'everyone has creative ability that can develop further some degree through educational stimuli and self-developmental activities' (Page et al. 2009:11). This article supports Page et al's (2009) IE for the reasons that it see possibilities in using new knowledge to produce new products that stimulate and develop the creative abilities of students. IE also encourages the teaching, studying and learning in certain problem and innovation-based learning process; from identifying a context, where students develop their own and realization with apropriate models. Finally, IE encourages and develops the students' initiative and strengthens their self-belief.

Effectiveness of ICT in graphic design education

ICT is encouraging graphic design students to be more innovative in their approach to design development. Spendlove and Hopper (2004) believe that ICT should be seen as a set of tools for developing ideas, and should be adopted as and when they are appropriate within the broad creative or design process (Spendlove & Hopper 2004:2). The argument of ICT as a tool or subject in graphic design will be settled when educators adopt the IE approach in design education. According to Page *et al* (2009), creativity and problem solving are not only intrinsic to design education but also to technology education. Quoting Loveless (2002) in their paper, Spendlove & Hopper, (2004) argue that, by providing new tools, media and learning environments, creative teachers and learners can use ICT to support 'imaginative expression, autonomy, and collaboration, fashioning and making, pursuing purpose, being original and judging value' (Loveless 2002:2 in Spendlove & Hopper 2004:2). The problems that need to be tackled then is when and how these tools should be adapted for effective development of ideas as far as current pedagogies are concern. As Spendlove and Hopper (2004)

remark, "it is now apparent that with the rapid introduction of new technologies, the time taken for them to be embedded into the curriculum and the time for them to impact upon pedagogy (favourably and unfavourably) is increasingly becoming shortened" (Spendlove & Hopper 2004:5). The time has come for educators to have the greatest opportunities for reflection prior to the introduction of new technologies (ibid).

Going further, this article encourages an on-going research of exploring issues that will greatly help in answer the question: what methods of ICT are there for the teaching and learning processes of ideation in graphic design and how effective are they for the educator and the learner in the developing economy. This can be achieved within the right and appropriate framework; an activity-oriented framework that relates to graphic design and show the tensions and imbalances in current pedagogy.

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New challenges, new strategies in research applied to design and communication

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Abstract: The paper discusses the evaluation of a master's degree in design and communication in Spain, and the impact of the evaluation on the development for future of the programme. Five years ago the first Master's Degree in Design and Communication (MUDIC) started at the Elisava design school in Barcelona. The social, labour, economic and academic situation has changed not only in our country but in many of those from where we receive our students. The premises with which the MUDIC was built must therefore be subject to revision. Now, half a decade later, the list of competencies sounds out of date, lacking in practical sense. The objectives, talking in academic terms, have moved into the background and the master has focused on completely reconsidering the basic and the specific competencies. Both answer the question: In what do the students should be competent in the end? The master therefore continuously has considered the multiple changing realities of the present situation and to combine them with the determinations of the didactic specialists, the pedagogues. The challenges have been distinguished by blocks coinciding with the phases before, during, or after the master's degree. A quinquennial review by the education quality agency will take place this year.

Keywords: New strategies in design and communication, Master's degree in Spain, Official Master's degree, Design education in Spain.

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Context and present situation

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Literature references should be placed in parentheses (Author 2000) within the main text, adhering to the same format specifications as found in the rest of the text. Note that the line spacing is single throughout the document.

The objective of the new structure of present university studies[1] is to harmonise the duration, the learning methods and the assessment of the academic activities of European universities in order to facilitate student movement and their professional integration in the European jobs market. ELISAVA, Escuela Superior de Diseño e Ingeniería has over half a century's experience in training graphic, industrial and interior designers, and has adapted its educational offer to the requirements of the Universidad Pompeu Fabra (UPF), the public university to which Elisava is affiliated, and through this to the Ministry of Education.

The Master's Degree in Design and Communication (MUDIC) has opted for a study profile characterised by a broad view of the problems and possible answers to company needs to contract high-level students trained in design and communication, both in the academic area and in the purely professional. This mixed profile is a guarantee of competence for professional practice, and preparation for research. Its aim is to complete the training acquired in the design degree and university qualifications similar to its profile in the communication degrees (Audiovisual Communication, Journalism, and Advertising) and fine arts, which are generalist in nature.

The programme therefore responds to one of the priorities that appear throughout the bibliography related to the process of adapting training to the European Space for Higher Education. The MUDIC is also developed as a reply to a tendency that in recent years has caused a current of specialising innovation in the university studies given in Spain. From an academic viewpoint, it must be stressed that design studies in Spain have recently become a university degree and although there were already doctorates in design in some Spanish fine arts faculties, the research can be considered something relatively recent and therefore in need of greater deepening and projection in all its specialised branches.

With regard to the study profile, it must be said that in the last twenty years, design in general has transformed considerably and, from being considered a trade or profession, it is now understood as an academic discipline. This is the result not only of the transformations in the productive systems, but of a claim on the part of the designers who, at least in the mid-1960s, considered it absolutely necessary to integrate theory and practice in any project as both fed each other, and even more at a time when design training has become something habitual in universities and higher education centres, where research is their reason for being. Another link in the development process was established at the change of century, when the designer was

[1] On 21st January 2005, Royal Decree 56/2005 was approved to regulate the Official Postgraduate Studies and to adapt the structure of Spanish University Studies to the European space of higher education, in accordance with the Bologna declaration of 1999 and complementary declarations.

invited to "take part", as Findeli (2001) said: "In effect, the systemic view implies that the making of an artefact, which usually is considered as the normal outcome of a design project, is no longer taken for granted. Within these complex systems, designers are expected to **act** rather than to **make**. […] In philosophical terms, one would say that design pertains to practical, not to instrumental, reason; or else that the frame of the design project is ethics, not technology". It therefore seems to be appreciated that there is agreement in considering design a system, a network of values that must be contemplated as a whole. Something clearly "holistic". And that this aspect, including perception, ethics and aesthetics, must be developed from the earliest courses of the design education and be maintained throughout all of the stages of the training: "I believe that visual intelligence, ethical sensibility, and aesthetic intuition can be developed and strengthened through some kind of basic design education." (Ibid. p.16). At the present time, it is reached the point where designer associations take part and are positioned in their work of establishing the role of the designer-educator: "Then, the role of a design educator shifts from that of knowledge provider to that of a mediator who inspires and facilitates orientation for a more substantial practice."[2]

Furthermore, it must be said that at the present time there are different master's degrees in Spain related to design from areas such as Industrial Design Engineering or Architecture. However, there are a reduce number specifically focused on graphic design and communication, two sectors with a great demand for professionals. This means a lack of training opportunities that might cause the university system to be uncompetitive with respect to other countries. This directly affects those who want to continue training. As without a Master's Degree in Design and Communication they are unable to achieve sufficient level in our country, and have to do these studies elsewhere in Europe. One agrees with Margolin (2009) when saying that "Only by preparing ourselves to manage an increasingly complex natural and social environment in which design plays an ever more important role, will we be able to fulfil our duty as good stewards. Well-conceived and high focused doctoral programmes in design are central to this task".

Similarly, there are more and more schools and university centres that give a design degree, so there is a growing need for teachers with doctorates and capacity to conduct research projects and to give teaching in Universities and Design Schools. At the present time, this shortfall has reached the point of causing serious difficulties in selecting and contracting the doctors. They are needed for giving third cycle training, for directing doctoral theses, and for participating in research projects. As result of all this the development of Design as the academic discipline it now is, and therefore, to answer the social needs discussed above and which are very much in line with what Buchanan (2001) summed up by reflecting that "design is the human power of conceiving, planning and creating products which serve human beings in achieving their individual and collective purposes".

It must be said that the MUDIC is the first experience in the country and in the design speciality leading to research, that is, a practical doctorate within Bologna system. Always knowing that the present doctoral formats are being reconsidered, as

[2] ICOGRADA, International Council of Graphic Design Associations (2011) "Icograda Design Education Manifesto 2011" p. 8-10 [Online] Icograda General Assembly, Taipei. [Consulted: 14 July 2012]. Available at: http://toolkit.icograda.org/database/rte/files/PR_IEN_Manifesto2011_webres.pdf

Hughes (2006) asserts, as hybrid options are being confirmed that have nothing to do with the traditional genres. And as Melles (2009) critically says in the *Temas de Diseño* journal: "Perhaps design fields and institutions should clarify their curriculum and mission statements before further doctoral differentiation becomes confusing".

Strategic changes

When revising the competencies to adapt them to the changing reality of present society and the requirements of the pedagogues, the support of a group of specialists was received from the Department of the UPF, the Centre for Teaching Quality and Innovation (CQUID). It was opted to annul the majority of the basic competencies expressed in the initial study plan. The basic competencies, being typical of the level of the Master's degree, are provided by imperatives of both: the Spanish National Agency for Assessing Quality and Accreditation (ANECA), plus the Regional Agency for Quality in the University System in Catalonia (AQU). Although the specific competencies were prioritised, as through these the specific profile of Design and Communication studies was defined. In consequence, it was passed from 16 basic competencies to only the 5 given by decree. Similarly, the specific competencies were synthesised: from the initial 70 (10 general plus 60 particular from the subjects) were brought them together into 7. It might therefore say that the 60 competencies have disappeared that belonged to the 19 subjects of the Master's degree. While other universities were observed, it was realised that this search for simplicity is spreading in the direct messages launched by the educational programmes[3].

This strategic change in reducing and reassigning specific competencies has partly been subject to the appearance of the so-called "Learning Results" which did not need to be included in the study plan of the initial course 2008-09 and which now have to appear on the descriptive sheet of each subject. Each competence is assigned from five to seven learning results. It would be complex to list them all here, so it will prioritise by first listing the seven specific competencies (SC).[4] And by way of example, it is set out the Learning Results of the last competence, 7, which specifically adapts to the Master's Degree Final Project.

- SC-1. To create an idea, concept or hypothesis that allows us to analyse, assess and face new realities.
- SC-2. To pose a completely new research and proposals in the field of design and communication.
- SC-3. To draw up methodological scripts in order to sequentially control the phases of defining, developing and interpreting the projects.
- SC-4. To communicate orally, in writing and visually to professional and non-professional audiences using advanced design and communication instruments.
- SC-5. To adapt to different users, environment and circumstances by using the strategic capacities to resolve the new challenges of present society.

[3] See the three parameters argued by the Indian Institute of technology Madras on what educational programme should be. "Mission" [Online] Indian Institute of technology, Madras. [Consulted: 1 September 2012]. Available at: http://www.iitm.ac.in/mission

[4] A list of the learning results assigned to each competence can be consulted on the www.elisava.net website or on the MUDIC blog: http://mudic-elisava.com

- SC-6. To dominate technical requirements in the area of design and communication and to coherently suggest solutions in relation to detected or commissioned proposals.
- SC-7. To develop a useful master's degree final project to implement theoretical frameworks that enable graduates to be better assessed in the academic and professional spheres.

Learning Results of competence 7:

- To develop the structure of a research work from the theoretical and practical part with a perfect finish.
- To specify the quantitative and qualitative aspects of a proposal in an organised, legible and easily interpretable way.
- To manage a database that includes the documentary elements found in different fields and referents with agility and productively.
- To relate the data found in a research, providing determining conclusions.
- To almost automatically discriminate the superfluous elements from those valid in the process of seeking data, benchmarks and backgrounds.
- To conclude a project in the field of design and/or communication with high academic level that prepares them for later doctorate studies.

With this panorama, one is now capable of effectively assessing whether a student has acquired the items required by the competence. Before, the qualification is based on the criterion of a responsible teacher running the project, partly loaded with certain subjectivity. Now it can be an external panel that decides, based on the results of the learning, whether the student has reached the required level. However, above all, it can detect where there are shortcomings and what aspects have to be corrected. Though not as the initial objective, these 7 competencies, now covering all the subjects have become the principal sale argument when the MUDIC is offered to potential students. Before validating the set of competencies, the master looked at those given by the AIGA[5], which reveals the expectations made of designers to cover future demands. In this list, 5 are selected as the most specific related to the world of design and communication, and another 8 as general, making a total of 13 which "should cover the educational institutions in developing their curricula, and the professional agencies in recruiting their teams" (AIGA 2012).

There is another requirement of the ANECA which is to prepare the Subject Teaching Plans (PDA). For each subject a Subject Teaching Plan has to be prepared with a content that contractually binds the student with the teacher responsible for the subject and, in the final instance, with the management of the MUDIC and the school. The Subject Teaching Plan specifies the full description of the content of the subject, the calendar, the activities, the general and specific bibliography, the teaching resources, the aims, the assessment criteria, the methodology, the competencies ascribed to it and how the assessment is to be made. In the time that MUDIC has been developed, one have seen that students find it difficult to understand and accept these Subject Teaching Plans. It is difficult to ask a professional collaborator to draw up a Subject Teaching Plan of the practical project they consider for their class. This is an arduous and complex job, as they have to start by understanding the concepts. A

[5] AIGA. (2012) "Designer of 2015 competencies" [Online] AIGA The professional Association for Design. [Consulted: 9 August 2012]. Available at: http://www.aiga.org/designer-of-2015-competencies/

specific training courses for preparing the Subject Teaching Plans among the teachers has been given, but they have largely failed as the concepts have been rapidly forgotten. Many teachers continue to think of what exercises have to be proposed for meeting objectives, ignoring the area of competencies.

Faced with this problem, the option was to create a Teaching Guide with the practical project at its centre. This project is what is going to be presented by the student for each subject. The Teaching Guide sums up the most outstanding aspects that must be attended with respect to the considered project, and binds all essential academic data to it: objectives, competencies, assessment criteria, deliveries and presentations and bibliography. This is useful for monitoring the student and the teacher. In each subject, there is a teacher responsible for the practical seminars and a series of specialist guests intervening with theoretical master classes.

Dynamics introduced

Another course dynamic that implemented is the use of the Virtual on line campus, so that there is direct official communication with students. The main sections are: the discussion forum, the academic regulations, the teaching guides for the projects proposed for each subject, and the documents that the teachers want students to have. Furthermore, for three years the MUDIC blog[6] has been running as a tool of continuous public information. Here it is suggest information on complementary course contents, new developments, initiatives and activity agenda of the world of design and communication. A detailed curriculum of the master teachers is included. Students take part by sending their projects in process or those completed at the end of the subject.

One element of communication that helps the master to inform potential students and to effectively communicate what it is done to students already enrolled is the use of diagrams. These are graphs that visually accompany the explanations of the methodology followed and clarify these specialities offered. The infographs give students a map that gives them indications on the phase of the project development where they are at all times, and what is left.

[6] MUDIC blog: http://mudic-elisava.com

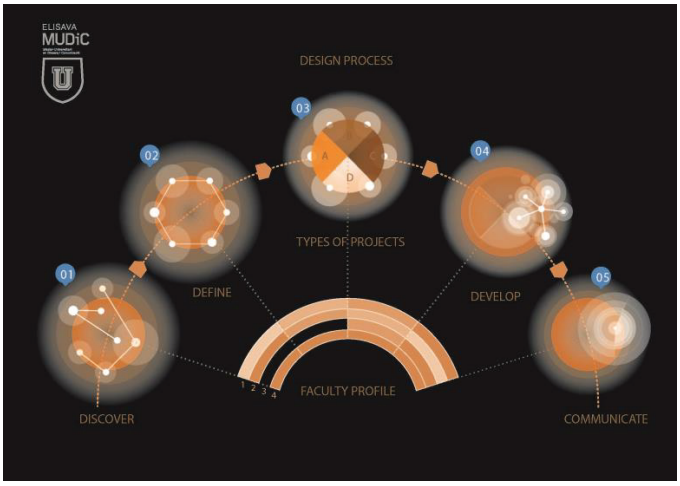

Figure 1. *General methodology diagram. Author: Attassa Cabrera for MUDIC*

Two years ago a schematic diagram of the way the master understands the design process was drew up. This year the quality of the graphic elements was improved and has turned the schema into infographs. They have the same function, but manage to communicate the development of each group in a more visually attractive way. It was built a graph explaining the general methodology of the course (Figure 1), including the types of projects to be developed and the final work of the Master's degree, as well as the four profiles of master teachers. The first of these is complemented with another diagram that focuses on how the master understands the world of communication (figure 2), and finally, two graphs to clarify each speciality module: Art Direction (Figure 3) and Graphic Design (Figure 4).

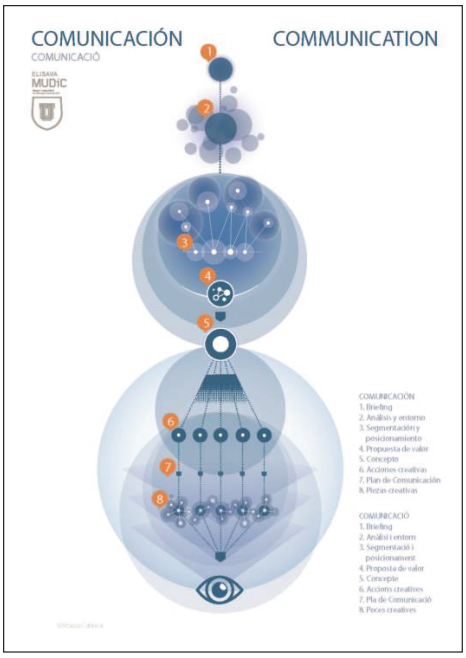

Figure 2. *Communication scheme. Author: Attassa Cabrera for MUDIC*

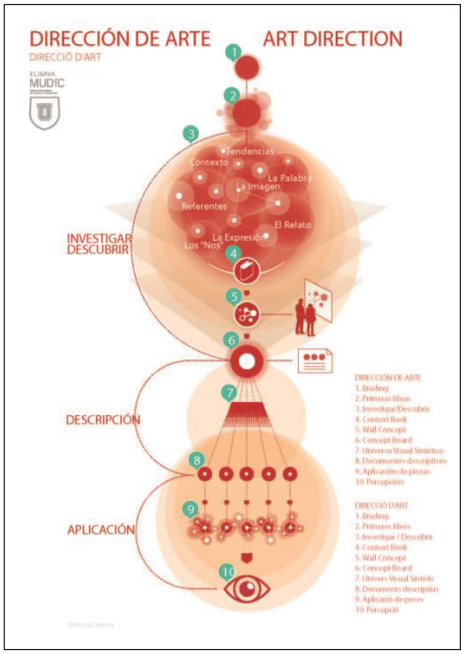

Figure 3. *Art Direction scheme. Author: Attassa Cabrera for MUDIC*

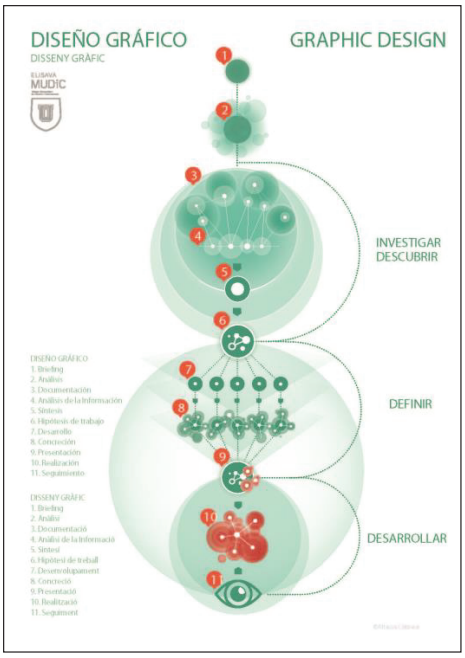

Figure 4. *Graphic Design scheme. Author: Attassa Cabrera for MUDIC*

To present the MUDIC universe (Figure 5), it has been processed an explanatory graph of the present state, specifying the situation before, during, and after MUDIC. The layout of the elements helps to detect where the strengths and weaknesses lie and to relate them to each other, with the aim to assess them comparatively and then establish future actions in areas where it is detect fragility. This exercise of putting all related items into a single table and viewing them with a bird's-eye view, all at the same time, gives an exhaustive control of the situation in order to suggest improvements and to see how they would affect the whole.

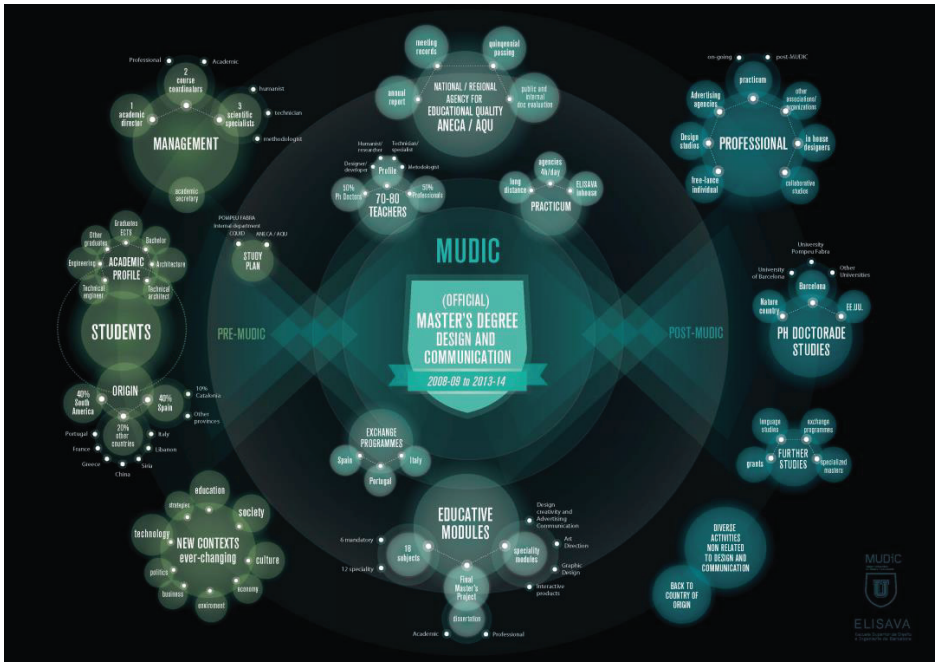

Figure 5. *MUDIC Univers diagram. Author: Attassa Cabrera for MUDIC*

As a result of an individual "Tutorial Follow-up" done to each student, it has been detected the continuous doubts arising on the choice of the subject of the Master's Degree Final Thesis. So a reference framework to help the students has been established. First students put forward the definition of their area of interest. Although the Master's Degree Final Project is not started until the third term, students are asked to show a concept map, (c-map), at the beginning of the second term, where it can be seen all of the fundamental questions on the proposed subject with a simple 6W system. What/What for? Why? Who? Where? When? and HoW? Then the specific subject on methodology starts, which lasts three months before the Master's Degree Final Project. In addition to the c-map, they have to position they are Master's Degree Final Project in one of these project or theoretical areas: *(a)* Conceptual/strategic *(b)* Technological *(c)* Historical/social, and *(d)* Mixed. This choice obliges them to pre-configure a structure for each type of Master's Degree Final Project.

The Master's Degree Final Thesis

The Master's degree final project has also been thoroughly reshaped. Up to very recently, one talked about "Project", for in the field of design and communication, the term project is the most precise definition for what is developed by students-professionals. The new definition imposed by the official bodies is "Master's Degree Final Thesis". The repercussion it has had on the master studies has been the double option now available to students to officially develop their Master's degree Final Thesis, 1/3 of the ECTS (European Credit Transfer System). Guiding them towards their objectives at the end of the MUDIC. The orientation of the Master's degree has

therefore changed and precisely adjusted to the output profiles and practice of the profession. Five years ago the Master's degree was only professionalising, but now it has turned towards a mixed profile combining the two future areas of output: professional and academic. This extension of the orientations has meant that in the short or long-term, those students who wish to do doctorates would finish the master's degree with a purely research work, and those who do not expect to carry on with their academic career can do a project aimed at the professional world. In this last case, the project report must include 50% research before the development of the design proposal, which would account for the other totally practical 50%. The project must be done with operative prototypes up to a level of final presentation to the potential customer and technically adequate for the developer or industrialist materialising it.

Why has been chosen to give the Master's Degree Final Thesis two orientations if there are fewer and fewer students interested in doing the doctorate? Simply because the access requirements for the doctorate have changed and obliged the master to prepare students better. While at first there was a group of students in the Master's degree who were teachers needing to become doctors, the profiles are now more diversified. Although there is an imperious need for doctors belonging to the field of design, the requirements are much more demanding: the number of vacancies has been halved, the priority has been given to students having done the official master's degree in the same university, and a very strong methodological base is now required. The public price of the enrolment has also increased and grants and economic aid have been reduced. The sum of all of these factors from social and academic areas means that one has had to be very aware of them. This link between aspects which in principle were not strongly connected was already seen at the beginning of the century: "The realities of the workplace, the knowledge and improvement of the profession and the rigour of the University begin to converge on new relationships" (Maxwell 2003). In fact, one has wished to complement these with other factors suggested by Hughes (2006) when he identifies the cultural and economic agents and how they affect the top ranking of universities in each country. This brings a better understanding of the barriers on university excellence. However, one has always borne in mind the aspiration that doctors in design should be assessed equally to doctors in other disciplines and that research should also be equivalent. In this respect, it has been seen that one is not alone and that (Hobbay, Boddington and Grantham 2012) appeal that "... If innovation researches take design more seriously, they might well discover that a wide range of different design processes, approaches, and categories already underpin industrial development, providing a source of economic growth and conferring individual firms with distinctive strategic advantage". As a result, in each addition the master has modelled all of the course components, basically three, to sum up: the study plan, the profile of the teachers and access students, and the didactic methods and processes.

Profile of students and teachers

The profile of the students has changed from year to year. Initially, the master has received students with two or three year's professional and teaching experience. Almost 50% of these wishing to use the master's degree as a trampoline to the doctorate, as this is the only form of access. This tendency has fallen in time, and now only 20% intend to pursue an academic career. Furthermore, the professional experience is also more limited. The "standard student" has done a four-year university

degree and one year of professional practice. They have realised the shortcomings in their training and that they require resources, and above all methodologies, to take on professional projects. So they have chosen to come back to the classroom. Concerning the origin, 40% come from Latin America: Colombia, Venezuela and Mexico are the main countries. A further 40% come from the other Spanish provinces, very few from Catalonia. And the remaining 20% from different countries of Europe, above all: Italy, France and Portugal. The master exceptionally receives students from China, Iran and Syria. The training profile of the students applying is: bachelor's degree, engineering, architecture, new bachelor in design, and in technical engineering.

With regard to the teachers, the master's degree is the first official qualification in the Spanish state in the discipline of design. One of the essential requirements for it to be an official qualification is that at least 50% of the teachers must be doctors, and the rest renowned collaborators in the profession. After performing a detailed study of the need for specific teaching staff for the area of design and communication, the master has established 4 profiles, independently of whether or not they are doctors. These profiles coincide with the different stages of the project development and appear in specific phases: *(a)* The projector/developer *(b)* The humanist/researcher *(c)* The technician/specialist, and *(d)* The methodologist. Master's great achievement is that they influence each other and thus produce an advantageous and enriching situation for everyone. The theoreticians have become interested in practice and the practical have taken on more theoretical aspects. Very much in the line of the position observed by Teal Triggs (2011) on this historical confluence: "I would argue that graphic design is in a unique position. While the master needs more trained design historians to provide a context to the understanding of graphic objects, movements, and people, we should also celebrate the practitioner historians who also have the capacity to locate, explain, and contribute to the development of graphic design practice. Graphic design history in the present is looking for its past; in doing so, it paves the way for the future of graphic design."

Actions and challenges

The most important developments in the last two years have been: the creation of a group of scientific specialists to cover all aspects related to the development of the course and the requirements of the teaching quality agencies. The inclusion of a further 2 speciality modules in addition to those in 2007: that of Graphic Design and that of Interactive Products. Opening to knowing what other masters' degrees are doing and possible contacts on the level of university exchange. The management of the practicum. The preparation of a teaching guide for each subject. And guided tours to fairs and exhibitions on related topics to the master's degree.

The challenges imposed by the master have been distinguished by blocks coinciding with the phases before, during, or after the master's degree. In the stage before the degree, the master will face the first generations of Spanish students with official bachelor's degree in design (four years of education). This generation will be complemented by the re-qualified, those who trained on the design degree and have done an Intermediate course to the official qualification. The quality assessment agencies will give new directives that will necessarily have to be observed to be able to continue offering the MUDIC for a further five years period. The doctor teachers must be certified by the National/Regional Quality Agency, in other words, they must have a

higher category. The master faces new changes of all kinds: social, political, economic, and so on.

While the master's degree is developed, one wants to establish new inter-university and international contacts. The master is considering publishing the teaching material developed and applied on the MUDIC. To study whether the new deployed competencies are in line with the requirements of the new social, academic, economic and business context. To discover and revise the present role of teachers as monitors of content acquirement and to encourage learning, rather than the simple transmission of information. At the same time, to attend the student profile with an active role in information management as a member of communities with shared interests, rather than simple passive receivers of contents. To involve organisations to include them in the practice of certain professional projects to cover objectives of the master's degree.

In the phase after the master's degree, one needed to deploy tools to study the usefulness of the information given to the students. To strengthen the decision to continue training future doctors in the area of humanities, and especially in design. To establish the professional outlets. Specifically to control the practice, where the master is concerned with the activities done, and the economic question: at the present time for a practicum contract students earn from a minimum €36 to a maximum €400 a month. To start a program to seek and arrange grants for continuing studies, languages, technical studies or areas more specific to design and communication. In the end, it is a question of generating new processes and greater knowledge by reconciling culture and technology through creativity and innovation. Without ignoring ongoing training, in which it is pick up on the following phrase from a specific article (Malouf 2011) about design education in the future: "The education of the contemporary designer requires reassessment in light of the reality that design education is a life-long journey that cannot be granted in a formal, four to seven year education (Bachelors to Masters)".

Just as the design profession is constantly changing, the master must assume the responsibility of continuously adapting the academic profile, and even bringing forward the future professional profile. If not, there is a risk that the profession and professionals will lose their status and disappear. The master has a nearby horizon to draw out from challenges set for ourselves and circumstances that one must overcome.

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Bringing practice to the theory: Project-led education in Industrial Design Engineering

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Abstract: The University of Twente started an educational programme on Industrial Design Engineering in 2001. The structure of the programme builds on project-led education, mainly to immerse students quicker and more profoundly in the field of expertise they are educated in. Given the impact of educational projects of considerable scope, complexity and scale on the overall programme, adequate balancing of the learning aims and implementation of projects and courses is essential. Based on the criteria for the programme, a reference architecture is devised that guides the way in which the programme is arranged. By means of an example, depicting one of the projects, the implementation of project-led education is shown. From this, the way in which students and teachers/tutors have changed their roles and demeanour is assessed. In this respect, it is depicted how experience and external measures have influenced the programme. Moreover, the consequences of introducing project-led education are discussed with respect to the vision of the overall educational programme.

Keywords: Project-led education, student motivation, Industrial Design Engineering.

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Introduction

The University of Twente is a campus university located in the east of the Netherlands. Established in 1961, it currently offers educational programmes in various technical and social disciplines. In this, the motto is 'high-tech, human touch', with a specific attention for entrepreneurship.

Consequently, the university inherently aim to encourage students to develop an entrepreneurial spirit, to work beyond the boundaries of one specialisation and to think multi-disciplinary and internationally. Students are trained to become practice-driven professional experts; they learn to focus on acquiring, creating and applying knowledge.

The university has an open eye for attuning the educational programmes to (changes in) the demand for such practice-driven professional experts. Therefore, the increasing demand for technically educated design engineers instigated the development of an educational programme on Industrial Design Engineering (IDE). The educational approach applied in the IDE programme, which started in 2001, has been inspired by the experiences gained in the more mature programme for Mechanical Engineering. This programme has a long tradition (since 1994) in educating engineers based on project-led education. Within Industrial Design Engineering, this educational approach has been further developed. At present, more than ten years after the programme started, over 410 students successfully obtained a Bachelor's degree and over 250 students obtained a Master's degree. The majority of these MSc. graduates quickly found a position in industry, (semi-)government, research or education. Nearly all BSc. graduates continued their studies in the MSc programme. Over the last decade, the enrolment of new students has increased from around 30 to more than 100; this number is still growing.

Especially a programme on Industrial Design Engineering should take its responsibility in regularly assessing the educational programme with respect to the underlying requirement specification. Inspired by external accreditation or by internal ambitions to increase educational quality or efficiency, the professors, teachers and students alike should unremittingly strive for continuous improvements and for more radical enhancements. This is especially true as concerns the relation between researches carried out in the field, and the reflection and visibility thereof in education.

Current practice

Principles of project-led education

Many definitions of project education, project-led education and project-based education exist. This publication, however, certainly does not aim to yield an all-encompassing definition, or to dispute any existing definition. It rather attempts to depict the context, (best) practices, working methods, pitfalls and challenges that are encountered in everyday educational practice enriched with projects.

Here, project-led education is essentially seen as an attempt to shift emphasis in education from passive to active learning (Ponsen, 2002). In conventional classical education, students experience the attempts of an instructor to transfer knowledge, whereas in project-led education this instructor acts as a coach, facilitator and challenger. Project-led education does certainly not negate the importance of theory courses. Courses are either integrated within the project, thus directly supporting that project, or they introduce students into more abstract or fundamental topics.

Project-led education focuses on the development of the students and their competences while exposing them to acquisition and creation of knowledge and skills in a realistic context. This is done by challenging students to work on realistic problems in team-based projects from the immediate start of the programme. During a project, students independently need to employ a variety of skills and knowledge. This inherently instigates a demand for obtaining knowledge, either by understanding/ learning or by creating it, while carrying responsibility for the results.

CLAIMS

Project-led education, setting aside the exact form that is used, contends to have many advantages over conventional educational approaches (Powel, 2003). A number of asserted advantages that are relevant in the context of this publication are mentioned here.

In project-led education, students immediately get acquainted with the daily practice of the field of expertise they are educated in. Therefore, students understand that field of expertise much quicker, and they can make well-founded considerations on the appropriateness of the study. This obviously decreases the amount of late dropouts due to wrong choice of study.

As project-led education allows students to promptly employ their knowledge and skills in a close-to-practice situation, students will be more motivated. This motivation is crucial, not only for the success rate of a student, but also for the study speed. Literature indicates that the number of dropouts due to lack of effort and motivation exceeds the number of dropouts lacking the capabilities to meet the standards (Prins, 1997).

Project-led education encourages students to think independently and more decisively. Students address problems in an adequate manner, and solve them effectively and efficiently. While solving the problems, students acquire knowledge, or put the offered (theoretical) courses in context. Moreover, working in a project team contributes to a student's ability to critically evaluate him/herself and others.

Project-led education enforces students not only to focus on the contents of the field of expertise; it also requires social and communication skills. After all, the 'best' idea or concept is only supported by the entire team, if it is adequately presented with the appropriate persuasiveness. Project-led education inherently develops and practices social and communication skills. These skills facilitate the easy and fluent switchover from academia to e.g. industry.

Rationale for implementing project education at IDE

Industrial Design Engineers are capable of creating – in the sense of designing, developing and engineering – future products. Moreover, they often act as the linking pin in product development trajectories; they simultaneously analyse, direct, co-ordinate, conduct, evaluate and contribute to the project. Such projects are generally embedded in multi-disciplinary environments, and executed in project teams. Therefore, Industrial Design Engineers require adequate information, knowledge and skills to contribute to the development process and to keep overview of the overall development cycle; i.e. to manage the project.

Such a set of skills is rather difficult to teach by merely offering transfer of theoretical knowledge in classical lectures (Eggink, 2009). Therefore, in many engineering disciplines there has been ample need for a more adequate way of education.

With the start of the educational programme for IDE, a list of conditions (or 'requirement specification') for introducing project-led education has been established (Eger, 2004). The following list presents a selection of these conditions.

- Increase the transparency of the diverse relationships between the fundamental science and engineering disciplines;
- Increase the coherency of the various parts of the study programme;
- Stimulate the motivation, engagement, self-activity, self-awareness and the team spirit of the students;
- Train students in project management skills like teamwork, allocation of tasks and time, communication and negotiation skills, the scheduling of control of a project, the oral and written presentation of results, etc. Aim to do this already in an early stage of the education programme.

Project-led education in Twente

The current implementation of project-led education for IDE has evolved considerably over the last decade. From the start, the educational programme itself had a 3 years Bachelor's programme and a 2 years Master's programme. For this publication, mainly the Bachelor's programme is relevant.

Curriculum of the Bachelors programme

Initially, the structure of the programme was an implicit carbon copy of the structure employed in Mechanical Engineering, with trimesters and a partial combination of projects and courses. A first overhaul changed the programme to a structure in quartiles, in which each quartile was characterised and dominated by one project, where the project and the related courses were conjointly graded. Experience indicated that this resulted in assessing 'oversized' modules, with a risky study progress for the students. Since the second overhaul, the programme consists of quartiles with projects of various sizes and learning perspectives as well as varying dependencies on individual courses. An overview of the current curriculum is shown in Figure 1.

First year (B1)

The students start with a short project to get acquainted with the profession of industrial designer. In teams, students design and produce a product like a small stove for backpackers or a laptop-stand. A product presentation, including the design rationale and a functional test at the end of the project are part of the assessment.

The next two projects aim at idea generation and technical construction respectively. The two projects concern the development of one and the same product (like for example a juicer or dispenser). The fourth project addresses the development of smart products containing sensors, actuators and control units. The decomposition of ostensibly complex systems is done in such a way that students experience the need for fundamental understanding of the underlying principles.

Second year (B2)

The first quartile deals with design methods and principles, principles of physics and the relation between people and design; no project is scheduled here. In the following quartile, the project focuses on products for consumers. This project will be used as an example for the application of project led education and is described in more detail further down in this publication. The project in the third quartile concerns specific

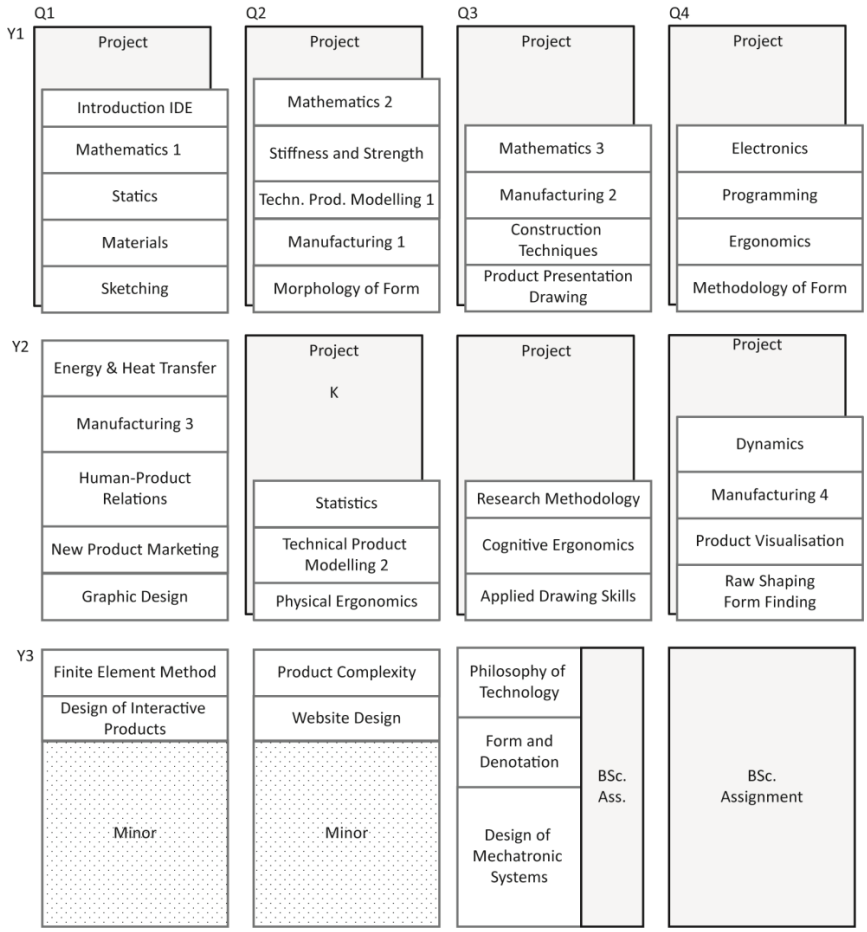


Figure 1. The curriculum of the Bachelors' programme.

target groups and has accompanying courses on ergonomics and research methods. The second year ends with a free individual project. In this assignment the students formulate, plan and execute their own project. The only limitation is that the project proposal has to be approved by the staff of the IDE programme.

THIRD YEAR (B3)

Towards the end of the Bachelors' phase, the program is more individual. The university has a major-minor concept, which allows students to follow a second line of interest during the first half year. In the third quartile, students do a project on mechatronics and systems design, working in large project groups of 15 students.

In the last quartile, the students do an individual Bachelor's assignment. They are allowed to execute this assignment in a company. It, however, is essential that they work on a specific assignment; students are not doing an internship.

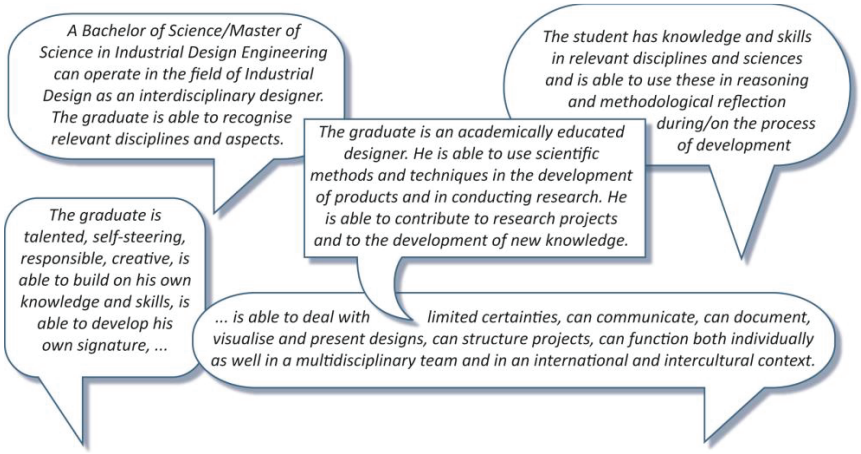


Figure 2. Excerpts from the Domain Specific Reference

Appraising project-led education

In order to be able to evaluate, govern and improve the implementation of project-led education, the programmes and their practical execution are unremittingly held up to the light. To do this in an effective and purposeful manner, a dedicated set of criteria is employed for a specific set of aspects. Together, these aspects aim to cover the characteristics of the educational programme that render it academic, suitable, feasible and attainable, both for students and professors.

Criteria

The abstract set of criteria for any educational programme follows from national law, which, reflected against academic posture and developments in the (international) field of expertise, renders the basis for formal accreditation. An example is the set of so-called Dublin-descriptors. For practical purposes, however, the generic touchstones are inadequate. Consequently, the three technical universities in The Netherlands conjointly formulate domain-specific reference documents. This allows them to co-operate in the accreditation process.

Domain Specific Reference

Essentially, the Domain Specific Reference (DSR) is a framework that allows for the adequate embedding of an educational programme in the addressed field of expertise in a manner that does justice to the academic aims of the programme as well as to other contextualisations of the programme. In the current DSR for Industrial Design Engineering, the excerpts in Figure 2 contribute to the profiling of a graduate. Next to this profile, the DSR depicts the domains of knowledge and skills, the labour market perspective and the distinguishing factors between a Bachelor and a Master graduate.

Encountered

Where the DSR addresses the envisaged content of the educational programme, its employment in everyday practice reveals organisational issues that influence the criteria to assess the educational programme as a whole. As a matter of fact, any educational programme can only be developed for a ‘standard’ student that enters the programme with adequate preliminary training, has the interests and motivation that can be expected of the Industrial Design Engineer to be, and also has the attitude and

discipline to make it through the curriculum. Fortunately, however, students do not come standard. In fact, it is expected that every student also has an open eye for the dynamics of their own work. This means that students become more versatile designers that can swiftly deduce consequences of changes for the project at hand, and can quickly associate thoughts. Interestingly enough, this means that distractions and diversions are inherent to the field of expertise and the educational programme itself.

This has led to a set of 'rules of conduct'. However, these rules are most certainly not imposed on the students as a straitjacket or a set of police regulations. On the contrary, in line with the rudiments of project-led education, it is attempted to integrate these rules in the educational programme by providing a study context that inherently brings along a culture and attitude to work that guides the students to become conscious of their own responsibility in the programme.

EXTERNAL

Next to the internal attempts to make the chances of success for students more clear and transparent, IDE is affected by a number of external influences on the organisation of the educational programme. To mention just a few:

At almost all universities in The Netherlands, students will, at the end of the first year of studies, receive a so-called 'binding recommendation on continuation of studies' (BSA). This BSA implies that a student has to attain a minimum number of credits in the first year in order to be allowed to continue with the studies. For this academic year (2012-2013) it is the first time that such a recommendation is indeed binding; the threshold is 45 credits, i.e. 75% of the nominal study speed.

Moreover, the transition between Bachelor and Master has become unconditional. Until now, students were allowed to follow Master courses before obtaining their Bachelor's degree. From this academic year, this is no longer possible. This is a direct instigation to improve study planning in the Bachelor's phase.

In The Netherlands, the government aims to decrease the number of students 'with a long history of enrolment'. To this end, the government imposed a fine for students that exceeded the nominal enrolment period with more than one year. This fine is significant, and therefore the observed study behaviour changed immediately. Compared to the earlier situation, four times as many students attempted to finish their Bachelor's programme before the end of the lecturing year. As a result of political power relations, however, this enactment has already been withdrawn again.

Nearly all legislations and agreements not even mention the fact that students may not intend to study nominally. However, the performance of educational programmes is measured against the nominal study load. Yet, students have jobs on the side or –not uncommon- start their own design bureau. This gives a rather biased view on efforts to measure/increase the study efficiency – to say the least.

Aspects

Together, the criteria shape a reference architecture for the IDE educational programme. This architecture gives handles for the organisation and 'maintenance' of the programme; it also provides adequate views on how to assess the various aspects of the programme. In other words, against the reference architecture, a number of aspects are indicated that are employed to convey the criteria to the reality of everyday educational practice. To illustrate this, a number of these aspects are depicted below.

Didactic approach

In essence, project-led education requires a paradigm shift in how knowledge reaches the student. From exposing students to reproductions of selected knowledge to facilitating students to formulate requests for knowledge is a big step. This focuses on making student aware of 'knowledge gaps' that prevent them from solving the project and on challenging/helping them to close that gap.

Two important approaches to achieve this include 'just-in-time' and 'just-too-late' teaching. Just-in-time teaching attempts to align theory courses with the project topic. For example, a course on statics is planned in the same quartile where the students need knowledge on statics to solve the project problem. Just-too-late teaching confronts students with a question without providing the theory to solve it; after students try to answer the question the underlying theory is presented, sometimes even in the next quartile. Both approaches work to challenge students to acquire knowledge and to immediately contextualise that knowledge.

Study environment

Project-led education attempts to expose students to the practical applicability of the theoretical knowledge they are confronted with. This first and foremost means that all projects in the educational programme must have a realistic foundation. Realism in the project assignment considerably increases the motivation and enthusiasm of the students. Moreover, realistic assignments make the assessments of the project results more genuine. Executing a project with a realistic assignment is only possible if the circumstances are comparable to industrial practice as well. In other words, project teams attempting to co-operate in a traditional lecture hall will simply not get through to the essence of the assignment. Conversely, it is practically impossible to provide each team with a fully equipped office space. In any case, it is essential to arrange for an environment that allows for professional group work, equipped with adequate ICT and meeting facilities. The environment must facilitate group work (in relative isolation) and lecturing for a larger group. Moreover, (limitations in) the availability of the environment must not hamper the students in doing their work.

Teaching staff and qualification

In introducing project-led education, it is essential that the teachers/tutors are confident with this way of working. For many of them it means that they can no longer have *the* answer to the project question to their avail. This implies that the teachers/tutors must be rather senior experts with an open and multi-disciplinary eye for alternative solution paths. As such, they should be tactful in the way they challenge the students in a group: i.e. helping them to find a way to solve the problems they encounter, without bluntly providing them with direct answers. Moreover, teachers/tutors most certainly must have capacities to distinguish group dynamics and be able to adequately intervene when required. The tutors are process controllers and representatives of the project client at the same time.

Organisational implementation

In the bigger perspective of the educational programme, the projects take a considerable share in the total workweek. If the projects are too small, they become insignificant; if they are too big, there is a risk that the project will focus too much on practicalities. Aiming at roughly 50% project effort, IDE attempts to balance the projects in the overall programme. This only makes sense if the available time is not fragmented throughout the week or the quartile. At first sight, this does not seem an

impracticability; however, in realising that courses also stem from different educational programmes or faculties (i.e. mathematics courses) complexity in planning and scheduling quickly increases.

On a different level, the implementation of project led-education requires sufficient insight in the learning aims of the overall programme and the dispersion thereof in the separate projects. This implies that some control has to be exerted on, for example, the learning aims per project, but also the types of deliverables per project and the ways in which the different projects are graded. Without adequate mutual agreement between the responsible teachers and educational management, this is well-nigh impossible.

STUDENT ATTITUDE AND CULTURE

In every generation of students, some 'iconic' individuals can strongly influence the general demeanour. In traditional education, this influence is subdued by the environment. In a project environment, the attitude of students becomes more relevant, in two respects: demotivated students may hamper the development of nearly all individuals in a group, but a few enthusiastic students can inflame an entire generation. In project-led education, serious attention for such phenomena is required. This mainly implies that no teacher can address an entire generation as one group; it rather is a set of individuals working together. The role of study advisors therefore also includes getting a feeling for what drives students and what affects their motivation. If the teaching staff adequately interacts with the individuals and the groups all stakeholders in an educational project can challenge each other to achieve the best results. In this respect, it is also noticeable that the student groups are often depicted as competing engineering bureaus. This competition certainly increases motivation, enthusiasm and a goal-oriented study attitude.

From a different perspective, the new students that enrol have grown up in a different world than the students from a decade ago. Also in didactic respect, there are constant changes. To mention just one: the focus in skills related to finding information has shifted from the sheer ability to get access to information to understanding the relevance and dependability of the overwhelming amount of information that is encountered.

INDUSTRIAL PRACTICE

As mentioned before, students are allergic to devised project assignments. Also, in preparing students for their future jobs, the educational programme should have an open eye for concerns from industry and the market. In combining these two, it seems advantageous to derive a problem statement for a project from industrial practice. However, this principle has to be handled with care: the set of projects a student is exposed to should not merely be a sequence of practical case studies. Therefore, it is important to vary the industrial influences with the projects. Sometimes, a company should merely be used as a reference for the context of a project, and sometimes a company can be part of the coaching and assessment processes of a project.

In their Bachelor's thesis subject, a majority of the students take up an assignment in industry. Here, it is important that the time they spend in the company does not degenerate in sheer internship. As IDE is an academic programme, much attention is paid to ensuring that the student works on an outlined assignment, which has a distinct result that, together with the way in which this result is obtained, can be attributed to the qualities of the student.

Practices and experiences

Because the educational programme contains a considerable number of projects that vary e.g. in size, lead time, group size and field of expertise, it is impracticable to comprehensively detail how the criteria depicted in the previous section are covered in all projects. Therefore, the so-called 'project K' is used as an example here.

Project K

One of the larger projects that is organised in the second year of the educational program is the 7.5 European Credits (210 hours of study load) project called Project K. It is a complex and broad project in direct collaboration with an industrial partner. Examples of previous assignments are: "Develop the next generation consumer packaging for Heinz tomato ketchup" (see figure 3), "Picture the camera of the future for Canon", "Re-design the Philips Airfryer to enhance the user experience". The required result encompasses a report and a prototype of the design, together with a stand for a trade fair and a commercial to communicate the developed solution. In the assessment not only the product, but the overall design rationale is important.

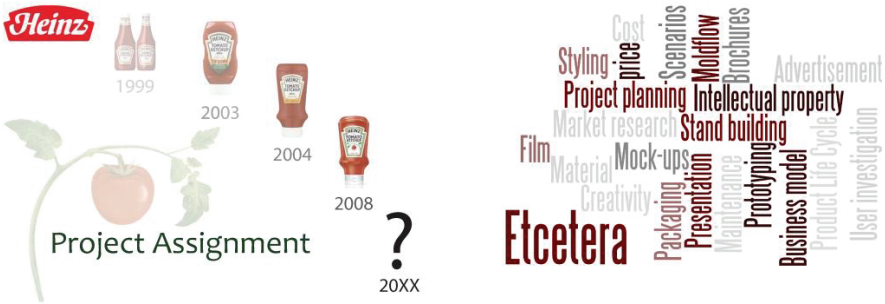
Although the assignment and the company it relates to are different each year, the organisation and the structure of the project remain comparable. This 'generic structure' is depicted in the following sections.

Project introduction

As the assignment itself is pointedly kept secret until the kick-off meeting of the project (even for staff members), the project starts with a sense of expectancy and keenness. This secrecy directly fits the topic 'intellectual property' that is discussed in the project. During the actual kick-off, the project co-ordinators and the representatives of the company visit the students in their study environment, being a large room that the students have to their avail during the entire project. After the formal assignment has been communicated by the project co-ordinator, and the students are grouped (by lot) in design teams of six persons each, the company (being the customer) provides the design teams with background information. An adequate contribution by the company provides the students with a flying start, both as concerns the information provided and as concerns the motivation. Without a doubt, the demeanour of the company during the project directly influences the practical results; the academic results are less dependent on it.

Topics and prioritisation

During the kick-off, students are confronted with a long list of topics/aspects to address in the project (see figure 3.b). However, the length of this list is manifestly in no proportion to the time available. Consequently, students are tested to prioritise and select the aspects they consider important. As the prioritisation of aspects is dependent on the specific solution under development by the design team this can only be done in the course of the project; yet it is clear that it is also advantageous to focus as quickly as possible.



a *b*

Figure 3. An example of an assignment (a) and topics (b) for project K.

INFORMATION SUPPLY

To give the students guidance in their considerations on some of the topics of the project, a number of workshops are organised. Examples of workshop topics are TRIZ (theory of inventive problem solving), Scenario based design, Patents, MoldFlow (injection moulding simulations), Philosophy of technology, Maintenance, Movie editing and Packaging. The design teams, however, are not obliged to elaborate on all topics; the selection of aspects is their own responsibility. Moreover, not all group members need to participate in every workshop, thus stimulating peer-learning. As the workshops are planned roughly 'just-in-time', students are extremely focussed during the workshops.

CONFIDENTIALITY

The design brief is commissioned to multiple design teams; their respective result will be compared at the end of the project. Therefore, it is in the students' own interest to observe secrecy and to be careful with exposing ideas. This is in line with one of the workshop topics in the project: 'Intellectual Property'. Moreover, by stressing this, also confidential information will not land on the Internet; this obviously is a serious concern for the company.

ASSESSMENT

Because every design team has freedom in formulating the aspects they want to elaborate, some alignment with the learning aims of the project is required. To do this in a more or less implicit manner, all design teams need to organise a milestone meeting, at a self-selected moment. Here, the prioritisation of aspects is discussed with the tutor and an examiner, and the exact set of deliverables is negotiated. During the project exam, the team presents its work, and they are interviewed on the result, the design rationale and the decisions that were made.

A t the end of the project, each team presents its work in a stand at a joint project fair. This fair is attended by a delegation of the company; usually they take ample time to discuss the results with the teams. The feedback from the customer is highly appreciated by the teams.

IDE Graduate is able to:	*Example of practice implementation:*
Analyse market demands and user needs along with technological and social opportunities.	In the project, it is the design rationale that justifies the result. Students cannot justify the suitability of a final product without examining the market demand and user needs without using scientific methods and techniques, and without elaborating on the technological realisation. It is essential to effectively structure the project in order to clearly communicate the rationale in a report.
Generate a (personal) vision on the design problem.	Each design team is self-steering and has the responsibility to self-select the aspects that will be encountered in the design process, based on the developed vision of the design problem. A milestone meeting in which the aspects are presented and discussed safeguards the learning aims.
Generate and select ideas and design concepts.	To justify a final design it is important that students are able to show the options that are investigated to enable decision making. This is done with increasing detail, resulting in ideas and concepts respectively. Creativity and visualisation skills are required here.
Transfer existing knowledge to new problems and to implement new knowledge.	Students apply the knowledge that is gained during their study on the new design case. During the case also new (case specific) knowledge needs to be gathered that requires direct implementation.
Materialise a concept to the stage of a working model.	One of the deliverables of the project is a prototype of the developed concept. Student build these prototypes in the job shop accompanied by staff members. Functional parts (engines, heaters, etc.) that are made available by the company increase the functionality that is realised.
Take into account the marketing and the product life cycle.	As the project is concluded with a stand presentation, students need to realise marketing materials to promote their product.

Figure 4. Summary of practices in relation to the learning aims of an IDE graduate.

Overview of embedded aspects in project K

To show the realisation of the criteria in project K, Figure 4 shows a more direct link between these two. Apart from these explicit aspects, it is obvious that many other aspects are included in the project as it is a comprehensive reflection of the way of working in practice. These aspects among others include communication and collaboration challenges, uncertainties, conflicting goals (polytelie), and responsibilities.

Vision

For the Industrial Design Engineering programme, it is a continuous challenge to keep up with the changes in the broad field of expertise the graduates will be engaged in. With a structure of the educational programme that is considered robust and future-oriented, attention can indeed be focused on (continuous) improvement. Obviously, these improvements can concern content as well as organisation.

With respect to the content, it is observed that IDE graduates, although they are already educated as versatile engineers, experience an increasing challenge to address even more multi-disciplinary projects. Examples not only stem from mechatronics, but also from crossovers with biomedical fields of expertise and closer co-operations with behavioural sciences. As such, the IDE graduate will stand up to increased complexities in assignments, dealing with more, and more diverse, experts. Therefore, the

educational programme needs to train the students more and more in bringing together all experts and stakeholders involved in one project to engender one optimal solution. Moreover, increased attention is required for the services that go together with products. Another significant focus is infused by the observation that many design bureaus will, next to working in client/supplier relationships, aim at bringing their own products and brands to the market. This requires additional training in e.g. user-orientation and market targeting but also in more attention for e.g. production techniques and logistics. In short, IDE graduates need to take the lead in creating products for future use situations while effectively and efficiently integrating the many fields of expertise involved.

With respect to organisational issues, there is a continuous need to improve study efficiency, while not hampering the personal development of the individual students. The aim is to offer ample flexibility in the educational programme while optimising the effectiveness of the students going with the times of the programme. As mentioned, there are some measures, both internally and imposed externally, that aim to aid in delivering the right graduates with more than sufficient qualifications. In this, the vision of IDE is to quickly separate the suitable students from the student that essentially do not qualify for the programme. As such, it is not the aim of the programme to educate as many students as possible; it rather aims to educate the right students properly. Currently, the possibilities to select students on abilities are rather limited in the Dutch educational system. Yet, it is foreseen that the measures presently implemented and increased claims on the motivation of students will yield adequate results. In other words, IDE aims at targeting the right students to provide them with the right means to become the design engineers of the future.

University wide implementation

Education is changing continuously. The University of Twente recognises that graduates have to meet demands (imposed by e.g. industry) that change over the years. Moreover, the university aims at a quality impulse for the academic programmes, while increasing the efficiency of teaching. As a consequence, from the academic year 2013-2014, the University of Twente will introduce the so-called Twente Education Model (in Dutch: TOM). For many programmes, the TOM implies a significant educational reform. It is inspired by the experiences gained in Mechanical Engineering and Industrial Design Engineering and influenced by project-led education at the Aalborg University Centre in Denmark.

The basic principles of TOM are:

- Challenge: teaching is made more enjoyable and challenging by the use of theme-oriented project education, allowing students to acquire insights themselves and apply knowledge directly.
- From passive to active: studying is not just a question of absorbing information in lectures and reproducing it in examinations, but of acquiring knowledge and insights actively, making discoveries independently and applying the knowledge gained in projects.

It will be obvious that these principles closely match the strategy in IDE. As such, the educational reform could have limited impact on IDE as concerns the contents of the programme. However, the IDE staff sees TOM as an opportunity for (continuous) improvement. Moreover, there are some organisational measures that will influence

the programme. For example, TOM defines a programme as consisting of 4 modules a year, of 15 EC each. A student will fail or pass a module as a whole, although a module is an assembly of a project and related courses. While converting the current educational programme to the new structure, it is assessed against the criteria mentioned previously. As a result, some learning aims are shifted or accentuated, some courses are re-aligned with the vision and the merits of some habits that have crept in are judged. Experience can be shared with other educational programmes that have to take up the challenge to implement project led-education; at the same time, it gives an opportunity to review the basic rationale of the IDE-programme and learn from other programmes. In an on-going process all faculties currently work together to devise the best practices and optimal approach to successfully implement TOM. In doing this, IDE and Mechanical Engineering take quite some pride in doing pioneering work and fulfilling an exemplary role.

Concluding remarks

In adequately implementing project-led education, numerous aspects play an important role. This is all the more true given the many changing and unpredictable circumstances that directly and continuously influence the feasibility and success of the programme. Even if the rationale for implementing project-led education is clear, the didactic approach is well-considered and all the required boundary conditions are met, the implementation and organisation should be, and remain, extremely flexible.

At the same time, an educational programme can only be developed for an anticipated 'model' student that enters the programme. Compared to traditional educational settings, project education requires much more (organisational) improvisation and ad hoc solutions to stay ahead of the (learning) behaviour of individual students and to adequately facilitate and guide their learning processes.

Moreover, a study context should be provided that invites students to become conscious of their own responsibility in the programme, evoking a stimulating culture and attitude to work for everyone involved. This encourages students to show pro-active behaviour concerning their own study goals. Educational approaches like 'just-in-time' and 'just-too-late' teaching can be instrumental in this.

In challenging students, it is essential to provide problem statements and working conditions that are closely relate to industrial practice. However, as the encountered problems working conditions and demands in practice are rapidly changing, assignments can often not be repeated in other year-cycles. In this, obviously, also a rather open attitude from staff members is required. They must be able to act as multi-disciplinary experts in the field while guiding individual students as well as groups. At the same time, they need to control the process. This does not imply that teachers are some kind of super-teacher; they much more compare to the traditional craftsman with his journeymen. Consequentially, in the contents of the educational programme, the way in which it is organised and in the way in which the students participate in it, the (industrial) practice convinces the theory to become more disentangled, comprehensible and applicable.

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Exploring Colour and Light as Dynamic Elements of Space Through the Activities of an International Workshop

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Abstract: The ephemeral qualities of lighting are explored best as part of lived experiences. For students at the baccalaureate level, this is difficult and requires developing ideas that become realized through modelling by studying what happens when light, colour and material intersect with form. This process uses design thinking and hands-on experiences to show students how a dynamic interplay of design elements within a project occurs through learning and discussion. While creative processes require some form of abstract thinking and when ephemeral qualities aspects of light and colour contribute to the purpose for a particular use, the material aspects of a luminaire design using found materials recycled and used in new and unique ways adds context to proposed design solutions. This paper examines what happens when dynamic design elements such as light and colour are explored through learning activities of an interactive/international workshop. Two professors on different continents facilitate a series of learning experiences in interior spaces, confronting the immaterial ephemeral qualities of light as these intersect with found materials and cultural senses. Through a series of distance and local problem-setting exercises of proposal models, students work through possible ideas set in context and grounded in creative abstract thinking that are then transformed into a potential solution.

Keywords: Lighting design, education, internationalization, ICT, learning-by-doing, sustainable design, colour and light, design process.

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Introduction

The main purpose of this paper is to offer a perspective on how the learning and teaching of colour and light as dynamic elements of an architectural environment, and the development of a deeper understanding of lighting in the context of a design process, contributes to the process of "learning-by-doing". We present the results of a number of experiments performed within the context of education where student experiences in the design studio are enhanced by understanding and interpreting the immaterial, ephemeral qualities of light, as they develop design projects that interject a lighting design within the concept. Students consider the quality, value and effects of light and colour on human behaviour, exploring lighting within a design studio project through a series of exercises that integrate 'learning-as-doing', a form of problem-based learning (Saven-Baden 2003). Using the context of an international workshop as a laboratory and with the help of information and communication technologies (ICT) currently available, teachers facilitate the student exploration of how light and colour mediate interior spaces and how the designs conceived are then actualized in model form and in the production of final design concepts for a variety of interior environments.

The subject of this topic is the following: How does a student, within a context of an international workshop, learn about particular design contexts such as colour and light and how these are mediators of experience and ambiance in interior space? How do they understand ephemeral qualities, explore them in tandem with theory, and work up design concepts as they explore these ideas in their design studio project development? While creative processes require some form of abstract thinking (Arnheim in Margolin & Buchanan 2000) and when ephemeral qualities aspects of light and colour contribute to the purpose for a particular use (Mahnke 1996), the material aspects of a luminaire design using found materials recycled and used in new and unique ways adds context (Fry 2009). In the context of the designing of interior spaces, studio learning experiences interjected with theoretical applications as learning experiences add context, provide learning-as-doing situations and provide places for students to examine theory in practice.

This paper proposes that studio designs, when integrating online learning, in-vivo situations of proposed concepts, and supported by actual lighting models that reflect material considerations, can contribute to a better understanding of the role of the architectural aspects of an interior space in the learning process, whilst integrating themes related to the said interior space identified in the design proposal. Those models are examples of how students can envision the ways that interactions occur between people and their environment. Whereas drawings and computer-aided plans are static, when lighting models are created, these add the dynamics of light to the architectural design envisaged.

The project workshop is presented, and the various phases are explored with these ideas in mind. Examples of the preliminary concepts and post-theory models of the student work are shown. The discussion examines how learning-as-doing is encouraged and how this is achieved using both ICTs and traditional design studio tools.

The Lighting Workshop and Theoretical Framework Overview

According to research, lighting has a direct effect on health, behaviour, and psychological well-being of people. (Liberman 1991; Reed, 2010) Lighting and colour can have both negative and positive effects on a person's health. For example, light therapy is recommended for people suffering from seasonal affective disorder and depression, and will help them regulate their biological clock associated with the body's circadian rhythm. Studying the interaction between a human and the space with light is vital for understanding how illumination can affect a person. (S. Winchip 2011). Furthermore, these basic theoretical concepts align with considerations of daylight as a modifier of the spaces, and what materials might be considered for creating either architecturally lit features or individual luminaires, both for function as much as for creating well lit environments. The advantages of daylight and windows include promoting psychological & biological well-being; constant and standard light; passive solar energy penetration in the winter; ventilation through non-fixed windows; view of the outdoors; fewer use of electrical lights which has an impact on energy efficiency; enhanced visual acuity and positive effects on productivity (S. Winchip 2011)

The international workshop described herein was created to see how these ideas might be put into practice, whilst facilitating an understanding of the integration of lighting and colour, from the earliest steps of the design process, and how this is made explicit for design students. The workshop of which we speak took place at the School of Architecture and Design in the city of Beirut in Lebanon and was conducted by the two authors participating in North America and Lebanon. The lighting workshop's main objectives were: 1) to identify ambiances in a lit space of a particular interior environment; 2) to analyse the principles of lighting and how a light fixture provides light for a chosen interior space; and 3) to create a simple light source that is used in an interior design project.

The workshop was launched in the beginning of the Spring semester 2012 and was followed by two intensive weeks of brainstorming and work. It was concluded with an exhibition at the end of the semester. The number of students was thirty-seven (3rd year Interior design students).

For the communication, the Workshop was animated by the LAU instructor and enriched by the input and visit of the professor of the University of Montreal. Both analog and virtual methods were used. Research questions guiding this study were centred on "How learning-as-doing is possible using both ICTs and traditional design studio tools ?"

The process follows the idea of 'learning-by-doing' wherein students approach problem-solving by integrating theory and practice together in a design problem context for a particular space. After some theoretical learning about principles of light, material reflectance (Gordon 2003; Winchip 2011; Poldma 2008) and a basic understanding and identifying ambiances in interior environments, students were asked to design a light source for a particular interior. In the beginning of the exercise, it was primordial to highlight to students the importance of harvesting daylight and capturing daylight for illumination through the use of apertures including windows and skylights. (H. Plummer 2009).

The design criteria and constraints were important to the success of the design development. First, students had to take into consideration the effect of illumination on performance, based on research studies that have examined specific characteristics

of elements of lighting systems such as types of luminaires and lamps. Second, they also had to respect principals of universal design, where lighting systems should be designed to accommodate all people and to meet a good inclusive design." Inclusive design tries to understand the needs of all potential users of a space, and to provide for their needs. It ensures that people are put at the centre of the design process and responds to human diversity in a positive way." (S. Dodsworth 2009) Third, their design intent and the fact that these design concepts were being considered for their design studio projects, meant that students were also supposed to treat the light expression as a rare and beautiful architectural element to be incorporated into an overall design concept.

Other fundamental criteria of the design process included consideration of creating a design for a light fixture using found materials, creating the design with an awareness of cultural senses, and producing a luminaire that could either be free-standing or part of an architectural detail in a space of their choice. This light fixture lit qualities could either be incandescent, fluorescent or LED. The students also had to respect some basic physical design criteria for their concept, such as: using recycled materials of their choice (paper, fabric, cardboard, plastic); maximum dimensions (610 x 910 mm); freestanding fixture, or ceiling mounted or an architectural detail built into a wall, ceiling or floor.

In this first phase of the design concept development, aspects of learning-by-doing were implemented first via e-learning, where the students were asked to consider several components of a future lighting concept through a series of initial preparatory exercises by the professor at a distance. During this "inspiration" phase they were asked to explore ambiances and find examples of the mood that they want to create in books, magazines or from the internet. Second, they had to decide on the type of interior ambiance and place for the light fixture (luminaire) that they would like to design by proposing some ideas of possible light fixtures and creating concept sketches of the light model ideas. Here in Figure 1 we see an example of a student's preliminary ideas.

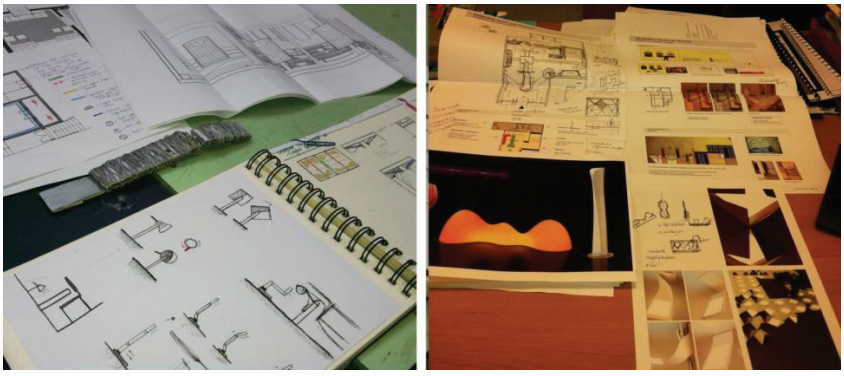

Figure 2. Atrium hotel interior, interior/lighting 2011 (photo credit: John Sylvester).

In the second phase, with the presence of the professor, learning turned towards a focus on seminars and lectures "Light and Color in the Dynamic Interior Environment: Perspectives and Processes" presented by Prof. Poldma (Figure 2). These included theory on ambiances, lighting basics and how to create an ambiance using principles of

light. As we see in Figure 2, examples of contemporary lighting in interiors were used to show how theory of light learned as principles is then actualized in various installations. Once they had seen this lecture and in light of the first preparation, they had to create some conceptual ideas and to find materials that could simulate the concept that they are creating. This meant creating some pre-design models to try and simulate the light effects and the ambiance that they want to create, before arriving at a final design concept that would be produced as a model.

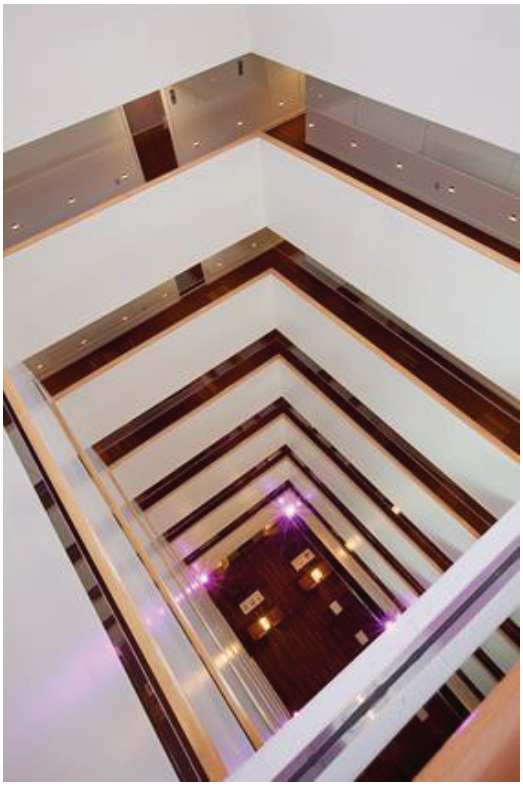

Figure 2. Atrium hotel interior, interior/lighting 2011 (photo credit: John Sylvester).

The third phase of the workshop then consisted of the professor reviewing the preliminary ideas of the students, through a series of structured critiques and reviews of the sketches and rough models, these both expressing creative ideas, concepts and preliminary design and lighting fixture designs and maquettes showing different types of ambiances and light effects (if possible). It was also noted that the professor/specialists from the field contributed to bring their knowledge and technical support to this workshop in terms of theoretical knowledge and during critiques, to help students in achieving their models. The students then went back and revised and refined concepts in light of the lectures and discussions around their projects.

The Workshop Learning Process

The workshop was structured to develop specific knowledge skills about lighting, sustainable materials, and design communication through the visual model and integrating all these skills into virtual, computer – generated design concepts. The learning process was one of "learning-by-doing", with some theory to ground the concepts implemented within the creation of the lighting elements to support the design concepts being developed in full scale built mock-up, using either actual or simulated materials. The workshop culminated in the critiques of the final models and student design projects, and the integration of both the student ideas with materiality, light and colour theory, design application and transforming the designs into dynamic concepts through the models and concepts produced.

In Figures 3, 4 and 5 we see the student models as these were developed. In Figure 3, we see how the design process is explored virtually using HCI (Human Computer Interaction) and then the execution of the idea in maquette form. In Figure 4, conversely, the initial work is done with analog tools and then modeled in the computer until the maquette is executed.

Figure 3. Design process explored virtually using HCI

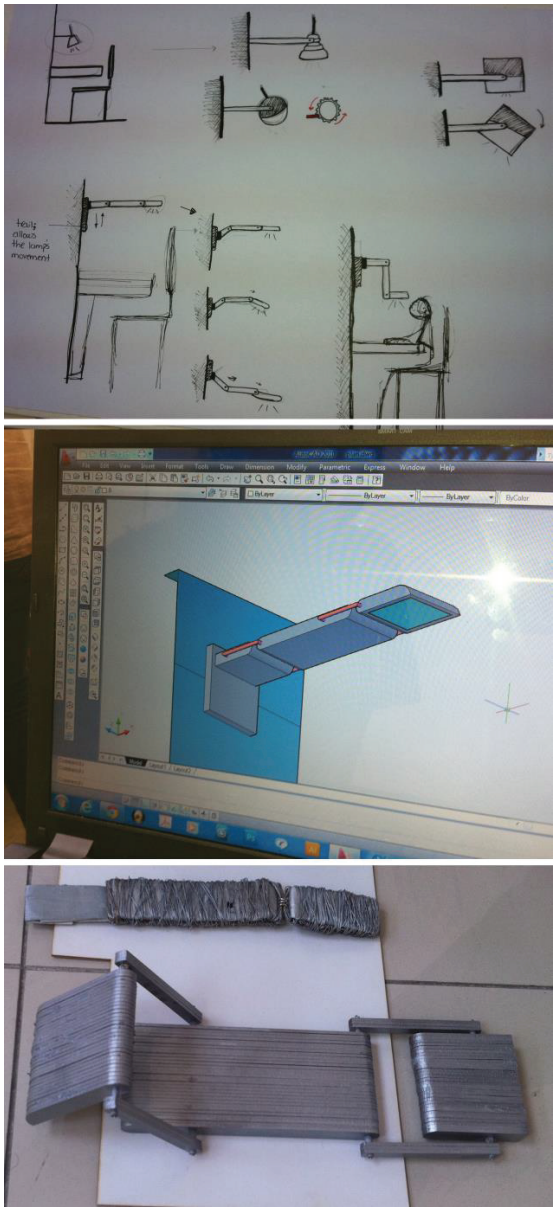

Figure 4. initial work done with(1) analog tools, (2) modeled in the computer, (3) maquette

In a final example in Figure 5, this proposal was interesting as the student used found materials to conceive of the design as she pursued her ideas. In this case the student wrapped an inflated ballon with a rope and glue and then, when she removed the air from the balloon, what is revealed is the shape and the luminaire concept.

Figure 5. Example of student work where found materials were used.

These are the final results of the various activities that culminated both in a presentation of proposed solutions as well as a professional critique of the design project and the lightings concepts proposed. The experiences were then presented within a collective workspace. In fact, the Workshop concluded with an exhibition and professional review by experts that, again where the link between Montreal and Beirut was possible using ICTs, to finalize the project evaluation and including the active participation of the professors and industry collaborators from both participating countries.

Discussion

This particular approach brings together international perspectives engaging theory in the application of creative ideas into the creation of ambiances through modeling interior lighting for design concepts, thus providing different perspectives on how light engages with the interior. These diverse perspectives and knowledge animate student learning. In the context of this international workshop, the students' models proved to be particularly useful in integrating the specific lighting aspects of an interior design project so as to respond to the demands of the spatial observer and user. The final models that students presented have a dynamic, interactive character and use a creative approach.

The successful project results obtained demonstrate how international collaboration can contribute to the improvement and evolution of the process of learning through diverse perspectives, how e-learning contributes to the teaching of both theory and practices in theory-studio workshop format, and how 'learning-by-doing' is achieved in the creation of ambiances of light through the model development. These results can serve as a basis for the initiation of other projects dealing with innovation in design curriculum.

Complimenting existing knowledge, this paper contributes not only to the development of the latest comprehensive teaching methods, which aid students preoccupied with lighting design concerns to understand the impact of light, but also to the development of new learning tools linked to ICT and the creation of places which facilitate an exchange of knowledge using a comprehensive approach. The role of ICTs

in this workshop is not limited to the role of communication, but also ICTs play the role of assistive thinking tools. ICTs have been used by some students during the first steps of the design process in the case of this workshop, to both search for the ideas and also to generate concepts and initial ideas. ICTs play both a role of communicator and also the role of tools for design concept and process reflection.

The results of this workshop also allow for the development of tools geared towards educating students on the importance of lighting in interior design. During our work we acknowledged that the roles of these new technologies are not limited to simple communication and representational tools. Information technologies progressively transform the methodologies adopted for information management in the fields of interior design and particularly influence the development of learning methods dedicated to the teaching field and its role in the design process to interior design students. Using both digital and manual tools allowed for students to express creative ideas initially, sketch from these ideas and model lighting concepts. Working back and forth with these tools allowed for the lighting theories understood to be implemented within the student projects in exciting ways.

Conclusion

We have shown, through this international lighting workshop, how the design process can be explored both at a distance virtually, and in studio class through digital and manual means. We have also shown how the dynamics of using expertise in lighting engaged theory within the creation of dynamic solutions that inform student projects in exciting ways. Students are catalysts and creators of ideas, while the role of the teacher becomes that of facilitator. The exercises in both virtual and real contexts allow students to consider theory, engage practice and integrate theory with practice in pragmatic ways. The role of digital tools in the case of this workshop was perceived by those involved as a federator that helps information-sharing between two continents in the context of design teaching and learning, as well as being useful thinking and learning tools.

This workshop is an example of how dynamic teaching leads to dynamic responses by students. The process of learning-by-doing is engaging, when using the interfaces of virtual communication intermingled with actual experiences and modeling ideas. The integration of both the student ideas with materiality, light and colour theory, design application and transforming the designs into concepts through the models is an engaging way to provide students with actual experiences that help them to understand how light and colour, when used with materials, mediate spaces, and how they can build their own tools to express these in realizing ephemeral concepts within interior spaces.

This work opens up perspectives for research that we will touch on briefly. These can be organized around two distinct poles: the first relates to the future of online education (collaborative e-learning), which is an essential function of an open knowledge international Platform. The second pole is the adoption of an interdisciplinary vision in the development of interior design education and outreach initiatives to better reflect the richness and subtlety of the design. The various disciplines involved in the enhancement of interior design education —history, archaeology, architecture, urban planning and others—come together and generate debate and discussion to propose solutions that integrate their combined expertise.

Research perspectives are not limited to these two poles but extend to other areas as well. For instance, the results of this research project could be used for pedagogical purposes. Teaching the history of interior design could be made more accessible by means of models to aid in our understanding of interior design issues.

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UFSC Design Course. A brazilian study

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Abstract: According to the National Survey of Students' Performance (Enade), held every three years by the Brazilian Ministry of Education, the Design course of University of Santa Catarina is now rated as second best in Brazil. The course objective is to provide facilities for the training of professionals able to operate in dynamic environments and diverse, capable of intervening in society to the criteria of innovation, environmental responsibility and entrepreneurship, offers students the mastery of techniques, methods and specific tools project. Currently the UFSC Design course works with a curriculum structure divided into three main nuclei divided as follows: Introductory, Project and Integration with the Market. The big difference is in the format at the nuclei of Project which is composed of modules of disciplines that must necessarily be realized together to build an effective project with the features of the module. Modules are offered in different areas of expertise such as Industrial Design, Graphic, Fashion, Promotional, Experiential, among others, that the academic have free choice. Thus the course enables the student within a general basis of design structure your training suiting your tastes and skills. That said, this paper aims to, through a study to present this curriculum. .

Keywords: Design, Brazil, Teaching.

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Introduction – The teaching of Design in Brazil

The history of the teaching of Design in Brazil dates from the 1950s. According Fontoura (1997), since 1951 when the concretist Max Bill visits Brazil to give a lecture on Concrete Art and Design, one begins to think about the education of Industrial Design in the country. Initially through a free course at the Museum of Modern Art (Rio de Janeiro). In São Paulo, the Institute of Contemporary Arts (IAC) of MASP had a course based on the concepts of Design International (in 1950), but accessible to few (intellectuals and artists). There wasn't, however, support from government and industry.

The Faculty of Architecture and Urbanism at the University of São Paulo - FAU/USP, includes in the early '60s, some subjects who gave training in Industrial Design students who did the course in Architecture. It is believed that corporatism and numerical supremacy of the architects did not allow designers to reach toward the institution and be given greater emphasis to sequence Industrial Design. With this, the number of hours/class intended for Design (4 weekly) proved to be insufficient for training in Design, constituting only a core disciplines informative (Niemeyer, 1995, p 92 and 93). At the Museum of Modern Art (MAM) of Rio de Janeiro was also created a school that would be called ETC - Technical School of Creation and have had college status, but lack of funding has caused the discontinuance of the school.

Many of the students of MAM and of MASP end up becoming Fellows (students) of HfG of Ulm (Germany), which was the main fomenter of design in post-war Europe. Upon returning from Europe, these enthusiasts of design began discussing the idea of creating a true college education of design in Brazil. At the time the most conducive place for that to happen was the capital of the Republic and in early '60s was created in the IBA - Institute of Fine Arts of MAM/Rio de Janeiro a possible School of Industrial Design which later was transformed in 1962 in the school of Industrial Design - ESDI (considered the first school of higher education in the country) (FONTOURA, 1997)

Since then other schools of design were created throughout the country. Until the mid-90s, according to the Ministry of Education and Culture (MEC) were around 25 schools. Today that number has grown. There are at around 520 courses, mostly concentrated in the south and southeast. In Santa Catarina, which until 1996 had no Design course, there are currently more than 50 (in various forms, such as: graphic, product, fashion, etc.).

Regarding the regulamentation of design courses in Brazil, There are the Ministry of Education (MEC) as organ legislature. The curriculum guidelines for the design courses date from 2004. But before that, the issue was being discussed. In 1997 and 1998, stakeholders, directors, teachers and design students from across the country gathered in forums to discuss new paradigms of design education in Brazil. At these meetings were discussed new technologies, new forms of teaching, the new Law of Guidelines and Bases of Education (LDB), cultural changes, the everyday and also the past of design.

The first Forum of Leaders of Design Courses was held in Recife with the participation of 22 institutions of higher education and several associations On the second forum, held in Curitiba, there were 23 institutions of higher education, associations, and also, at this meeting, there were students representation through their representative council, the CONE Design. On the third forum, held in Rio de Janeiro, it was already established in MEC the Committee of Experts on Design Teaching, unbind Design Education Commission of Experts from Arts and Design

(CEEARTS). This greatly improved the process of discussing the rules for the new curriculum guidelines. As a result of these discussions (and other regionally occurring) they prepared the Educational Guidelines for Teaching graduation in Design. In this document new ways of Design teaching in Brazil became clear and its emphasis is a priority. According to what was proposed in the guidelines, the emphasis gives more agility, personality and the differential to the Design courses, because it allows a course to be taken to a regional expertise or to the institution in which you are bound. So the courses were proposed based on the following model (table 01):

***Table 1**. Design configuration of courses from 2000.*

Basic Common Core (Required Fixed)	Qualification (Required Variable)	Emphasis (Optional)
Grounds Planning and Setup Systems of Use Production Systems	Product / Industrial Visual Communication Interface Fashion / Apparel Indoor Landscaping	According to the expertise of each course

Finally, in March 2004, the Ministry of Education, through the National Board of Education, approves the curriculum guidelines for undergraduate programs in design. "The Educational Projects of undergraduate courses in Design and modalities may admit lines and specific training to the best comply of the needs in Professional Profile that requires the market or region" (Brazil, 2004). Article 4 of the guidelines have the skills and abilities relating to the formation of the designer. Regarding content to be the headquarters of Design courses has its distribution in interconnected axes (basic content, content and specific content theoretical and practical).

According to Couto (2008: 45), "with the new curriculum guidelines they intend to establish to a profile of the student, in which the tertiary level would constitute a continuous process, autonomous and permanent, with a solid base and a training based on theoretical and practical competence. "The author adds still discussing issues related to the flexibility of the curriculum in which" institutional autonomy and freedom to innovate their undergraduate educational projects, to meet the ongoing and emerging changes to whose challenge the formed future should be able "COUTO (2008: 46).

Once the new guidelines indicate to the possibility of innovative teaching projects, the Federal University of Santa Catarina, in 2008 began a detailed study in order to make restructuring of the Design Course curriculum, which until then had only the Graphic Design course, that emerged from diagnosis of the faculty of the Department of Graphic Expression pointed out that the existence of demand in the market, both regionally and nationally for professionals trained to plan, develop and produce information systems grounded in current theories of communication and visual expression. In 2008, the federal government launched the Program of Support for the Restructuring and Expansion of Federal Universities (Gather). In this proposal were implemented new qualifications (Product Design and Animation Design). In 2010, a new study was designed to, and to evaluate and monitor the procedures established to recommend improvements to the course already deployed. From this study resulted

the course current proposal, implemented in the first half of 2011, in which the modalities (Animation, Graphic and Product) were extinguished and a general proposal was implemented.

UFSC Design College

The designer graduated from UFSC – Federal University of Santa Catarina - will have a generalist graduation, able to understand and answer both individual and society needs, with ethics and capability of criticizing, reflecting and having humanistic vision, regarding conception, development and projects monitoring, as well as its production, through aesthetic consideration in the midst of technological, formal and functional aspects, acting creatively in the problems identification and solution, considering politic, economic, social, ambient, historic, and cultural components of a specific market and which is in constant evolution. The adoption of a new pedagogic approach for the Design college aims a conceptual restructuration, characterized by:

Detaching itself from STAGES individualization as reference for the knowledge construction and, in a more adequate way, create lines that trespass the whole formation period or, at least, enough groups of STAGES in order to reach the goal;

Focus on the basic formation in the first years, but already in an articulated way with the Project actuation, in order to reduce the INTERSTICE between basic theoretical basic subjects and its practical utilization;

Stretching project practice among every STAGE of the college, seeking to obtain a backbone for the college, as a point of concentration of the subjects an approaches worked in the surrounding disciplines;

Create between the disciplines a logical series regarding the subjects and topics addressed and the progressive raise in the complexity and depth;

Create interdisciplinary “blocks” in which an amount of 4 circular components (Project + 3 disciplines that characterize a parallel requirement and will give support to the project development) that must be taken as a block where three professors (one to each parallel requirement) act in their disciplines separately, but act gathered in the project discipline seeking to promote the necessary integration to achieve this and the interdisciplinarity.

Philosophical Conception of the Course

The designer graduated from UFSC – Federal University of Santa Catarina - will have a generalist graduation, able to understand and answer the individual and society needs, with ethics and capability of criticizing, reflecting and having humanistic vision, regarding conception, development and projects monitoring, as well as its production, through aesthetic consideration in the midst of technological, formal and functional aspects, acting creatively in the problems identification and solution, considering politic, economic, social, ambient, historic, and cultural components of a specific market and which is in constant evolution.

Pedagogic Conception

The Design college pedagogical project highlights the matter of the contributions and presuppositions of the constructivism to the comprehension and improvement of the teaching-learning process. In this conception, learning is a process that conduces to integration, modification, to setting relations and coordination between layouts of knowledge that one already has, endowed with certain structure and organization. In

the scope of the design college pedagogical project, such a conception includes issues of the management of the contents and human relations and of the management of the teaching-learning process.

To the constructivism, learning is more significant as more meaningful relations the student be able to establish between what already knows (the previous knowledge) and the new content that is introduced as learning object (Miras, 1998). This definition indicates that students have a variant amount of knowledge layouts, they do not have a general notion of reality, but the notion of certain issues of the reality. Therefore, depending on the background they develop and live, on their direct and indirect experience and the information they receive, students might have a larger or smaller quantity of knowledge layouts.

David Ausubel, contemporary of Jean Piaget, contributed to the "significant learning" conceptualization. In his studies, he explains that learning regards the cognitive structure enlargement, by incorporation of new ideas and contents. Depending on the kind of relation established by the learner, between the ideas already existent in his structure with the new that are being internalized by it, it is possible to verify is the learning was meaningful. The author tells apart the "meaningful" learning from the "mechanical" one, that would be taken in a arbitrary way. (Fontoura, 2002).

The constructivism in the classroom is an open and non-exclusionary referential. Therefore, it stands out that the process is gathered, shared, in which, with the help from the teacher, the learner can prove himself progressively competent and autonomous through the resolution of tasks, the utilization of concepts, the practice of certain attitudes and other many issues. The student builds a meaning and/or rebuilds it from the personal and social point of view. The construction of the knowledge evolves an intense mental activity, characterizing itself by the fact that the students establish non-arbitrary relation, but appropriate and valuable in the individual and collective scope. Vygotsky (1991) defended the significance of the relation and the interaction with other people in the learning process roots. In the cooperative interaction, the contrast between points of view, moderately divergent about a problem or content of gathered solution, is positive. The Learners should show disposition, intellectual and emotional capacity to accept the debate and the controversy.

In this perspective, when it is learnt, it is not taken into account only the content, learning object, but it is also needed to be considered the organization for the learning process. The capability of teamwork presupposes the progressive knowledge of certain contents regarding the procedures and norms, the values and the attitudes, that also must be explicit object in the education. To this effect, the values and the cultural background of the group interfere in the interaction.

This theoretical input is used as reference for the elaboration of the profile of the professional that will graduate in UFSC Design College, who should:

Act on design following his specific graduation (variable from one student to another considering his school records/portfolio);

Control the specific techniques, methods and tools of design project;

Knowing the technical resources applications seeking a project practice;

Be prepared to act in specific cultural, historical, technical, and market environment.

Knowing how to step in the society with criteria of innovation, social-environment responsibility and entrepreneurialism.

Once set the professional's profile that will graduate in UFSC, it is possible to describe the objective of the college which is 'to provide ways for the formation of capable professionals to act in dynamic environments with specific cultural, historical, technical and market characteristics, besides knowing specific techniques, methods and tools of project, seeking through that, to step in the society with criteria of innovation, social-environmental responsibility and entrepreneurialism'. Attached to this general objective are the specific objectives, which are:

Provide a theoretical and practical knowledge ensemble required and enough for the design students qualification, attending to the adequate levels of skills and competence development compatible with those required for their insertion in the professional market.

Provide adequate physical structure (class rooms, labs, workshops, computing equipment, etc.) for the students formation;

Structure theoretical backbone for the college based on the available bibliography, on the learning by the design practice and on the articulation between the college teaching staff components;

Create technical and institutional articulation environment with others design teaching institutions around the region, the country and abroad;

Provide the college supporting structures in order for it to have the capability of promoting complementary teaching, research and extension activities in the right dimension to embrace the diverse surrounding needs regarding the professional formation.

Therefore, it is agreed that the Design synthesis happens in the project disciplines, by the convergence and association of knowledge regarding the areas that structure its backbone, in other words, the teaching must happen by the construction of primary articulations (between areas of knowledge), secondary (by the engrossment in some area) and tertiary (by the association and synthesis of the acquired knowledge, applied to the project problems solving). With that, it is sought a greater approach between the student and the market, as shows figure 01.

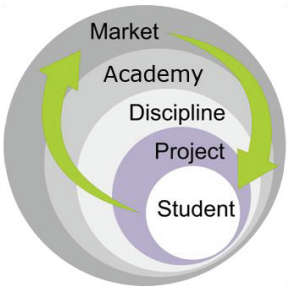

***Figure 1**. Representative image of the interaction Student - Market*
Source: Authors

The UFSC Design College was thought in a free organizational structure between the formations, in which the Project disciplines should be the guideline of the students formation. The disciplines were thought in a way to embrace 5 different axels: languages and ways; society; technology; market and project. The languages and ways axel embraces contents about ways of representation from the freehand drawing up to

the digital tridimensional moldings acquired for the Design professional actuation and links them to the languages that are appropriated to the activity. The Society axel deals with the matters upon which the design professional establishes his relations with the society as a scenario for his actuation. It is studied the Human Sciences notions and historical, technical and of sustainable development questions regarding the Design area. The Technology axle broaches the technological resources acquired by the project embodiment. The Market axel groups the contents about theoretical and practical nature by which the Design professional relates with the commercial and enterprise reality. Subjects regarding marketing, managing and management, professional practice and internship compose this axle and at last the Project axle goes through all the college STAGES, linking the stages that compound the Design projecting method (from analyses to the projects implementation), incorporating projecting activity support techniques and tools (creativity, management, information systems, etc.), up to the Course Conclusion Project.

Therewith, project disciplines won't have isolated "life" and will be taken jointly with three more disciplines in parallel requirement, as shows figure 02. These parallel requirement disciplines will sustain the project and its three professors will take responsibility by the functioning, management, and evaluation attribution of the project performed by the student, which should contain information about all of them for a complete understanding about the course.

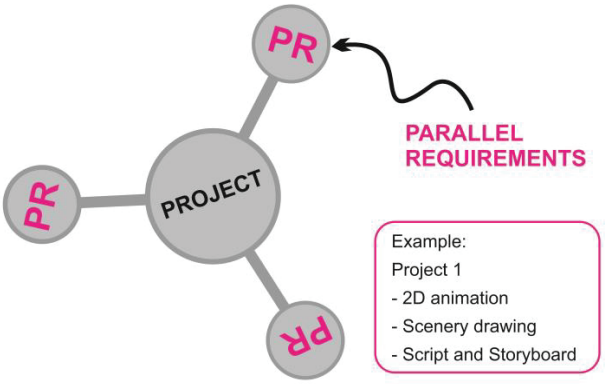

Figure 2. *Project disciplines group example.*
Source: authors.

The professors of the parallel requirement disciplines and, thus professors of the project to which they are linked, should structure the contents and schedule in order to reach the best interdisciplinary and learning result for the student, being able to organize the semester time accordingly to the group needs. Although, should also care about the resting disciplines that the student attend to simultaneously so that the works always be accomplished with the best quality possible.

The course Project has an integrating and embracing proposal in which the central concepts of the Design are presented to every academic in the course. Large classes in which the registration is taken by order of enrollment and/or IAA (INDICE DE APROVEITAMENTO ACUMULADO – students accumulated notes) and which look on

design through a wider and more scientific scope, assembling practical activities according to the Design graduation needs, There are 120 vacancies offered every year, 60 of them being for first semester admission and the other 60 for the second semester.

The course brings a total course load of 3521 hours class (h/c) – being the length of each h/c of 50 minutes. It is distributed as shows the table 02, following.

Table 2. *Course loads distribution*

Disciplines	Course load (h/c)
Prep disciplines	846 h/c
Project modules	1152 h/c
General mandatory disciplines	533 h/c
Inclusive disciplines and CCP	450 h/c
Mandatory internship	360 h/c
Elective disciplines	180 h/c
Total	3521 h/c

This course load is divided into groups: prep disciplines, project modules (project with parallel disciplines); general mandatory disciplines; inclusive disciplines and CCP; mandatory internship and elective disciplines. The figure 04 shows the structure of these 5 groups of disciplines distributed along the course, which is 4 years long.

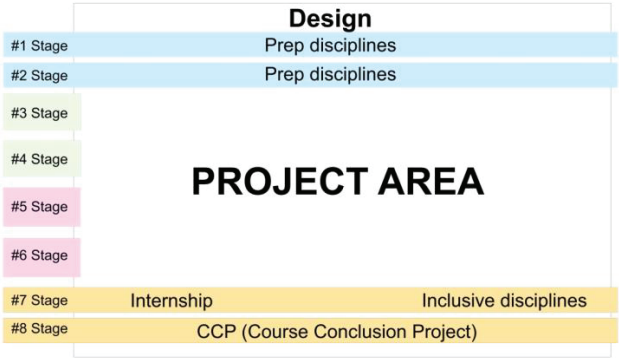

Figure 3. *Circular structure of the Design college disposing the 5 disciplines groups.*[1]
Source: authors.

[1] The figure 3 shows a graphical representation of the Design course curriculum. There are two columns and eight rows. The column one shows the 8 stages that comprise the course (and each stage is equivalent to one semester). The second column shows what type of activities are developed in each one of the semesters. Thus we have that: in the first and second stages the students attend the prep disciplines. Between the third and sixth stages, students attend projects modules and Genneral Mandatory disciplines. They can attend the

As the course runs on different shifts (morning, afternoon or also night shift) it is possible to accomplish easily in this prep stage the Design theories and concepts that compose the prep disciplines. After taking the prep disciplines, the academic goes to the project area in which are concentrated all the Project disciplines (modules of 4 disciplines : P + PR + PR + PR). In this area, the student builds - helped by the tutor (professor of the course that acts as advisor of the student along the college) – his final formation within his abilities and competences. Figure 04 details the projects area

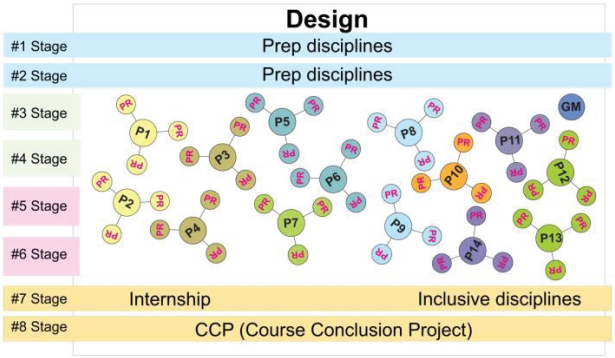

Figure 4. *circular structure of the Design College highlighting the general mandatory disciplines in the projects area.*[2]
Source: authors.

Along the four (04) semesters of this Project Area duration, the student must take at least 4 Project Modules being required approbation in at least two projects of a same specific Design working area. There is also in the Project Area, the General Mandatory (GM) which are formative and will structure the Design thinking of the students. These disciplines should be taken for their resume and portfolio integration. Figure 05 shows general mandatory disciplines insertion in the projects area.

elective disciplines. In the seventh and eighth stages, students attend Inclusive disciplines and Course Conclusion Project;

[2] The figure 4 shows complements of figure 3, by presenting in more detail of the activities undertaken by the students during the period comprising the third and sixth stages. Emphasis is given to the projects modules (composed of four disciplines as shown in figure 2) Note that to complete the course, the student must attend 4 project modules (chosen by students with support from the tutor)

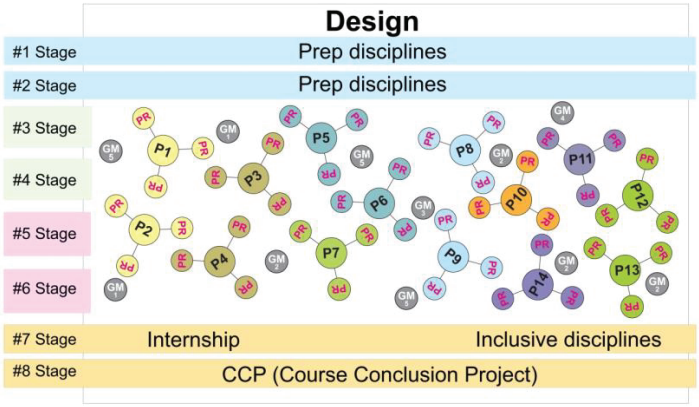

Figure 5. *circular structure of the Design College highlighting the general mandatory disciplines in the projects area.*[3]
Source: authors.

The course concludes with an inclusive disciplines area, which aim to insert the student into the labor market and into the scientific researches. The inclusive disciplines gather those ones about ethics and law, entrepreneurship and the Course Conclusion Project. Internship, mandatory by the MEC guidelines for graduation in Design, can be taken at any time by the academic once the prep disciplines and two more project modules have already been taken.

All these activities (prep disciplines; project modules; general mandatory disciplines; inclusive disciplines and CCP and internship) constitute the workload mandatory by the course. Besides them, other activities called elective disciplines are offered (disciplines from the Graphic Expression department or other departments, courses, or institutions, chosen by the students and accepted by the collegiate body of the course that get to complement mandatory activities). Design course curriculum becomes integrated when the student get to accomplish the total course load, composed by an amount of mandatory disciplines (prep, general mandatory, inclusive, projects and internship) and elective disciplines and/or complementary activities (which may be accomplished by another departments disciplines, but being complementary to the students formation). The complementary activities are configured: extra-class activities – non-mandatory internships, events attending, publications and other activities that also aim to complement informationally the course. They should follow the regulation of the collegiate body of the course. If a student accomplishes beyond the minimum of 4 projects (with their parallel requirements), the projects workload considered extra can be considered complementary activities hours.

Final Remarks

UFSC Design College, deployment proposal, was thought with the intention of provide to students a complete formation to act in both national and international markets. With that proposal, arises the opportunity of widening the UFSC Design

[3] The figure 5 shows a bit more detail the activities to be performed by students in the period that includes the third and sixth phase. Thus, in addition to the project modules, the student must attend the courses in this period that comprise the Mandatory General disciplines (GM).

college acting field tendering diverse graduations that, besides answering the demand, also complete the Design circle. Furthermore, the formation proposed by the UFSC Design gives tools to the student tools so he can act also in partnership with other professionals, in the areas where the Design professional is required.

Considering that, during the process of restructuring and upgrading of UFSC Design course, important concepts were incorporated in this didactic-pedagogic project, added to new surveys, research, and discussions to structure appropriately the new Design course, paying attention to a innovative proposal, however, consistent with this demand and pondering the limitations and potential real.

Thereby, the course is configured as generalist Design course - by proportionating the students a basic formation in Design area – and that also allows the students to specialize in a specific Design area at the same time, in other words, to guarantee integrated single formation with the possibility of using the expertise within the curriculum to form professionals with wide knowledge and focused practice.

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Transformation and consequences: Do change and divergence in the premises of Bachelor of Design educations in Norway today reveal a need of a General Plan for design educations?

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Abstract: *This paper presents a small pilot study on Bachelor of Design educations which initiates a larger research on some problems within design educations and consequences of changes and school reforms in Norway during the last decades. Design programs of study are popular and the number of schools which offer these programs in Norway has increased since the 1990s. However, the premises for what a design study program should include as well as criteria for getting entrance to higher design educations have changed. This is particularly the case with newly established design educations at several University Colleges. While some study programs are labeled design without actually being that, other design programs are watered down by subjects less relevant to design, to make the education more profitable. Such tendencies may obstruct the concentration on design subjects and the time it takes for students to develop their abilities to create sustainable and competitive design. Changing the premises of higher design educations from great emphasis on design subjects to superficial study programs with less emphasis on design may in the long term undermine the quality of design and the capability for Norway to compete internationally. Thus one may ask; do Bachelor of Design educations in Norway need a General Plan to ensure that design students achieve the skills and knowledge which is needed to become successful designers?*

Keywords: Bachelor of Design, Design study programs, Design curriculum, General Plan for higher design educations.

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Introduction

During the last couple of decades Norway has had a tremendous economic growth while developing into a mature oil-state. Parallel to this, the general interest and knowledge on art, architecture and design has increased in the Norwegian society and reached a level where also business and industries emphasize these fields in their plans, both in their physical work environments and as an important quality of their core production. New ways of collaboration between design and industry have also caught the attention of the Norwegian Government, where the Ministries of Culture, Industry and Foreign Affairs have created several plans of action for strengthening the ties between design and industry, together with well-recognized designers and the Norwegian Design Council. For example the plan of action launched in 2001; «Design som drivkraft for norsk næringsliv»; "Design as motivating power in Norwegian industries", launched several suggestions for strengthening the ties between Norwegian design and industry, as well as developing the national design competence, by taking systematic steps to strengthen higher design educations (Nærings- og Handelsdepartementet: Rapport fra Utvalget for Næringsrettet Design, 2001). However, the 2001 plan was never implemented.

In 2009 the program "Designdrevet Innovasjon" (DIP); "Design Initiated Innovation", was launched by the Norwegian Design Council, based on an examination of 515 Norwegian companies called "Design Diagnose"; which revealed that companies who emphasize design have a higher level of innovation than companies who do not (11.13.2012: http://www.norskdesign.no/2009/designsatsning-dobler-norsk-innovasjon-article12670-8028.html). The DIP program has been successful, and in 2012 the program supports 16 projects of design and industrial collaboration. The main objective for the Norwegian Government to support design is; to strengthen national values, national identity and to increase the ability for Norwegian industries to compete internationally on the global market.

In spite of the political intentions of strengthening Norwegian design as a significant and competitive industrial factor, as well as the everyday value of design, the meaning of design seems underestimated in some educational institutions which offer design studies today. Instead design on many occasions has become a popular buzzword in principal speeches and advertisements where "design" is used to attract applicants to the school. In the following I discuss changes and compare some divergent premises for higher design educations in Norway and how this may influence Norwegian design and the competitive factor of design in media and industries. I also consider a potential need for a General Plan for design educations, regarding some of the problems revealed in this small pilot study, although this question will be better grounded in a broader study. This limited study only briefly examines the content of ten three-years lasting Bachelor of Design programs of study. A broader study should look deeper into each curriculum as well as it should include the curricula of some Bachelor of Design educations abroad. It should probably also include Master of Design educations, as some design educations in Norway only accept students for a five-year program of Master study. When including five-year Master programs, I only examine the content of the first three basic years, to grasp the Bachelor level of these programs. The research questions, empirical data and theory are as follows: Which changes and divergences in content and entrance requirements mark Bachelor of Design study programs in Norway today? Which problems may this lead to, and which actions may be considered to solve or prevent these problems? The empirical basis for this paper is the curricula of ten

Bachelor of Design studies in Norway. In addition I use my experience from many years of practice as a designer, visual artist and teacher within art and design subjects at different educational levels to enlighten some problems commonly known among most art and design teachers. I only briefly refer to the theories of Bourdieu, Veblen, Arendt and others in my description of various tendencies and problems within the field.

Preparatory studies for higher design educations

First I like to enlighten what make young people apply to higher design educations and present a few preparatory programs for applicants to some design study programs. Similar to higher education within music and sports, studies within art and design may also require that the students have a minimum of talent and skills to develop also within these fields. As described by the American Psychologist Howard Gardner, we all have different intelligences, which should be guiding us in our selection of education (Gardner, 1994). Based on many years of practice as an art and design teacher, from Junior High School, High School and University College, as well as from an art school for children 9-16, my experience is that most pupils and students in art and design classes manage to develop their abilities for creating art and design expressions into a higher level than before they started. With guidance from the teacher, most of them show great progress. However, as within music and sports, it is a challenge that not everyone seems to have the necessary potential to develop their talent and skills to a level where they can create design and art expressions of high quality. Of course young children should not be subject to such judgments, as some are late bloomers, but at the time they complete High School at the age of 18-19, it is more obvious who have or have not the necessary talent, skills and interest for higher education within art and design.

Many youths who are interested in creative subjects such as art and design also apply to study programs within art, design or architecture, often with great potential to succeed. However, when young people choose which subject they like to study at University or College, they do not always choose the field of study which is most harmonious to their personal abilities and interests. Instead many are influenced by their family, friends and school mates, which makes them choose studies that are most popular at the time they leave High School. For example, at the moment, the one year lasting Norwegian boarding school called “Folkehøgskole”, which holds an educational level between High School and College, but without, or with only offering a low degree of formal education, has become very popular. The reason why, may be that many of these schools offer study programs and practice in creative subjects such as art, design, music, theatre, film, photography and media. Only a few years ago, (5 - 6), these schools, which are spread around in the country, were threatened by being closed down, due to the lack of applicants. Then they suddenly became very popular and today a great part of Norwegian youths choose to stay for one year at a “Folkehøgskole” after graduating from High School.

Likewise, a great part of High School students tend to choose popular study programs. A few years ago, the study program “Tegning, form og farge”, (TFF) launched by the Norwegian High School Reform 1994, (R 94), where the main subjects were drawing, creating form and using colours, became tremendously popular and produced a great number of students well prepared for higher art and design educations. However, thirteen years later, in 2007, the Norwegian ministry of education launched a new High School reform called “Kunnskapsløftet”; “the Raise of Knowledge”, where the TFF program was replaced by a program called “Studiespesialisering med formgivning”,

(SF), which means "specialization for higher education, including design". The change implied that the most popular part of the tree-year long TFF program; drawing, form and colour was reduced and instead of starting with these popular creative subjects in the first year of the education, as in the former TFF, they were moved to the second and third years of the new study program. The result was that the SF program never gained the same popularity as the former TFF and today it has been abandoned and closed down at many High Schools. Instead a related vocational study program, Media and Communication, (MK) has become a favourite program for many high school students.

The closing down of the former TFF study program, and the great changes in the following program, SF, which made many abandon the study program, may also partly explain why the "Folkehøgskole" in Norway has become so popular during the recent years. Seemingly young people have an inherent need to express themselves through creative subjects, which today are offered by many of these schools. After graduating from High School, many students who plan to take higher studies within art and design also seek to develop their talent and skills by one or two years of study in a "pre-school" for higher art and design educations, which there are several of in Norway, for example "Einar Granum Kunstfagskole", "Nordland kunst- og filmfagskole" and "Asker kunstfagskole". Studying at one of these schools makes applicants well prepared for the entrance examination still arranged by some higher design educations, for example at the Academies of Arts in Norway.

Entrance admission to higher design educations

Regarding the current issue, it is important also to know the premises for getting admission to Norwegian design educations. Some years ago most of the higher design educations only accepted applicants who had 1) passed the entrance examination, or 2) showed their abilities for the study in other ways. Well-established design studies at the National Academies of the Arts have always arranged, and still arrange entrance examinations, such as the Oslo National Academy of the Arts, the Oslo School of Architecture and Design and the Bergen Academy of Art and Design. In the past, several design educations at University Colleges have also arranged entrance examinations, or asked for a portfolio, which some still do, or they used to require that the applicants had two years of basic education within art and design from a relevant study program at High School, such as TFF, to be accepted for the study. The latter was the case for some higher design educations until the latest reform in 2007, when the TFF study program was radically changed and the succeeding program, SF, lost most of its applicants, as described above.

Today several design educations at University Colleges neither requires preparatory art and design studies, nor do they arrange entrance examinations. Instead they have a common demand for a general competence of study; "Generell studiekompetanse", (GSK), which means that the applicants have passed all their exams in compulsory subjects at High School. GSK is a common requirement for entrance to all higher educations in Norway. While many higher design educations at the Academies of Arts still regulate the admission to their design studies through an entrance examination or a portfolio, several design studies at University Colleges have no other requirements for accepting applicants than GSK, the same as for any other education in Norway except for a few other studies with additional demands; such as education within music, medicine and engineering. In other words; the only thing the applicants compete on for

getting entrance to some Norwegian design educations, are the average graduation level of their compulsory subjects from High School. This means that if the applicants have high grades within subjects such as language, mathematics, biology and sports, which increase their average grade, they may get entrance to design education, even though they may have low grades within art and design subjects. Conversely; applicants who are highly talented and well skilled within art and design subjects, risk being refused, if they have low grades within other compulsory subjects such as languages, mathematics, biology and sports, which lower their average result. Although being good at sports and biology is a good thing in itself, and mathematical skills are actually also needed in some design study programs, it is worth questioning if applicants who are talented within art and design are refused entrance to design educations. In its uttermost consequence, prohibiting entrance to design study programs for talented applicants, who have an obvious potential to develop their abilities for creating high quality design, may contribute to make Norway less competitive within design.

Design educations with no demands for applicants other than their average grade from High School, means that "everyone" can be accepted for studying design at the current schools, as far as they are among the applicants with the highest average result from other subjects. However, being a strong student within language, mathematics, biology and sports, is certainly no guarantee for success within design subjects. In reality many students who lack the necessary talent and skills to become a designer, are often not able to complete a three-year Bachelor of Design program and because of this, many of these students quit during the first or second year. Choosing a study not harmonious to their natural talent and abilities, often has high economic and personal costs, as most Norwegian students finance their studies by loans from the Norwegian student bank "Lånekassen", which they pay back during a time span of several decades after graduating from higher education.

When many students quit design study programs at University Colleges because they are not able to complete the study, this is also an ethical problem and one may ask; is it a good thing for University Colleges to attract students to design study programs, who are obviously not able to complete and graduate from the study? A common problem today is actually due to the financial system of higher educations in Norway, where the educational institutions get paid for each student they accept for their study programs. Thus it seems more important to attract and accept students, than actually make sure that they are able to complete the study. In this cynical game, popular design studies may function as a bait to lure applicants into a trap; a study in which they have little chance to succeed, but where the institution earns money. In an ethical view, entrance examinations or other requirements for getting entrance to design study programs, contribute to regulate the admission in a way that students who lack the necessary potential to develop as a designer, do not have to take up high loans and spend years in a study in which they will not succeed. A central question then is; should all Norwegian design educations be regulated by an entrance examination, presentation of portfolio or other entrance requirements?

Watering down design study programs

Because many of the regional University Colleges in Norway have a great number of study programs, the content of several design studies are also watered down by subjects less relevant to design, in order to make their programs of study more profitable. This is particularly a problem within schools which are not specialized within

arts and design, or which do not have a specialized Faculty within arts and design. The lack of teachers and leaders with sufficient competence within design may also be a problem in non-specialized schools or Faculties, which due to this may also lead to a weak understanding of what a design study actually is, or should include. By sharing subjects and courses between divergent study programs based on New Public Management ideas, closely connected to commercial market theories, several schools save wage expenditures for teachers and other costs. For example, the idea that many students in a few lectures are less expensive than a few students in many lectures reveals a simple logic more adapted to economic interests than the interests of design students and the design disciplines. The current tendency that many humanistic public institutions such as schools and hospitals are led by economic interests rather than humanistic values creates displeasure and many public debates in Norway today. Within design studies, this tendency may lead to a superficial understanding of design and contribute to a deskilling of the current design disciplines, because the business thinking obstructs students in the necessary and crucial concentration on relevant design subjects. By enforcing less relevant subjects into a design study, the students also lose the necessary time to develop their abilities to create sustainable and competitive design. Some of the design programs at University Colleges or Faculties which are not specialized within design are also marked by a significant fragmentation, consisting of a large number of small subjects during a three-year Bachelor of Design education. The number of subjects in the included ten design study programs varies from 9 – 23, which also means 9 – 23 exams during the study, of which programs with the highest number of subjects make little opportunity for in-depth studies.

Every three-years lasting Bachelor education in Norway is awarded with 180 ECTS credits, based on the European Credit Transfer and Accumulation System. Each education offers a number of credits in the core subjects of the current discipline. A central question then is; how many credits within design subjects should be included in a Bachelor of Design study program? By examining the present curricula of the ten Bachelor of Design programs included here, it appears that the number of credits in compulsory design and design related subjects varies a lot.

The table below, table 1, shows the design credits of the ten design study programs and programs offered to applicants under the label design, which are included in this small pilot study. The data is collected from the 2012 curricula of each program offered by different types of educational institutions in Norway, such as; Academy of Arts, University and University College. Column 3 includes credits from compulsory design subjects as well as from “design related subjects”, which means subjects such as art and design history and basic training in different digital design tools, although one may discuss whether the latter should be included here or not. Many design teachers claim that basic training in digital design tools should be a requirement for getting access to the design educations, similar to how basic knowledge within language and writing is required. This means that the table may give a wrong impression of the number of credits offered within design. Still, by including these subjects as “design related subjects”, the number of design credits counted for here is not underestimated. For some programs it is also difficult to decide the number of compulsory design credits due to overlapping or interdisciplinary subjects, or because it is difficult to decide whether the subject actually is design related or not. These studies appear with two numbers of credits in column 3 and 4.

Table 1: Design credits in 10 Bachelor of design programs/Bachelor programs labeled design

Schools	Bachelor of design programs/Bachelor programs labeled design, 180 credits	Credits from compulsory design subjects & design related subjects	Credits from other subjects
School 1	a)	165	15
	b)	171	9
School 2		105	75
School 3		90-100	80-90
School 4	a)	90	90
	b)	90	90
	c)	15-22.5	165-157.5
School 5	a)	160	20
	b)	160	20
School 6		85-125	95-55

Although this study is much too limited to be generalized and as some might claim, somewhat superficial, as it is a pilot and not an in-depth study, Bachelor of Design programs at specialized schools, such as Academies of Arts, seem to collect most of their credits from design subjects, which mean most of the 180 credits. Other relevant subjects may then be integrated as a smaller part of the design subjects. It seems like Academies of Arts have a stable emphasis on the core subjects of their Bachelor of Design education. Seemingly it is the credits of the design subjects that are offered in design educations at University Colleges which diverge most. While older, specialized Faculties of arts and design at University Colleges offer around 160 credits within compulsory design subjects in their Bachelor of Design programs, some newer programs at other University Colleges offer 85-90 credits within compulsory design subjects. Supplied with design projects or optional courses, these educations may reach a higher number of design credits, for example 105 – 125, the latter shown in table 1 above. However, although the compulsory design subjects may be supplied with optional design subjects, students at these University Colleges may well complete their Bachelor of Design degree with only 85 - 90 credits within design. From a design point of view, this low number of credits collected from design subjects is highly questionable. The students at these studies are only offered one and a half years of design studies in a three-years lasting Bachelor of Design education. However, the lowest number of design credits offered from compulsory subjects among the ten programs of study included here, only offer 15-22.5 credits from design subjects. This is an example of Bachelor programs offered by University Colleges under the design label without necessarily being a design education, as discussed below.

Today Norway has no General Plan for Bachelor of Design programs. However, due to the significant divergence in the number of credits within design subjects in these educations, a central question is; should Bachelor of Design educations in Norway

consider developing a common General Plan to ensure that the students get the same amount of knowledge within design as several other study programs in Norway offer in their core subjects, for example within Engineering and Teaching? Obviously that would have given the Bachelor of Design students an equal amount of design knowledge during their three-year lasting design education.

Misusing the design-label on non-design studies

From a professional point of view, it is a problem that some University Colleges offer study programs under the label "Design", where the word design is integrated in the name of the study, although it can hardly be defined as a design study program. Instead it may be a program of study within information technology, electronics or other disciplines. As shown in the table above, some programs labelled design offer as little as 15 – 22.5 ECTS credits within design subjects in a 180 credit Bachelor education, although it is labeled design in the marketing of the study program. The reason why some institutions choose to use the design label on non-design programs may be due to the great popularity of design studies, which makes the word design function as a buzzword to attract applicants to the current program of study as well as to the educational institution. However, many students in these "pretending-to-be design studies" are dissatisfied, and many quit after a while when they discover that it is not a design education they have started on after all. As described by the Canadian social scientist Erving Goffman, individuals may often conduct different "pretending-to-be performances", trying to establish a desired impression although on misleading premises (Goffman, 1992). Obviously this is also the case with some educational institutions. In these cases however, the marketing of false design educations is very misleading and may have serious economic and personal consequences for students who take up loans to achieve what they think is a Bachelor of Design education. Obviously this is also a practice with major ethical implications and therefore should be questioned. Put to its extreme; institutions who offer false labeled "design educations" are cheating their students by offering studies under a false flag. Although several study programs other than design may offer one or two smaller subjects where the word "design" is integrated in the name of the subject and awarded with around 10-15 credits, most people will hardly recognized the current study as a design study.

Another reason for using a false design label on non-design studies may be the consciousness of higher educational institutions on how the significance of art and design has increased in the Norwegian society, parallel to the economic growth. Cultural capital, which as described by the French Sociologist Pierre Bourdieu is gained through education and social wealth (Bourdieu, 1995), has increased within the entire population parallel to the growing wealth and a growing number of inhabitants who take higher education. This has transformed cultural capital into a value which gives social status also to institutions. Never before has art and design been mentioned more in principal speeches than today. Also the Norwegian-American economist and sociologist Thorstein Veblen describes how knowledge within the cultural field is "a mark of the master" (Veblen & Mills, 1994) and seemingly, design has become a snob factor for many educational institutions, which they obviously also believe may contribute to increase their popularity and the attention paid to the school.

The meaning of design in the society; why the quality of design educations matters

During the last decades, the technological development and digital revolution have created great changes in the society. Parallel to this Norway has had a tremendous economic growth while developing into a mature oil-state. Although the general knowledge and interest on design has increased, the importance of design both as a competitive factor and how design can contribute in our everyday lives still seems underestimated. The meaning of design as well as art and architecture can be traced back to ancient times, to the Egyptian, Greek and Roman cultures as well as the Asian cultures and the great dynasties. In newer times, towards the end of the 1800s, members of the Arts and Crafts Movement in England, such as John Ruskin, William Morris and Walter Crane, were engaged in how industrial production declined the quality of artifacts and worked to improve the quality of everyday objects. The Norwegian art pedagogue Helga Eng describes how Ruskin, who was also an art critics and pedagogue, pointed out the significance of aesthetical school environments, which he claimed increased the learning abilities of the pupils. Due to this, schools should be well designed and decorated by art for the purpose of better learning (Eng, 1918).

In our time, many people engage in similar questions, including professionals within health and medicine services, who point out the significance of the visual environment for the healing of patients. The growing consciousness of the meaning of art, design and architecture during the last decades combined with the growing national wealth, has made it possible for many Norwegian schools, hospitals and other public institutions as well as for cultural institutions and corporations to erect new buildings with modern and high quality architecture and design, often decorated with high quality art, as also described by the Norwegian sociologist of art Målfrid Irene Hagen (Hagen, 2011). Many old and valuable buildings are redecorated and integrated in new architecture. Additionally, every manmade object we use is in its origin designed. The shape, colour, ergonomic function and user friendliness have great importance for how we manage our everyday tasks. Clothes, food-packaging and media such as newspapers, books, magazines, television, smartphones and personal computers are all designed in different ways and the quality of the design may decide whether we buy and use the current objects or not. Many of us are closely tied to our everyday objects and physical environment and as described by the German philosopher Hannah Arendt, the durability of our artifacts and physical surroundings contribute to establish our identity (Arendt, 1984). In other words, because the design of the artifacts has great impact on our lives, the quality of design is crucial for all of us.

High quality design is also an important competitive factor for Norwegian industries, which according to the Norwegian Design Council and the Ministries of Industry, Culture and Foreign affairs is a main objective of the Norwegian Government for supporting design, as mentioned in the Introduction above. Neighboring countries such as Finland and Denmark are known worldwide for their high quality design. For example in Japan, everyone admires the Finish Marimekko design and for many years they have also admired the works of Danish designers, for example chairs designed by Arne Jacobsen and lamps designed by Poul Henningsen, which are sold in many Japanese furniture stores. These countries are already well known for their high quality design and remain popular in the international competition. If the Norwegian Government wishes to increase the acknowledgement of the industrial production in Norway through a high quality design, Norwegian design educations should be

significantly emphasized, to be able to educate designers with the ability to create design of a high and competitive quality.

Today many higher educational institutions in Norway seem marked by features of anomie, where every school has the freedom to practically introduce almost every kind of study they like. As described by the French pioneer of sociology, Emile Durkheim, anomie may appear in times of crisis. But he also describes how anomie may appear even in times of sudden wealth (Durkheim & Østerberg, 1978), which is the case for the Norwegian society today. In respect to design, every school of higher education seems to have the freedom to decide how many design subjects and design credits they may offer in a Bachelor of Design study program. Also for this reason, to prevent anomie in higher design educations, considering a General Plan for Bachelor of Design educations may also be fruitful and contribute to ensure the quality of Norwegian design, and the competitive factor of Norwegian design within media and industries.

Conclusion

During the last decades, design study programs have become popular and the number of design educations has increased, particularly by the offering of many new design study programs at several University Colleges. While traditional design educations, for example at the Academies of Arts, have entrance examinations or other demands which the applicants must pass in order to be accepted, other have no other entrance requirements than that the applicant have passed their compulsory High School exams and gained a general competence for higher studies (GSK). Every three-years Bachelor educations in Norway are awarded with 180 ECTS credits. While Bachelor of Design study programs at the Academies of Arts seem to offer nearly 180 credits within the core design subjects, the number of credits offered in compulsory design subjects at University Colleges seems to vary from around 160 credits to 85 - 90. On some occasions University Colleges misleadingly offer Bachelor studies under the label “Design”, although the study only offer 15-22.5 credits within design subjects or design related subjects and can hardly be characterized as a design study.

Due to the features of anomie which seems to mark some educational institutions today, based on the freedom to define which subjects they like to offer in a Bachelor of Design study program or not, it may be appropriate to consider a common General Plan for Bachelor of Design studies. It is however important to make explicit that the aim of a General Plan would be neither to restrict the direction and personality of each design study program, nor to dictate the content. Instead the benefits of a common General Plan would be: a) To ensure that the number of credits offered in design subjects in Bachelor of Design educations holds a level which also ensures that the students get the necessary amount of knowledge and experience within design subjects; to become well educated designers with the ability to create high quality design. b) To prevent educational institutions from the marketing of false design studies, with negative consequences and economical loss for students. c) To describe and recommend relevant entrance requirements, for example entrance examinations or presentation of a portfolio, to ensure that the students who are accepted for higher design education have the sufficient potential to develop as a designer, so that they do not have to take up loans and spend several years in a study which they are not able to complete. This may also improve the ethical practice at the current schools.

Finally it is important to make clear that although the need of a General Plan may probably be most crucial for a small number of Bachelor of Design educations at non-

specialized University Colleges and Faculties, a common General Plan would ensure that all of the students who are accepted for a Bachelor of Design education in Norway are guaranteed to achieve the sufficient amount of design knowledge to become a designer, with a solid Bachelor degree within design. Considering the need of a General Plan for Bachelor of Design educations would also be relevant for Master of Design educations. The long-term benefit of a General Plan would be to increase the quality of Norwegian design, including the design of our everyday objects and the competitive factor of design within media and industries.

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Knowledge generation in doctoral design education

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Abstract: Knowledge generation in doctoral design education and its endeavour to meet a variety of interdisciplinary issues from engineering to aesthetics, sustainability and stakeholder requirements can be labelled with what Rittel and Webber called a "wicked problem" [1]. The following article reflects on conditions, methods and challenges to combine design theory and design research practice on a doctoral level. The study case for these reflections is the PhD course, PD 8300: "Topics in design research" at the Norwegian University of Science and Technology. The course introduces among others a disciplinary architecture for industrial design and three theory of science philosophies related to three paradigmatic design theories: Critical rationalism to Simon, Pragmatism and Hermeneutics to Schön, and Social Constructivism to Krippendorff. Further the course attempts to mediate research skills such as writing, analysing and evaluating texts and structuring one's PhD work. The article is meant as a contribution to the on-going discussion on teaching design theory at different industrial design schools in Scandinavia and as contribution to appraise and develop doctoral education in industrial design.

Keywords: Industrial design curricula, PhD education, industrial design as academic discipline, theory of science, design theories

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Introduction

Lately, substantial concern in the design community has arisen about what the industrial design profession will look like in the near future. Industrial design schools restructure their curricula to develop soft skills, interdisciplinary problem solving, or consideration for the environment to find a niche in a market which is increasingly driven by innovation and constant variation. Besides these challenges for the design profession, educators do not only struggle with the issue of complexity of subjects but also with the disadvantage that many theoretical foundations of design methods and tools are rarely made explicit. Appropriate knowledge seems critical to the industrial design profession's survival. Design research is one reliable source for new information that enhances the possibility to identify future trends, needs and patterns and validate decisions. But what kind of knowledge is important for today's design research? Addressing this question, the following article discusses an interdisciplinary approach to include theory of science in the industrial design doctoral course and combine it with research training for PhD candidates.

Following the introduction, the second section of the article presents a brief overview of how Scandinavian design institutions treat design research and theory in PhD education. Section three describes the rationale, background and aims of the doctoral course PD 8300: "Topics in design research" at the Department of Product Design, Norwegian University of Science and Technology and thematizes specific challenges for PhD candidates in the design field. Section present the contents of part one of the course, while section five analyses benefits and challenges for the students. Conclusively, section six reflects on further possibilities to synthesize doctoral education in design disciplines.

Design education on the doctoral level: A brief overview

In his article 'Doctoral Education in Design, Problems and Prospects' Margolin draws attention to a core difficulty in current PhD education - the lack of common guidelines: "Today they (doctoral programs, M.K.) exist in many countries and more are on the way, despite the fact that the fundamental questions about what constitutes doctoral education and what it is for remain unresolved. Most new programs appear to be devised locally without reference to others elsewhere."[2] Margolin's assertion of the multiplicity of doctoral programs can partly be vindicated by referring to the 'hybrid' scientific character of design as a discipline between practice and theory and a resulting undecidedness to submit to basic or to applied research. Design is a per se normative, and design research is advantageous whenever it enables designers to make well-founded decisions. Moreover, design research has to draw on knowledge from many fields. It is not possible to find one coherent paradigm or an everlasting theory however if the most prominent approaches today can be classified within three representative areas, described below. In order to give the students an introduction to these areas, three authors were chosen who stand each for a paradigmatic theory, i.e. a theory that represents a paradigm, in design.

The epistemic flexibility of design theories is an advantage in some cases, but it also comes with challenges, especially if researchers are not aware of what kind of theories

they adopt. From a theory of science perspective, design has a rather small core of scientific "truths", and a rather wide area of "intruders" [3]. These intruders may be a threat to an established science. However, for design research they could provide an opportunity to learn from other disciplines and cumulate knowledge to advance design theory. Considering the arguments above, it also seems difficult to review the variety of doctoral design curricula in Europe, so the focus here is on Scandinavia (Denmark, Norway and Sweden) [4]. Considering the representative areas in design theory the reviewed courses were classified within three categories: problem solving oriented, engineering approaches (EA), societal and stakeholder oriented, hermeneutic approaches (HA), and research-by-design oriented, practitioner approaches (PA). Real teaching often employs mixed approaches and the categories serve to indicate tendencies rather than final curricula. Table 1 illustrates some examples of the review:

Table 1. Examples of PhD courses Scandinavia

Institution	Course title and Link [5]	Category
Lund University, Designs sciences (a)	Empirical research methods in user-centered design	PA
Oslo School of Architecture and Design (b)	PhD school with various subjects in design, urbanism and architecture	PA
Umeå Institute of Design (c)	Design Theory, The Process of Doing a PhD, From Lines to Designs, Roles in Early Design Process: Collaboration among industrial design, interaction design and service design	HA, PA
Chalmers University (d)	Doctoral programme: Human-Technology-Design	EA
Norwegian University of Science and Technology (e)	Design research, Interaction design, Sustainable design, Industrial systems design	HA, PA, EA
Centre for Innovation in Product Development, Technical University of Denmark (f)	**Strategic Foresight in Engineering, Sociotechnical Theory and Analytical Methods, Innovative processes and their staging**	EA, PA
Aalborg University (g)	Service Design in the public sector, Design vs. Management: epistemological perspective and practical experiments.	PA, HA

Background

The examples above confirm to a certain degree that a unified perspective in design research hardly exists and opinions vary on what theories should been taken up in doctoral design education. Common formal denominators in the different courses are

however the focus on basic theoretical knowledge and on research training how to write a PhD thesis.

The main objectives of the PhD course "Topics in Design research" are set up similarly - to provide insights in three leading theory paradigms in industrial design and to support the development of an individual research design for the candidates' topic of investigation. This includes the ability to understand which methods are appropriate for the particular work and why, and how to integrate them in the doctoral project. The first part of the course covers a theory of science introduction for designers, as well as a discussion and analysis of the three design theories. Further qualitative and quantitative methods such as protocol analysis, observations, interviews, activity theory, participatory design, and ethnographic methods etc. are presented. The second part gives an introduction on how to write papers for scientific journals and presents possibilities to design one's own dissertation related to choice of methods and practical information related to the PhD writing and submission process.

The objective of the first part of the course, to discuss design theory, relates to the rationale of an underlying disciplinary architecture of design as an academic field [6]. As illustrated in figure 1, a disciplinary architecture consists of:

- a statement or a system of statements e.g. articles, textbooks, journals etc. (I) about
- an object, a phenomenon or a class of objects/phenomena treated (II) with
- methods, models, instruments, calculations etc. (III) based on
- and basic ideas, assumptions, theories, principles or axioms (IV)

In this architecture, (I) statements about (II) something that is (III) represented, interpreted, modelled or manipulated by something (IV) in the light of something.

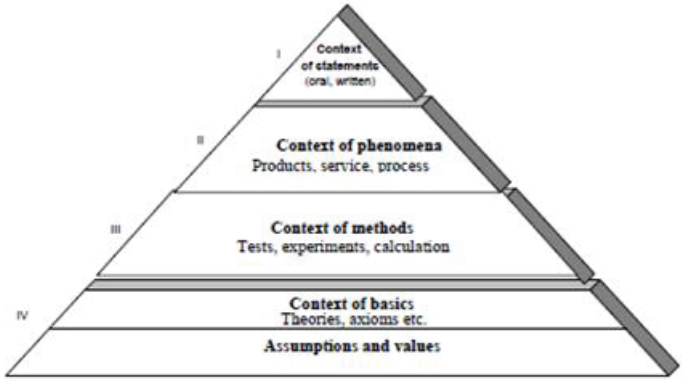

Figure 1.Disciplinary architecture

The disciplinary architecture represents a meta-model and in reality the contents from the layers merge. However, layer IV typically includes implicit assumptions and values which serve as "regulative ideas" in a Kantian sense [7]. Even if regulative ideas habitually remain tacit, they play an important role for organising thinking and governing decision-making. They are often merged with fundamental statements such

as “design is (-problem-solving, communication, reflection-in action etc.)”, “the tasks of the designer consists of” etc.

Instead of a mere content discussion of the three paradigmatic theories the course aimed also at tracing their implicit epistemological statements on level IV. In the disciplinary architecture, regulative ideas shape the theory one formulates, which in turn influences the choice of methods. It was thus a necessary follow-up in the course to continue with an appraisal of different methods in design.

The content of the course’s first part

If the need for design experts who can bring different disciplines together increases, e.g. the UK Design Council claims [8] that design educators have to raise the stakes for varied types of knowledge. Following this viewpoint it seems reasonable to improve reflection and analysis skills and thus the first part of the course took an onset in the architecture of the design discipline as described in Figure 1 to analyze three paradigmatic design theories.

The first theory was Herbert Simon's engineering-oriented, problem-solving approach, which implies two basic values: critical rationalism and (epistemological) pragmatism. The critical rationalist/positivist view stems from Popper’s theory of science and manifests itself e.g. in the assumption that knowledge about nature is ‘objective’, unconstrained by the development of the natural sciences. For Simon, design can e.g. mediate a “…body of intellectually though, analytic, partly formalizable, partly empirical, teachable doctrine about the (design, M.K.) process” [9]. In the ‘Science of the Artificial’, Simon asserts further that design has to solve ‘ill-structured problems’ and that time and money is often lacking. Because of time-money constrains, design processes are always concerned with “resource allocation” [10].

Pragmatist/instrumentalist is the belief that something is true if it works satisfactorily and that unpractical ideas have to be rejected. Simon’s theory of design as problem solving is centrally concerned with how people handle complexity by reducing the (design) problem and selecting a solution from a set of alternatives. Simon claims that a large part of design problems can be solved by heuristics belonging to bounded decision making [11].

Secondly, we analysed Donald Schön’s practice oriented theory, which has had significant impact on design – resulting in various training and education programmes. Two main values in Schön’s design theory are (ontological) pragmatism and pedagogy, originating respectively in Gadamer’s and Dewey’s philosophies. The first means that the *primary motivation* for human activities is always a practical need combined with a need to extend the field of human action. The second claims that education is a necessity and a pillar for the continuity of our culture heralding values such as critical thinking, profound expertise, lifelong and global learning, and accentuating how these values contribute to a fair society. Schön’s crucial argument is that lifelong-learning is possible (and desirable). It is expressed as a hermeneutic (self-reflexive) endeavour that connects existing professional experience with surprise, or even confusion within a situation which is uncertain or unique. This ‘reflection-in-action’ can (dialectically) contribute to a new understanding of the problem and change a situation. By becoming aware of former tacit frames, the practitioner sees now new links and relationships to the problem. Schön asserts that the cultivation of the capacity to reflect in action (while doing something) and on action (after having done it) as well as the ability to engage in a process of continuous learning is defining characteristics of professional practice.

Schön's theory is language centred and so is the third approach, discussed in the course, Krippendorff's theory. This theory is epistemologically based on weak social constructivism and the belief in interpretability of everything by language. Constructivism argues that humans generate knowledge and meaning from their experiences. Weak constructivism sees a relationship between the construction of knowledge from individual experiences and the acknowledgements of objective (universal) knowledge. Strong constructivism believes that *all facts we possess* are constructed or even stronger - that there is no independent reality and *all facts* are constructed [12]. Social constructivism believes that individual knowledge and social knowledge the same, which culminates in a shared knowledge concept and a "social construction of meaning" [13]. Krippendorff puts a lot of emphasis on what artifacts mean to the people affected by them (design semantics). For him, design: "…brings forth what would not come naturally (...); proposes realizable artifacts to others (...) must support the lives of ideally large communities (...) and must make sense to most, ideally to all who have a stake on them" [14]. This human-center, hermeneutic approach opens, among others, methodological possibilities for a discussion about relationships between professional designers and the network of stakeholders they cooperate and communicate with.

The discussion and analyses of the three texts were meant to contribute to increase the participants' understanding of implicit values and statements in design theories and teach them to be aware of the relationships between choices of theory and related methods and outcomes.

Part 2 of the PhD course was pragmatically oriented and had the objective to enable the candidate to put his/her own research activities in the context of design research. The candidate was also to become able to interpret and assess different approaches in design research in the context of his/her own research objectives. Further he/she should manage to define research questions, identify and use relevant literature and produce articles. Ideally, part 1 would contribute to make the candidate aware of their own underlying regulative ideas and values, identify them within a paradigmatic theory framework and select methods accordingly.

Analysis of the course

The discussion of the theories in part 1 made the students more conscious of their own possibilities to choose an approach for their studies, further on the consequences this choice has for the selection of methods and, to a certain degree, what types of results are achievable by choosing that theory/method. However, the theory part of the course posed a great deal of challenges. In design education exist few analytic traditions and argumentatively the candidates were rather limited to justify their positions. The students suggested that this seems to be a drawback of treating theory in the design field is as something foreign to practice or as an instrument that can be applied as a recipe without much understanding of underlying values or conjectures [15].

Further, they did not have a lot of background knowledge about the authors, the history and the context of the theories. Conclusively, most of the students were more or less able to locate their own work or some of its features within a theory and give reasons for their decision.

A positive aspect was their genuine interest in how such an analysis can be done and in the relationship between theory and methods. Students on this level understand

that these texts matter to them personally and their work and that is what makes theories interesting. Design theory is experienced as foreign yet attractive, and sometimes the students also showed indications that they thought themselves as not clever enough to understand these theories, especially when related to theory of science. The learning effect for the teacher was that theory analyses improve and expand professional knowledge and argumentation skills but doctoral students need "entry points" relating to their own work. Further, the students must be brought to a threshold which they have to pass to experience success. From my point of view it is best for doctoral students (in contrast to Master and Bachelor students) to begin with the most difficult challenge and ease tasks successively, since this creates a feeling of mastering the following assignments.

Difficulties in the second part of the course related mainly to the lack for practical training in writing and assessing scientific text. In design, students are less challenged to write texts than to develop models and produce solutions. So, basic steps as how to write an article- abstract and how to develop a PhD roadmap were discussed extensively in the course. On the other hand, the candidates' comments on part 2 were very positive (75% strongly agreed that it was a useful to exercise these steps). Despite the limitations of a 7,5 credit course, it seems helpful to separate both parts time- and effort wise and supplement each of them with exercises to train the candidates in scientific argumentation as well as in practical research work.

An additional issue is how far expertise in design theory should stretch into other disciplinary areas such as e.g. theory of science and how the gathered knowledge should be applied in a design PhD. Buchanan makes a relevant point here: "Those involved in de-sign research are easily drawn into research in other fields. Indeed, it is tempting to evaluate design research by its contributions to other fields. In design research, how-ever, the central challenge is to understand how designers may move into other fields for productive work and then return with results that bear on the problems of design practice."[16]

Challenges and possibilities for doctoral education in design

What kind of knowledge is important for today's design research? From the author's point of view doctoral curricula in design education cannot be universified or synthesized, but the debate on appropriate teaching methods could possibly continue parallel in at least two lines, which are equally relevant – one line follows the intellectual discourse on design theories, their epistemological heritage, development so far, their diversification in different design fields and their relation to other disciplines as well as their reflections to actual topics in the design field, society, culture art etc.

The other line, inspired by a didactic fiat to help (doctoral) students in design to engage with theory, can develop approaches that motivate them to understand and integrate theory into their practical work. This means moving beyond theory as something that is to be recited, and comprehend and relate it to designers' experiences, sensual and poietic (from gr. Poeisis - production) knowledge. Today, possibilities to engage in theoretical design questions are few in design curricula [17]. By the same time, students seem to be happy to find an identification platform for design as an academic discipline since this gives their profession greater credibility and status. In this credo, one student

formulated her detection of Lakatos in the following way: “Even if we have a small core of truths in our discipline, I know now at least that there exists one”.

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[4] The following brief overview is partly based on a search for PhD courses in design at: http://www.phdportal.eu/, accessed 3rd May 2012

[5] All links accessed 5th May 2012

(a) http://www.certec.lth.se/english/education/

(b) http://www.aho.no/en/RD/The-PhD-program/The-Research-education-at-AHO/

(c) http://www.dh.umu.se/education/phd-education/phd-courses.aspx

(d) http://www.chalmers.se/en/education/doctoral-programmes/graduate-schools/Pages/human-technology-design.aspx

(e) http://www.ntnu.edu/web/studies/courses

(f) http://www.design forskeruddannelse.dk/English/Activities/phdcourselist.aspx

(g) http://www.linkedin.com/groups/PhD-course-in-Service-Design-3993019.S.99550950, and http://www.design-forskeruddannelse.dk/English/Activities/phdcourselist/phdcourse.aspx?id=14

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Classroom Architect: Integrating Design Thinking and Math

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Abstract: Classroom Architect is a project-based curriculum that uses the principles of design thinking to review mathematical concepts, such as measurement, scale and area. The anchor task in this curriculum is to create a 3-D virtual model of the ideal classroom, based on the data the students collect. The curriculum uses design thinking as leverage to help students transfer classroom knowledge to real world problem-solving situations. Specifically, the students go through design thinking process -- user needs discovery, ideation, prototype and redesign. In each step of the process different mathematical concepts are reviewed and reinforced through their application to the task. The students will present their final prototype, justifying their design decisions, and mathematical calculations. Classroom Architect promotes an enduring understanding of key concepts of both design thinking and mathematics. It focuses on the learning of cognitive skills, such as problem solving, flexible thinking, making connections, representation of material in multiple ways, collaboration and application of mathematical concepts and skills to develop solutions. The curriculum is developed by applying Wiggins and McTighe's Backward Design method, with six design imperatives, (i) Knowledge Transfer and Application, (ii) Experiential Learning, (iii) Multiple Entries to Learning and Mastery, (iv) Scaffolds that Enable, (v) "Fit For Purpose" Assessment and (vi) Technology that Inspires Learning.

Keywords: Design curriculum, Design education for non-designers.

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Introduction

Relevance and Accountability for 21st Century Learning

In "Curriculum 21: Essential Education for a Changing World", Heidi Hayes Jacobs cautioned, "Curriculum should not only focus on the tools necessary to develop reasoned and logical construction of new knowledge in our various fields of study, but also should aggressively cultivate a culture that nurtures creativity in all our learners" (Hayes Jacobs, 2010, p. 17). In their work to improve classroom teaching, teachers therefore need to be bold advocates for helping students develop creative ideas that are actionable, rational and constructive.

Yet much of today's education system still focuses on guiding students toward finding the correct answers to fill-in-the blanks on standardized tests, as this kind of instruction facilitates streamlined assessments to measure success or failure. Van Dam (2003) states, "Many districts are so overwhelmed and concerned about the No Child Left Behind requirements and potential financial repercussions of not complying, that for lots of them the safest route is the 'back-to-basics' approach-focusing entirely on 20th century skills at the expense of 21st century ones." It is critical that the "banking" model of learning does not continue to prevail because in this concept of education the scope of action allowed to the students extends only as far as receiving, filing, and storing the deposits (Freire, 1993, p. 72).

In fact, a holistic, constructivist, child-centered approach to education does not end with shifts to a standardized, subject-specific, back-to-basics curriculum. These shifts represent changing priorities: relevance and accountability, and one way to increase relevance while maintaining accountability is to adopt an integrated approach (Drake, 2007). That is why through the implementation of a curriculum that integrate design thinking and math, "Classroom Architect: Integrating Design Thinking and Math" strives to help students develop a skill set that includes ideas generally not fostered within traditional school settings (see Figure 1 for framework and Figure 2 for Curriculum Summary). This skill set would produce an overall creative confidence in students by encouraging non-traditional problem solving skills and creative thinking. More importantly, through design thinking the curriculum hopes to engage students in new ways of thinking with which to deepen Mathematical understandings – beyond mere mastery of computational speed and proficiency. In fact, Kafai & Resnick (2002) and Todd (1999) suggest that design thinking skills are not merely extras, but can in fact aide students in core subject areas as well as building cognitive and social skills. It is therefore the aim of this curriculum product to explore and actualize the potential of Design Thinking in deepening mathematics learning in the classroom. The purpose of this article is to introduce this unique curriculum, and to share its design process and design imperatives with educators and design education researchers for constructive feedback.

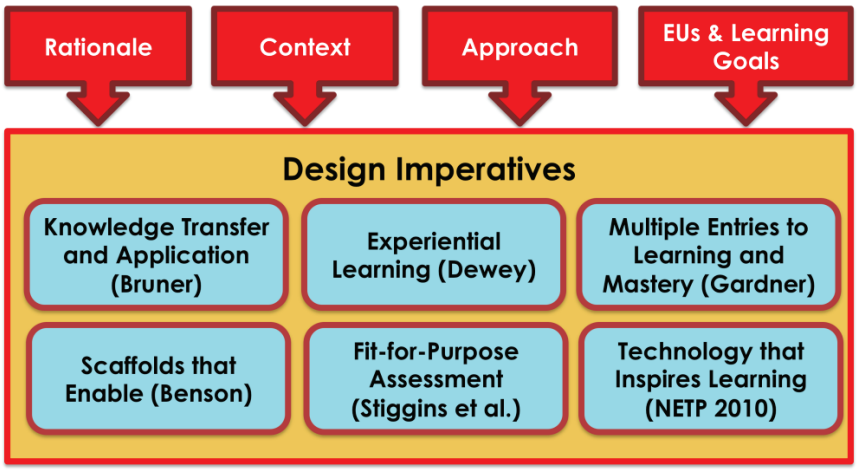

Figure 1. Curriculum Framework for Classroom Architect

Rationale / Context

Curriculum for 21st Century Learning

- Develop 21st Century Skills
- Deepen understanding of academic content knowledge through real-world application

The School

- School's philosophy: "Every Child is a Learner" -- to engage in standards-based skills and inquiry learning, solving real-world problems.
- Twenty-nine 5th graders
- All students on either free or reduced lunch
- 17 students classified English Language Learners (ELLs).

Approach

Integrating Design Thinking and Math

- Solving Design Challenge using Design Thinking Process adapted from Stanford d.School.
- Review of Math concepts taught.

EUs and Learning Goals

Students will understand that:

- Good design solutions serve the needs of their users.
- Ratios, proportions and scale factors are used to solve problems encountered in everyday life.
- Area is used to represent the size of a two-dimensional space.

Learning Goals

- To help students see connections between what they learn in math and problem solving in the real world through design thinking.
- To review already taught standards in Math.

Design Imperatives

Knowledge Transfer and Application (Bruner)
Experiential Learning (Dewey)
Multiple Entries to Learning and Mastery (Gardner)
Scaffolds that Enable (Benson)
Fit-for-Purpose Assessment (Stiggins et al.)

<table>
<tr><td colspan="2">Technology that Inspires Learning (National Education Technology Plan 2010)</td></tr>
<tr><th>Lesson Components</th><th>Assessment</th></tr>
<tr><td>User Needs: Students interview their fellow students and the teacher to assess what they need in a classroom setup.</td><td rowspan="2">Assessment for learning:
Teacher feedback and monitoring of student progress (Catch Up Days)
Group Process Portfolio
Individual Design Journals</td></tr>
<tr><td>Ideation: Students take basic measurements of the room and furniture and brainstorm many redesign ideas.</td></tr>
<tr><td>Prototype: Students use their Blueprint to rearrange classroom and add furniture.</td><td rowspan="2">Assessment of learning:
Final Prototype presented during Expo
Final Group Process Portfolio
Final Individual Design Journals</td></tr>
<tr><td>Redesign: Students get feedback on their Blueprint and redesign to create their final Prototype (3D virtual model)</td></tr>
<tr><th colspan="2">EXPO and Celebration</th></tr>
<tr><td colspan="2">Peer Assessment Using Rubrics
A celebration of student success</td></tr>
</table>

Figure 2. Curriculum Summary for Classroom Architect

Overview

For students, the classroom is a place for learning, an environment dedicated to promoting feelings of well-being and motivation to learn and focus. In fact, the classroom space offers both fertile ground and topic for students to bring creative thoughts to the process. Dunn and Burke (2009) stated the need for teachers to be taught how to redesign their classrooms so that all students will be provided the necessary space that complements their environmental learning style preferences. By altering the classroom some students will be given the opportunity to work in formal areas – desks, chairs, and tables; other students will choose informal areas – couches, rugs, soft chairs. Within the areas of every classroom, adaptations can be made for sound preferences, lighting needs, and temperature controls.

In "Classroom Architect: Integrating Design Thinking and Math", the curriculum puts the students in that role instead. The classroom is a space for them to move around, a space for identity, a space for community-building and a space with working areas that fit the individual student. This experience would present them opportunities for greater ownership and motivation as learners.

Classroom Architect is a project-based curriculum that uses the principles of design thinking to review mathematical concepts, such as measurement, scale and area. The anchor task in this curriculum is for the students to each create a 3-D virtual model of their ideal classroom, based on the data they collected as a group. In this curriculum, the design thinking process the students go through is a simplified form (see Figure 3) of the approach developed by Stanford University's d.school (refer to Figure 4). In this adaptation, the steps have been renamed while ensuring high fidelity to the key stages of the design thinking process. The changes are necessary because the language of the design thinking process becomes the language of communication and self-reflection as well. By simplifying the steps and renaming them to align with the key concepts of "user needs", "ideation", "prototype" and redesign" it would help these ideas stick and

help the students experience greater success with the process of redesigning their classroom. The four steps are as follow:

- Step 1: User Needs Discovery
  Students interview fellow students and the teacher to assess what they need in a classroom setup.
- Step 2: Ideation
  Students take basic measurements of the room and furniture and brainstorm many redesign ideas.
- Step 3: Prototype
  Students create their first 2-D blueprint of their classroom design.
- Step 4: Redesign
  Students get feedback on the 3-D Virtual Model and create a final prototype of their classroom design.

In each step of the process different mathematical concepts are reviewed and reinforced through their application to the task. At the end, students will present their final prototype to the class, justifying their design decisions, and mathematical calculations.

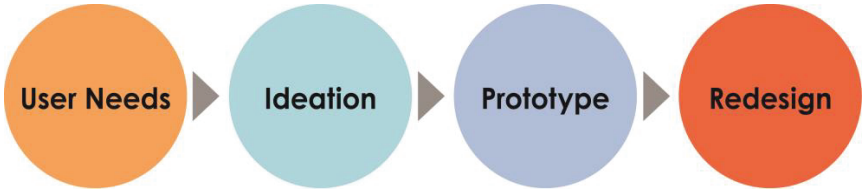

Figure 3. Design Thinking Process adapted from Stanford d.school's approach

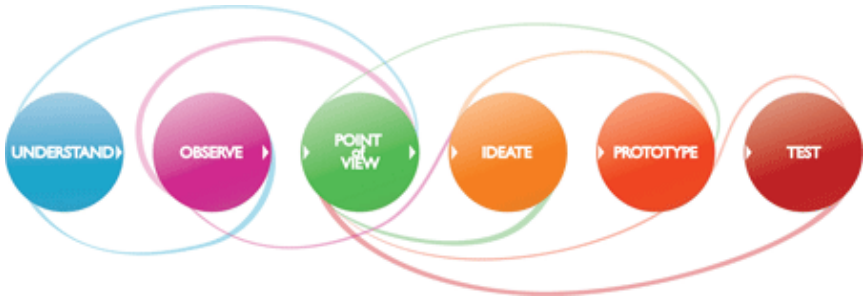

Figure 4. Stanford d.school's Design Thinking process (from: www.designthinkingblog.com/wp-content/uploads/2009/10/Design-thinking-process.png)

Information about the Site

ABOUT THE SCHOOL

The chosen site is a school in Southern California. The school's philosophy of "Every Child is a Learner" drives their commitment to developing instruction that provides students opportunities to engage in standards-based skills and inquiry learning, grappling with real-world problems, and seeking answers to their own questions. The

school's overall approach to learning and teaching is driven by the following imperatives:

- A standards-based curriculum, best strategies, and differentiated instruction enable students to develop analytical and critical thinking skills.
- Learning and communicating through different modalities, and working individually and in groups, enables every student to learn.
- Mastering and developing knowledge in all subject areas prepares students for higher learning.
- Students learn to Make Good Choices about their learning in a positive school community.

About the Students

The project team has chosen to develop a curriculum for the school's 5th Graders, aged 10 to 11. There are 29 students (13 males, 16 females; 17 Hispanics, 3 Pacific Islanders, 8 African Americans, and 1 white). Seventeen students are classified English Language Learners. This is quite a varied class where students come with different learning abilities, styles and interests. Helping all students succeed in their learning is therefore an enormous challenge that requires innovative thinking. Therefore, instead of simply "teaching to the middle" by providing a single avenue for learning in the classroom setting, their teacher splits the class into two heterogeneous groups to be taught by two different teachers. Every Tuesday, both teachers would teach math to the whole class together.

Another key point of consideration is that many of these students are struggling math learners. These children have experienced little success with math and it is the goal of this curriculum to help them build confidence in learning the subject by using math to solve real-world problems – this potentially circumvents the problem of them encountering repeated failure and pressure of getting their answers right when solving math problems. In fact, Huinker (1998) makes the case for contextual problems and for letting students develop their own methods of computation with math. According to him, this allows students to have a firm understanding of math concepts – not computational algorithms that can rapidly become superficial.

Also using design thinking as a scaffold allows the English Language Learners to construct their own meaning of abstract math concepts without fear of judgment while they are actively applying math skills and knowledge through the trial and error process of design. Bruner has highlighted that notions of mathematical concepts can be made accessible to children of seven to ten years of age, "provided that they are divorced from their mathematical expression and studied through materials that the child can handle himself" (Bruner, 1960, p.43). Moschkovich (1999) also asserts that mathematical discourse is more than vocabulary and technical terms. That is why in Classroom Architect, it is encouraged for the teachers to let the children use their own terms of mathematical understanding to engage in collaborative problem-solving work, thus bringing them into a level playing field with their classmates.

About the Teacher

The teacher of chosen site is an educator who brings enthusiasm and a passion for teaching to her class every day. Being trained in the Design Thinking approach at the Stanford University d.school, she is excited about using the learning model to design challenging curriculum to deepen learning and empower her learners as change agents. The teacher does not expect that the themes will directly transfer until she explicitly

teaches and links them to content and context. Through this curriculum the teacher would have the opportunity to integrate the processes of Design Thinking into academic content curriculum while working to achieve state standards.

Curriculum Objectives

The curriculum is designed to promote an enduring understanding of key concepts of both Design Thinking and mathematics. It focuses on the learning of cognitive skills, such as problem solving, flexible thinking, making connections, representation of material in multiple ways, collaboration and application of mathematical concepts and skills to develop solutions. To help students arrive at these outcomes, the curriculum is developed with Wiggins and McTighe's Backward Design method (refer to Figure 5). The approach presented a helpful way to think about what understandings the curriculum want the students to gain, how to design for them, and how to find evidence of these understandings in student work (refer to Figure 6 for the overall curriculum schedule and lessons. For more detailed lesson plans and learning materials contact the authors).

Stage 1: Desired Results	
Established Goals	**Standards**
To help students see connections between what they learn in math and problem solving in the real world through design thinking.	Listed in individual lesson plans. The curriculum is designed to review already taught standards.
What overarching understandings are desired?	**What are the overarching "essential" questions?**
Students will understand that: 1. Good design solutions serve the needs of their users 2. Ratios, proportions and scale factors are used to solve problems encountered in everyday life. 3. Area is used to represent the size of a two-dimensional space	1. Why do some design solutions work and others don't? What makes a design solution a good one? 2. How can ratios, proportions and scales be used to solve problems in everyday life? 3. How can the size of two differently shaped physical spaces be compared using the concept of area?
Students will know… 1. Design thinking process: stages that they go through in developing their solution 2. Mathematical knowledge: • Scale factors (ratios) are used to create scale drawings. • Area is used to compare the sizes of different two dimensional spaces	Students will be able to… 1. Use information-gathering skills like research and interviewing to find out what their users need 2. Test their ideas using prototyping and refine their ideas with the feedback provided 3. Develop skills with ratios, scale, and area and apply them in the redesigning the classroom project 4. Use ratios to express scale
Stage 2: Assessment Evidence	

Performance Task	Other evidence…
Culminating Performance: • In your teams, your task is to redesign the classroom to best meet the needs of everybody who uses it. What would it look like? • Who uses your classroom? How do you know that your solution would create better learning environment? • Present your solution to your class. Convince them that your solution is the one to be implemented.	Formative Assessment: • Individual Design Journals • Group Process Folder: o Interview Questions/Notes o User Needs List o Measurement Chart o Original Blueprint o Ideation List Summative Assessment: • Final Presentation • Final Prototype 3D Model • First Prototype 2D Blueprint Observations of group processes (meetings etc.) and dialogue with student groups

Figure 5. Development of Classroom Architect Curriculum Using Backward Design

Week 1 - Discovering User Needs and Current Classroom Model:

Interview and User Needs
- Day 1: Classroom Architect Project Design Launch (1hr 30mins)
- Day 2: Interviewing to identify User Needs (1hr 30mins)

Current Classroom Blueprint
- Day 3: Room Measurements (1hr)
- Day 4: Scaled Classroom Representation (1hr 30mins)
- Day 5: Conference & Catch Up Day (1hr 30mins)

Week 2 - Ideation and Prototype:

Ideation & Software Introduction
- Day 1: Ideation (1hr 30mins)
- Day 2: Narrow Down Ideas & Software Introduction (1hr 30mins)

Virtual Prototype
- Day 3: Work on Prototype (1hr)
- Day 4: Work on Prototype & Virtual User Test (1hr 30mins)
- Day 5: Conference & Catch up Day (1hr 30mins)

Week 3 – Expo:

Expo
- Day 1: Expo Preparation & Prototype Completion (1hr 30mins)
- Day 2: Expo, Ballot & Celebration (1hr 30mins)

Figure 6. Overall curriculum schedule and lessons

Integrating Design Thinking and Math Learning

This curriculum uses design thinking as leverage to help students transfer classroom knowledge to problem-solving situations in the real world. In most math curricula mathematical concepts are taught in isolation and as a result students do not view math as an integrated whole – and thus they do not understand its relevance and importance. According to Van de Wall (2001), mathematical ideas are "important" if

they are useful in the development of other ideas, link ideas one to the other, or serve to illustrate the discipline of mathematics as a human endeavor. In the classroom, a strict algorithmic focus on teaching and learning math has unfortunately undermined the real enduring understanding the students to get out of studying math. Algorithmic procedures are helpful in conducting routine tasks easily but the most skillful use of a procedure will not help develop conceptual knowledge that is related to that procedure (Hiebert, 1990). Doing endless multiplication exercises will not help a child understand what multiplication means and what it is used for. In the real world, mathematicians are concerned less with algorithmic memorization and computation, but more with creative problem solving.

This is where the design process can come into play. Design Thinking is an approach to learning that focuses on developing children's creative confidence through hands-on projects that focus on empathy, promoting a bias toward action, encouraging ideation and fostering active problem-solving (Carroll et al., 2010). It fosters iterative problem solving and solution generation, making it relevant to projects in academic subjects while adding an inventive imperative highly consistent with 21st century skill sets[1].

In fact, design thinking can provide powerful tool to help students learn mathematics with understanding. With design thinking embedded in the mathematics curriculum, students are required to evaluate their own ideas and ideas of others, are encouraged to make mathematical conjectures and test them and develop their reasoning skills. More importantly, the notions of mathematical concepts can be made more accessible to English language Learners because in a design project these concepts are "divorced from their mathematical expression and studied through materials that the child can handle himself" (Bruner, 1960, p.43).

Moreover the design thinking process moves beyond problem solving and project-based work by including a human-centered approach. With a focus on addressing user needs, learning therefore becomes an active endeavor of students that takes place in an environment that stresses problem-solving, reasoning, and thoughtful interaction among students.

Curriculum Design Imperatives

i. Knowledge Transfer and Application

According to Bruner, in The Process of Education (1960), the best way to create interest in a subject is to render it worth knowing, which means to make the knowledge gained usable in one's thinking beyond the situation in which the learning has occurred" (p. 31).

The Design Thinking model of learning can provide learners the platform to apply knowledge and concepts and enable teachers to go beyond the standard ordinary didactic teaching approaches towards more engaged learning. This curriculum explores how to bridge the gap between the theoretical and reality. Through Design Thinking, the curriculum attempts to make concepts learned in the classroom relevant to the real world and provides opportunities to apply the knowledge and skills acquired on solving real-world problems. The clarity of such reality-based links is also more likely to drive greater engagement in learning. That is why this curriculum focuses on an authentic

[1] These include innovation, creativity, critical thinking, problem solving, communication, and collaboration skills (Partnership for 21st Century Skills, 2009).

challenge that drives students to explore the core concepts and principles of Math[2] in a familiar classroom setting. The design challenge requires the children to explain and defend their solutions and in so doing can have a positive effect on how they view mathematics and their own mathematical abilities. Justification of responses mathematically forces students to think reflectively and eliminates guessing or responses based on rote learning.

Next, Moschkovich (1999) highlights that it is important for the teacher to model consistent norms for discussion but it is more important for the teacher to "revoice" student contributions, building on what they say and probing what they mean. That is why in addition to the design thinking process and authentic project task, the curriculum strongly encourage the teachers not to enforce a strict regimen of using accurate mathematical language throughout the redesign process.

ii. Experiential Learning

This curriculum takes an approach that places the students in the active role of design thinkers. According to Dewey (1938), education needs to be based upon the experiences and the interests of the student. More importantly on the quality of experience that is educative for them. This curriculum is inspired by his ideas that "every experience is a moving force" (p. 38), and that "every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after" (p. 27). In this curriculum, the students are provided with a deeper experience of the content, concept and issues they have learned through experiential learning. This will enable the students to be exposed to issues, simulations, concepts and theories in a way that they have never been exposed to before. It will help students to move from just knowing facts to understanding and appreciating them – the curriculum also tries to ease and facilitate this process by trying to capture students' prior experience and to build upon it in order to propel them to learn more in and out of the classroom. By engaging students actively in the role of design thinkers, this curriculum hopes to make the experience meet their internal needs, interests or goals.

iii. Multiple Entries to Learning and Mastery

To celebrate a culture of innovation and motivate the development of diverse talents, this curriculum takes an approach that also seeks multiple entry points for understanding of the students to take place. According to Gardner (1999):

> [I]ndividuals possess different kinds of minds, featuring different blends of mental representations. People will, consequently, approach and master curricular materials in quite idiosyncratic ways…. [The] approach weds the theory of multiple intelligences to the goal of enhanced performances of understanding" (p.133)

This vision for teaching and learning in the 21st century reflects a curriculum of processes that serve as the leverage for learning academic content. It is a curriculum that provides the learners the opportunity to engage with a situation of dilemma and

[2] In each lesson plan for Classroom Architect, key math concepts according to K-12 California's Common Core Content Standards for Mathematics (from: http://www.scoe.net/castandards/agenda/2010/math_ccs_recommendations.pdf) are identified. For example, in a lesson where students need to measure the classroom, their ability to accurately read a ruler and to what amount (e.g. in ½ and ¼ inch) is monitored. Also when they each need to draw a blueprint, understanding of scale and unit conversion skills are required.

thus allowing them to tap into different intelligences – logical-mathematical, linguistic, spatial, interpersonal and intrapersonal – and bring to fore the multitude of dispositions and strengths needed to develop innovative and effective solutions that meet the real needs of their users.

iv. Scaffolds that Enable

A key feature of Classroom Architect is that it is structured around helping the teacher to scaffold support for the learners so that the responsibility of learning would reside increasingly with the learner – which is in line with the school's vision. More importantly, scaffolding helps to build upon what the students already know to help them navigate the challenges that come with the new project task. In fact, if scaffolding is properly administered, it will act as an enabler, not as a disabler (Benson, 1997). To ensure success with instructional scaffolding, Lange (2002) identified two major steps: first, development of instructional plans to lead the students from what they already know to a deep understanding of new material and secondly, execution of the plans, wherein the instructor provides support to the students at every step of the learning process. That is why the lessons in this curriculum always include the teacher modelling a familiar task or concept that the student is still not confident to grasp independently before letting the children handle the tasks independently.

v. "Fit For Purpose" Assessment

In Understanding by Design, Wiggins and McTighe explain how curriculum and instruction promote higher order learning and deep understanding through a systematic approach to curriculum development beginning with identifying the course objective and then developing appropriate assessment matched to the objective. In fact, in developing the assessment modes and rubrics, this curriculum is mindful that they must be "fit for purpose". Indeed, in Assessment Manifesto: A Call for the Development of Balance Assessment Systems, Stiggins (2008) asserts that to yield dependable results, regardless of the context of their use, assessments must meet these standards of quality: They must be designed to serve a specific predetermined purpose, arise from a specific predetermined definition of achievement success, be designed specifically to fit into each particular purpose and target context, and communicate their results effectively.

The culminating performance of this curriculum is a class expo. It is believed that the students will feel a greater sense of ownership of what they create and will try harder to make it as good as possible because it will be seen by a larger audience. They learn to take responsibility for evaluating their own efforts rather than waiting for the teacher to pass judgment on them.

However, this curriculum also takes an approach that assessment should be an on-going process where students receive timely feedback so tat they can make continuous improvement toward the achievement of high standards and desired learning outcomes.

Critical checkpoints will be identified throughout this process. The curriculum encourages the power of learner autonomy and proposes that the students' performance and design thinking mind-sets be assessed through self-and-peer assessments. However an accurate assessment of content understanding should still be carried out by the teacher and thus it will continue to be a role of the teacher to monitor the students' learning and provide just-in-time feedback to move the students toward the acquisition of enduring Math ideas and skills on which the curriculum

focuses. That is why every Friday is reserved as Catch Up day where teams can work with each other and the teachers to work towards greater progress and gain assurance that they are on the right track.

vi. Technology that Inspires Learning

The model of 21st century learning calls for engaging and empowering learning experiences for all learners. As educators, it is necessary to bring state-of-the art technology into learning to enable, motivate, and inspire all students, regardless of background, languages, or disabilities, to achieve.

The National Education Technology Plan 2010 released by the US Department of Education has challenged the education system to leverage the learning sciences and modern technology to create engaging, relevant, and personalized learning experiences for all learners that mirror students' daily lives and the reality of their futures.

Against a backdrop where standards-based competencies still form the basis of what all students should learn, it is hopeful that technology is a powerful tool that provides students greater options for engaging in learning and inspires higher levels of motivation and achievement. In this curriculum, therefore an online freeware Sweet Home 3-D is included to facilitate their articulation and expression of ideas and, more importantly, collect evidence of their knowledge and problem solving abilities as they work.

Assessment Framework

The assessment in this curriculum aims to provide both the students and teachers an indicator of whether the students have achieved the expected learning outcomes. During the two and a half weeks, the students have to demonstrate their ability, individually and as a group, by applying the knowledge of both design thinking and math to develop the project task.

i. Areas Assessed

Students are expected to demonstrate the ability to generate, develop and evaluate ideas and information so as to apply both design thinking skills and mathematical knowledge as they develop their project task of redesigning their classroom. They will be assessed in the following areas:

(i) Identification of user needs
(ii) Development of ideas and solutions to meet these user needs
(iii) Application of Mathematical concepts

ii. Means of Assessment

Students will be assessed on their performance both as members of their group and as individuals. Assessment is made of students carrying out the project and of the final products delivered. The performance of individual students and that of groups is assessed through the following means:

- Group process folder
- Blueprint
- 3-D Virtual Model

iii. Communicating about Student Learning

In this curriculum, one key consideration is that the assessment information should motivate students to put in efforts and do better – even after the project. It is accepted that assessments with grades assigned usually have strong motivational effects and any work which has no score figured into the final grade may not encourage students to invest time and efforts. In "Classroom Assessment for Student Learning: Doing It Right – Using It Well", Stiggins et al (2006) assert that "this system of motivation does not work well for all students; most noticeably it does not work for students who are performing marginally or those who are failing." In fact the group of assessment experts advocate reducing evaluative feedback and increasing descriptive feedback to affect motivation and achievement.

This means that there must be strong principles of assessment for learning put in practice to develop an internal sense of motivation in students. The assessment this curriculum adopts is therefore criterion-based to help students keep improving with the availability of frequent feedback from peers and teachers to attain the desired level of achievement. As a result of this process, students would have clearer and reinforced learning targets, constantly receive feedback about where they are in relation to the targets, and are able to make changes to reach higher levels.

iv. Assessment Rubrics

In Classroom Architect, a set of assessment rubrics for both students and teachers is provided as an authentic assessment tool to help students make progress and measure their final work (see Figure 7 and 8). These rubrics would be handed out at the beginning and highlighted at appropriate checkpoints to get students to think about the criteria on which their work will be judged.

Classroom Architect would provide them a new assessment experience where they can be acclimatized to receiving descriptive feedback rather than evaluative feedback. For a project-based and process-oriented task, this also helps the teacher provide a picture of learning that is more accurate and more meaningful. Again Stiggins et al (2006) emphasize that if the objective is to communicate thoroughly about student achievement then the educators should not simply convert rubric scores to letter grades. Rather, they recommend that teachers communicate using the points on the rubric – indeed the description of the performance allows us to provide more clear and focused feedback. More importantly, it is unauthentic to combine the scores for the different categories of user needs and application of mathematical concepts into a single score or grade. If the curriculum was to treat the students like real-word designers, helping them understand the areas of improvement is more critical than helping them make sense of a final score. "Stigmatizing" them by labeling their work with a score does not help them focus on bettering themselves but may instead make them rank their work in comparison with the achievement of others – just like any other math assignment or test they have always had.

Davies (2009) believes it is important to involve students in the assessment process. When students are involved in the classroom assessment process, they are more engaged and motivated, and they learn more. One way of involving students in the process is to allow them to co-construct criteria that will be measured in assessments. That is why in the assessment rubric the teachers and students work out the criteria for "Creativity and Design" largely because this is an area where student input could potentially spur them to deliver their best for the final prototype. It is also a category where criteria could be more easily developed.

Finally every student will receive a Personal Design Journal as a way of encouraging them to share (orally and in writing) with both the teacher and fellow students their thoughts and learning, and assist them in becoming reflective learners. It also provides the teacher with information on what each student has learned and what each student has difficulties learning. In addition, they can see their progress over time because they have a tangible record of their learning.

Group Assessment (Group Process Portfolio and Blueprint)

		Novice (1)	**Intermediate (2)**	**Expert (3)**
User Needs	**Group Process Portfolio**	Shows limited understanding of users' needs with little/no explanation.	Shows understanding of users' needs with links to interview responses.	Shows deep understanding of user's needs by demonstrating how a more generalizable user need fits with their interview responses.
	Blueprint Prototype	Creates a prototype that demonstrates limited evidence of testing and limited understanding of user needs.	Creates a prototype that demonstrates understanding of user needs, tests specific aspects of their idea and leads to further iteration.	Creates a prototype that demonstrates clear understanding of user needs, tests for constructive feedback and leads to further iteration and deeper understanding of the user.
Application of Mathematical Concepts	**Group Process Portfolio**	The group process portfolio addresses none of the mathematical components presented in the task.	The group process portfolio addresses some but not all of the mathematical components presented in the task.	The group process portfolio puts to effective use the underlying mathematical concepts upon which the task is designed.
	Blueprint Prototype	The prototype addresses none of the mathematical components presented in the task.	The prototype addresses some but not all of the mathematical components presented in the task.	The prototype puts to effective use the underlying mathematical concepts upon which the task is designed.

Figure 7. Group Assessment Rubrics

Individual Assessment (3D Virtual Prototype)

	Novice (1)	Intermediate (2)	Expert (3)
User Needs	Creates a prototype that demonstrates limited evidence of testing and limited understanding of user needs.	Creates a prototype that demonstrates understanding of user needs, tests specific aspects of their idea and leads to further iteration.	Creates a prototype that demonstrates clear understanding of user needs, tests for constructive feedback and leads to further iteration and deeper understanding of the user.
Application of Mathematical Concepts	The prototype addresses none of the mathematical components presented in the task.	The prototype addresses some but not all of the mathematical components presented in the task.	The prototype puts to effective use the underlying mathematical concepts upon which the task is designed.

Figure 8. Individual Assessment Rubrics

Discussion

Classroom Architect has been developed in the hope of achieving goal of disseminating design thinking among young students. Also to deepen understanding of mathematical concepts by applying them to real world problems by ways of solving design problems. The curriculum has been developed with keen interest in the actual students and the teacher who would conduct the curriculum in the belief that the genuine understanding of the audience would render it with authenticity and effectiveness. However, the curriculum has been designed with philosophy and imperatives that is universal so that it could be adapted in broader circumstances.

The next steps for the Classroom Architect would be to gather data from actual use in the classrooms to test its feasibility and to further improvements, also to try fusing design thinking with other classroom subjects.

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Rethinking pedagogy for iterative design process learning and teaching

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Abstract: *Product Design as an academic discipline is a relative newcomer to higher education. As a result it has had to adapt to the teaching practices and organisation already in place in Universities. However, with the viability of the current business model of higher education under threat from economic pressures, the dominance of established practice could conceivably be challenged, suggesting the time is right for a review of Product Design education as it operates within academia. Product Design educators need to focus on developing an innovative, practical approach to the organisation of learning based on sound design practice-based principles and provide leadership in pedagogy rather than adapting to the pedagogy of others. Design is a unique discipline that can impact on other disciplines as it is necessarily predicated on ideas of leadership and innovation. The role of Product Design in higher education should not deviate from that. Product Design has a real world heritage that is characterised by realistic, considered, innovative thinking. This paper is a reflective opinion piece, suggesting how that thinking could be applied to redress an imbalance in teaching design process to facilitate a more real world experience for the benefit of students and confidence in the discipline as a whole.*

Keywords: Learning spaces, workshop, computer-aided design, integration, pedagogy.

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Introduction

Over the last twenty-five years, Product Design education has graduated from professional training into a recognised academic subject in higher education, but there has been a cost. Design has had to be manipulated to fit with conventions of higher education teaching across traditional disciplines. Project work has been increasingly divided down to fit into a modularised method of teaching whilst design research has skewed from practice-based research towards the study of the ontology of design.

Design, as an applied subject, has its own particular approaches and ideas that underpin professional practice as well as design research, and inform teaching. These approaches and ideas are not common with other disciplines, differentiating it from more established areas of study and research in Universities. However, the pressures to conform to the structure and teaching organisation of these established academic disciplines, and of trying so hard to be taken seriously as a research discipline, have altered the focus and pedagogy of Product Design teaching to the point where it is in danger of losing its identity, as highlighted by Crisp (Crisp: 2011) and argued by Loy (Loy: 2012).

Until recently, this trend looked set to continue with discipline academics advocating the distancing of design from its professional roots to gain acceptance in the more elite higher education establishments, such as the G8 in Australia, but then economic factors intervened. The downturn in the economy in the Western world has re-ignited the need for innovative, effective design professionals to contribute to a manufacturing-based economic drive to move Europe and America out of the recession (for example, Obama investing in additive manufacturing in Ohio as widely reported, for example in Science Magazine in 2012 and the UK government identifying growth in the manufacturing sector as vital for recovery, as discussed in BDO, UK in 2012). Combined with this, has been the uncapping of places in University systems and increased competition to attract students now paying substantially for their education in countries such as the UK and Australia. As a result, graduate destinations are gaining in importance again, in comparison to recent years, and the ability of graduates to work effectively in manufacturing, particularly with new technologies and global markets, is having an impact on the direction of discipline thinking, both in research and teaching.

Overall, it is a good time for a rethink for the discipline. Time to pause in the relentless pursuit of acceptance and conformity in the University education system, and step back from the imposed methods and philosophies of teaching practice that Product Design lecturers have found themselves subject to. Time to re-evaluate the knowledge base of the discipline, the learning priorities for future designers and how these can be best achieved, irrespective of how teaching is organised at the moment in other disciplines. With a strong reiteration of the values and principles of Product Design as a base, approaches to design teaching can be redefined to support the subject, not merely to conform to established practices in higher education teaching, but to lead the way to new practices in learning and teaching in higher education instead of following those that are already in place.

Redesigning Design teaching

Product Design (defined here as the study of problem solving with a focus on production) is a unique discipline. Its challenge is to combine two opposites – art and engineering – and to work with a constantly shifting viewpoint. Successful designers move between creativity and process effortlessly, without allowing one or the other to dominate, throughout every stage of a project. It is recognised in Product Design teaching research that immersive, experiential learning workshops allow the students to emulate this approach and develop strategies for left brain, right brain shifts in thinking whilst mapping, planning and applying problem solving techniques to complex situations. However, this approach does not lend itself to the modular organisation of learning in current, conventional University teaching. Units or courses in a structured undergraduate program taught week-by-week and organised into teaching sessions, subdivided into lectures and tutorials, are the dominant paradigm. Immersive workshops rarely fit. In trying to create a conventional academic discipline out of Product Design, there is a danger of it losing the rigour and integrity of its characteristic project based, client focussed approach.

What if designers were given the rethinking of the teaching of Product Design as a design task? What would be the outcome of initial research? How would the return brief differ for the basic redesign of Product Design University teaching? What would the design intent look like?

The key to effective Product Design teaching is to provide learning opportunities that encourage an iterative design process that moves the student between the objective and subjective, the practical and the theoretical, the imaginative and the critical throughout their work and does not create artificial divides or impose a linear process.

The divisions that generally exist in Product Design education now, are in part due to the convention of allocating specialist-teaching areas along units, rather than across them, with single lecturers responsible for teaching an entire, isolated course within a semester and rarely across courses. By dividing teaching in this way, discipline specialists are inevitably inclined to detach their own teaching focus from the holistic nature of design that is at its core. This can create an imbalance in the design learning experience and allows for specialist areas to develop in ways that are divorced from an applied design thinking approach.

In the drive to understand and pin down design process, both for teaching and for research purposes, there is a danger that the holistic, iterative nature of design practice is reduced to a didactic systematic methodology approach. In addition, by dividing out skills, theory and design studio there is a fragmentation of design process that is difficult for the student to recover from.

Even within a design project based module there is a problem with instilling iterative practice if it is a single course stream within a program as it has little opportunity to build the depth of thinking and iterative research and development needed to give the project experience credibility. Tornado thinking, where a repeated cycle of primary and secondary research, creative thinking and critical evaluation informs design development, moving it towards a conclusion, is based on all aspects of design practice being applied throughout the project, not consecutively but concurrently. To promote this thinking over an entire program, there needs to be a greater awareness of the role of year co-ordinators, stream co-ordinators (who track the revisiting, progression and accumulation of ides and skills vertically through the

degree program), the rethinking of the allocation for specialists to ensure that their expertise is spread across units, rather than delivered in isolation along units of work (a move that also supports research specialisation), the reinforcement of assessment practices that embrace failure as a teaching tool for experimentation (Kelley, Littman, Peter. 2001) and the changing of physical spaces to support positive working practices.

If the basis of inculcating a rigorous, iterative practice is to ensure a holistic approach to project work, then the combining of theory and practice seamlessly to inform thinking is essential in facilitating that combining of opposites – art and engineering – and a constantly shifting viewpoint. To promote the successful movement of designers between creative thinking and practical and research based processes repeatedly throughout the entire project, rather than in lineal stages, means a breaking down of compartmentalised teaching, and a refocus on genuine iterative cycling through 2D and 3D, practical experimentation, lateral thinking and research based informed reasoning all the way through.

Proposed design intent as the basis for the redesign of the University teaching of Product Design:

What – Create situations that enable – ensure - integrated teaching, re-imagine course organisation to promote an iterative, creative, practical, and theoretically informed design process. Create a culture of making based on experimentation throughout project work, break down barriers to integrated learning through making, break down learning silos such as CAD teaching, integrating it into design studio rather than teaching it as a separate set of units.

Why – The basis for Product Design education is to create a constantly shifting viewpoint, an ability to think creatively throughout a project (not just at the beginning), to map and use whatever tools are the best to move a project forward and test its validity (at every stage), to research practically in 3D and using secondary research to inform design development throughout the full distance of the design project – at every stage in every possible way.

How – Reorganise teaching by specialists across courses rather than along them. Facilitate team teaching and the provision of lecturing staff in the role of consultative expert for the students at every stage of a design project, irrespective of a unit structure. Rethink the curriculum to work across specialist areas, not along them. Rethink learning spaces to encourage working across specialist areas for genuine iterative design development – no dedicated computer labs, for example, but rather combined spaces with CAD and advanced technology alongside studio space with easy access to physical workshops that are set up as experimental stations. Break up lecture / tutorial structures where they exist in favour of student centred learning and use blended learning to encourage proactive learners. Create assessment that rewards integrated practices.

Distortion of the balance in learning for Product Design education

Computer Aided Design

The advent of computer-aided design has changed contemporary design practices over the last three decades. The emergence of new technologies has presented additional challenges to design educators wanting to equip graduating design students with the best possible skills to compete in the workplace. Design educators have to evaluate a bewildering array of competing CAD design packages and select the most relevant of these to include in their curriculum. CAD tools are complex and can be slow to master and can take up a significant proportion of a student's time spent in the design education environment. The inclusion of more complex CAD packages and the teaching of these new technologies in the design curriculum have often come at the expense of other more traditional design tools such as workshop activities.

There is an expectation now that all Product Design graduates will have an expertise in 3D digital modelling and this has become a focus in education that is popular with students. Increased confidence and skills in 3D digital modelling is in itself a positive, but stepping back from looking at the skills in isolation, there is a growing danger of a disconnect between screen and design process that is a particular feature of current students. Modern design tools have an ability like never before to present a conceptual idea as a seemingly real product. If these tools are used well it is often nearly impossible to distinguish between a rendering of a concept and a real product itself. So convincing is this technology that companies use it to market products rather than photograph the real product itself. Design educators, as well as students, have to guard against being seduced by the technology and the seemingly miraculous results it turns out and for some students, these results can become an end in themselves, with the presentation of a conceptual design as if it were real. Impressive digital models can become a metaphorical chequered flag for design students at the expense of genuine discovery and design development through more traditional means, such as studio drawing and studio material making, materials and process exploration and working models made for testing.

Screen based games and online social media, such as Facebook, Twitter and You Tube, have led to a generation of students who are increasingly immersed in computer-based activities. They are comfortable in the virtual arena like no generation before them. As Web 2.0 (interactive online media) becomes the dominant paradigm for everyday interaction for this age group, interaction with people and objects in the real world has to compete with those that are web based as even forays into the real world tend now to be expressed through online sharing. With this immersion, there is a danger of a growing disconnect between this age group's abstract view of the world interpreted through the computer screen and their experience of the environment they physically interact with. This possible disconnect has implications for teaching design and for the attitudes and understanding of their interactions as professional designers, where they are likely to be increasingly involved in designing objects in one country and having them made in another. Products that are made in a distant place, in ways that are unseen, as part of a mass production system that seems beyond the control or influence of the individual removes the sense of control of the designer and therefore

the sense of responsibility – both for it being brought into existence and for its fate at the end of life. A lack of understanding of how objects are fundamentally constructed reduces the likelihood that young designers will design for disassembly to allow materials to be reclaimed.

For Product Design students, this disconnect used to be addressed (prior to advanced CAD and the modularisation of university teaching over project based blocks of learning) in their education by hands-on, workshop based project work at each stage of development. In creating a product to a point where it could be readily understood by other people, it was necessary to engage with practical model making, and during that engagement develop an understanding of construction and material properties that informed thinking, design decision making and research planning (Velasquez: 2009, Romiszowski: 2009). This is no longer the case. It is now possible to create 3D digital models to communicate ideas to others that look as if they are fully resolved even if actually they are not. Students are increasingly keen to model their work on screen over producing any physical reality (and increasingly over drawing too), as the results are seductively impressive, even when they are not based on any realistic understanding of what they actually represent.

This is exacerbated in CAD teaching because the conventional lab style layout in CAD rooms has lines of computers, without any facilities for studio drawing or modelling to take place during their use. This reinforces the idea that students can develop their designs on computer without reverting to hand drawing or any form of physical modelling. This is a concern in teaching, as CAD used in isolation can give Product Design students a distorted view of their product ideas. CAD represents a mathematical ideal that cannot exist in reality, for example, where students zoom in on a 3D CAD model to an unrealistic level. A gap of 0.001mm can look like the Grand Canyon as opposed to reality where the gap is infinitely small and beyond any level of tolerance even the most accurate manufacturer can achieve. As part of their education, the students need to learn to fully understand this reality even whilst they utilise the breathtaking capabilities on the software. What does a gap of 0.001mm look like? How does the 1kg of material specified on screen feel like in reality? As teaching becomes more modularised and specialised, with more specialist CAD courses emerging, such as haptics or algorithm based, the relationship of CAD to any design process is further distanced. This trend needs to be reversed for integrated design learning with CAD as an embedded, not separate, process.

Workshop practice.

Workshops in education are increasingly seen as rigid, dangerous places with the growing number of restrictions surrounding their operation, and are expensive to run, but ideally, students should feel as at home in the workshop as they do in the classroom. Students need to spend time in the workshops in order to feel comfortable and at home in that environment, to create confidence so that learning through making becomes second nature. In order to do this, students need be introduced to tools and materials as early as possible in their education and have workshop practice an inherent part of their everyday learning so that this confidence and knowledge can be developed and reflected on by the students in informing decisions. However, workshop practice has become less of a feature of Product Design education with the problems highlighted above and also the growing sophistication of 3D computer modelling. Students increasingly choose to spend their time in CAD labs with traditional workshops seen as antiquated in comparison and only for final model

making, yet, as the principles of the Bauhaus underline, there is value in students interacting with materials in the earliest stages of a project. Alfred Barr, in the preface of his book on the Bauhaus, describes experimentation with materials as -"essential to the student of design experience - at first confined to free experiment and then extended to the practical workshop" (Bayer, Gropius, Gropius: 1972).

Students who are taught 3D digital modelling in isolation from an integrated workshop experience lose the value of a sense of approximation about materials, processes, ergonomics and construction in favour of the perceived levels of accuracy that digital technology offers. Students of the 'computer generations' could potentially begin to see judgments made by their own eyes as somehow inferior to those made through digital technology. This flawed idea should be recognised and challenged in Product Design education to ensure that students have confidence in their own judgements. For Product Design education, creating an enhanced relationship with the physical (and emotional) realities of that world is fundamental to build skills upon. In addition, with regards the CAD / workshop relationship, it is important that both aspects support the value of learning from failure as part of studio project work. With models that require handwork, the models can be a disappointment to students unaccustomed to working with their hands and students are often tempted to ignore these models in favour of models created using CAD technology. Yet as unfinished as these physical models may be, they are where students are really learning about how materials behave, and how difficult it is to manipulate them with any degree of success.

The role of the rounded modern professional designer is to pre-empt or foresee potential problems with individual designs using a combination of experience and knowledge gained through research and experimentation. It is difficult to see how students unfamiliar with manufacturing processes and different materials can successfully design products that contain these very materials.

New technology has become so convincing that it can seduce students into a false confidence about the validity of their design and yet, in contrast, undermine students' confidence in their ability to work through problems through physical experimentation as a tool to assist in the design process. It is unrealistic to substitute free experimentation with materials with a design development process confined to modern technology, as seductive as it is. This experimentation with materials should not be limited to any one stage of the project, with students free to transition between the various learning modes with a minimum of hindrance.

One of the benefits of this transitioning is that it can be used to prevent or break any kind of deadlock the designer may encounter during a project. Changing one tool for another and making progress in another area is often difficult to do but pays dividends. It is often these forays into other areas that can progress a design and are essential for design teaching. Seeing CAD modelling as iterative within a practical design process brings it back into a positive, contributory role in design project work. Equally, the introduction of advanced technology for digital fabrication, where machinery can be placed in a classroom setting and combined with CAD work contributes to breaking down the possible resistance to learning through making that students feel when they have to enter an alien environment to undertake such work.

Creating facilities for supporting iterative design education

Design teaching facilities tend to be physically divided into distinctly separate areas – studio, computer lab, workshop, library and lecture theatre. The first four are all involved in the facilitation of student centred project work (Biggs, Tang: 2007, Aknes: 2004). Transitioning between these areas, however, is not always easy, in part because of University timetabling and the organisation of specialist teaching and in part because the spaces are predominantly designed as dedicated to one specialist area of teaching. For example, University programs invest in high specification computer laboratories that typically consist of rows of screens facing a teaching screen. Rarely are tables included in labs for students to switch between working on screen and working in sketchbooks or on craft models. Even more rarely will a situation exist where students can work seamlessly between lab, studio and workshop. Lecturers must currently choose between a lab environment, studio environment or workshop for their classes. Even if the timetable and demand on spaces allowed all three to be provided for a single course, the likelihood is that they will be located in different parts of a building (for example, workshop on the ground floor, computer labs in a more secure, dust free environment on higher levels) whilst libraries tend to be centralised with no opportunity for lecturers to 'borrow' enough books for a class activity or be near enough to the studio for students to research in as a direct part of the project activity.

If Product Design as a discipline is to take control of its learning paradigm, this separation needs to be challenged to promote genuine, integrated learning opportunities for the students and break down the idea that these activities can be learned and applied in isolation. The four areas of studio, CAD lab, workshop and library need to be brought together into a new space for teaching design where students can transition seamlessly between them all. Without it, students will tend to view each learning area in isolation and not carry their understandings between them.

Using assessment as a tool for changing practice

The assessment challenge for design educators is to not only organise specialist teaching across courses for an integrated design learning experience, but to create assessment that equally supports that integration, rebalancing the design process, encouraging learning through making and away from instant design resolution (Harman, McDowell: 2011, Eshun, Graft-Johnson: 2011).

The design process is described and documented (Popovic: 2004], as a combination of problem solving and reflective practice. A vital part of this design process is having ongoing progress to reflect upon and students and professional designers alike can be at a loss for inspiration, feeling they have to complete one process before moving onto the next. The benefit for students in integrated learning is that students learn to move freely between modes and media.

In contrast to practices in a linear, progressive model of a project's development, workshop activities in a tornado thinking, integrated approach to design should not be restricted to the latter stages of a project but rather should be introduced at the outset to expose students to a culture of making and experimentation. Instead of adhering to traditional models of industrial practice, learning through making should be a significant learning part of a much more holistic

process with students being free to move between workshop and studio, with activities between these places to be much more integrated.

The challenge presented to design educators is how, in the light of these difficulties, to re-integrate and encourage learning through making and shift the emphasis of assessment to reflect the importance of that learning through making, and away from 'instant', visualisation based, design resolution.

Assessment needs to be managed so that the vital nature of learning through making can be brought to the fore as an inseparable part of the design process. To do this, the assessment model must move the emphasis from 'finished' objects and the idea of 'completely resolved' designs, towards a weighting that rewards learning through experimentation. Assessment tasks that promote engagement of materials outside their traditional uses would be an example of how to foster a culture of making and experimentation. The expectation that students can learn about how materials react when manipulated based on research theory is akin to teaching someone to learn to swim in a classroom. First-hand knowledge of the type gained through repeated exposure to materials and tools is vital for this type of knowledge to take root. Rather than reducing students' time spent in the workshop, an integrated learning experience should be in place that increases it and promotes a 'culture of making' with students confident in their ability to make and design.

Typically current Product Design students explore ideas and develop designs through sketching and move directly from sketching into CAD where designs are resolved to a level where they can be rendered for presentation and final submission. The emphasis of student design work tends to be on presentation for final submission rather than on genuine evaluation through rough modelling and testing of design ideas through making. In design education concept books have been used a means to show evidence of the importance of the design process and to shift some of the emphasis from the outcome itself. Photographic documentation can also be used to show evidence of iterative models and testing through making. What are necessary are better ways to celebrate and reward the lessons learned through repeated failures, particularly when a final outcome has not been reached. In addition, assessment should support the uncertainty and effort that students would have to embrace to move between studio, computer based work, workshop and library research more seamlessly than specialist units of learning currently allows. This reorganisation of assessment would involve specialists contributing to marking combined assessment matrices. This would bring its own challenges but should ensure a more effectively moderated assessment model.

Conclusion

Product Design in academia has a small window of opportunity to take advantage of the current academic climate to wrest control of the subject from dominant, more established disciplines and their practices. Instead of focussing on selling design principles and practices into other disciplines, Product Design educators need to focus on building a stronger foundation for the future of the discipline within academia so that it does not gradually become diluted and eventually lost. The way to do this is through a practical approach to the organisation of learning based on sound design practice principles developed in the industry based subject and provide leadership in pedagogy rather than adopting and adapting to the pedagogy of others. Design is a unique discipline that can impact all other disciplines, it is necessarily

predicated on ideas of leadership and innovation. The role of Product Design in higher education should not deviate from that. University education is floundering in a mire of past practice that is holding it back from responding to the real world needs that are impacting its economic viability. Product Design should be proud of its real world heritage and realistic, considered, innovative thinking and apply it to its own practice in education to lead the way to new practices and new approaches.

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How Can We Make It Better? Translating An Innovative Medical Model Into Cutting Edge Design Curriculum

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Abstract: *This is a story of design – of designing a viable present in transition from an increasingly obsolete past to a transformative future. More specifically, Karl Aspelund's seven design process steps (2010) provided the framework for our curriculum redesign at a typical American Land Grant University. The* ***inspiration*** *surfaced from a combination of necessity and vision based on conditions within and around our design unit.* ***Identification*** *of the design problem resulted in key findings, among them that ours is a small design unit in a large university that explicitly favors STEM disciplines.* ***Conceptualization*** *provided a focus on human-centered design culture and process, asking the question "How can we make it better?" Moving into the* ***exploration/refinement*** *phase we needed to determine who else asks that question within a human-centered culture and process. Medicine emerged as a possibility. The University of Central Florida College of Medicine provided the pragmatic framework used.* ***Definition/Modeling*** *included the adaptation of our design curriculum to the UCF medical curriculum model. By engaging stakeholders to analyze the proposed design and iterate changes, we are currently addressing the project phase of* ***communication****.* ***Implementation,*** *to include establishing timeframes, tasks, responsibilities, and assessment processes, will be the next step in the process.*

Keywords: Innovative design curriculum, design pedagogy, design process, PRSM, quality of living

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Introduction

For us, this is a unique moment in time in which to be contemplating academic programming. Academic evolution is both complex and dynamic. It occurs on multiple levels simultaneously in a continuous process that involves physical, mental and emotional changes, in both personal and public spheres. Under most circumstances the process is incremental, building slowly upon familiar foundations as new knowledge is refined. Occasionally, that new knowledge is sufficiently different to be disruptive and the entire enterprise must be re-imagined from top to bottom (Kuhn 1962; 1996). With the rapid rise of information technology and social media, the first decades of the 21st Century represent one of those times in our disciplines. Change of this magnitude requires a reconfiguring of curriculum that goes far beyond courses, calendars and syllabi. As faculty colleagues in design and merchandising, our journey over the last few years has involved a deep exploration of who our students are and/or should be; what they need to become successful in the world they will inhabit; and how we might best enable development of such expertise. We think that we have found a few answers while perhaps raising even more questions. This is the way of design. It is always iterative, and that is the story we propose to share.

Behind every design there is a process, no matter what the end product might be. Though language may vary from model to model and there may be more or fewer steps articulated, the general sequence is familiar to all. Framing our curriculum reconfiguration project was Aspelund's (2010) seven-stage design process. As outlined this process uses stages:

1) inspiration
2) identification
3) conceptualization
4) exploration and refinement
5) definition and modeling
6) communication and
7) production.

The purpose of our paper is to share a conceptual approach to curriculum design that addresses the need for improved alignment between design education and the process that unites the profession of design in a globally oriented economy. Figure 1 illustrates a broad conceptual representation of our overall plan of action. At this moment, we remain in the midst of our curriculum design process. We are reiterating the design as we are initiating the first phase of implementation. If the subject of our effort was a building, we might describe the project delivery method as fast-track, design-build.

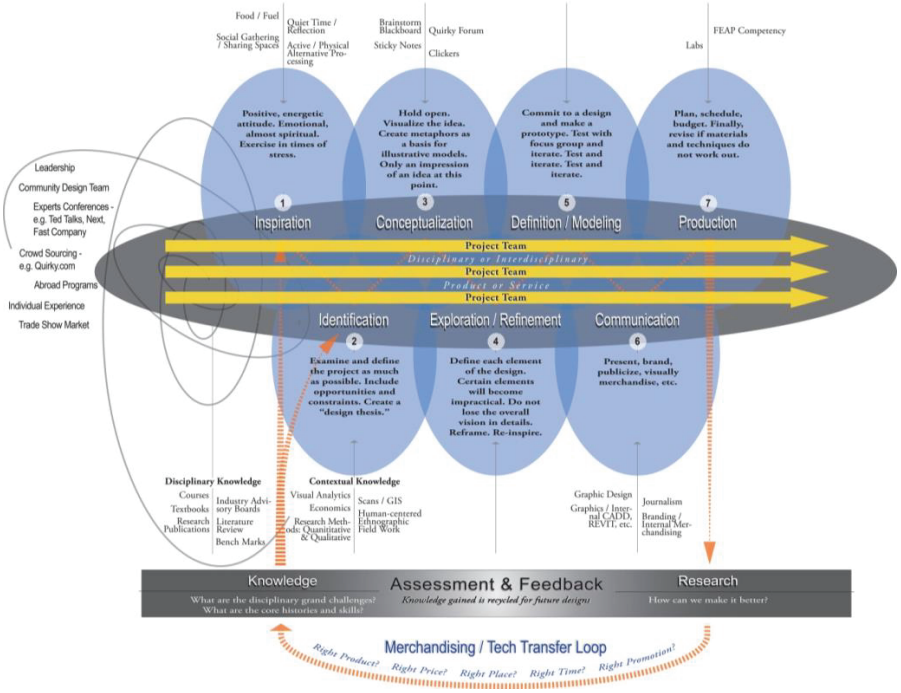

Figure 1. Design is a plan of action, created in response to a situation or problem that needs to be solved.

Inspiration: The Process Begins

"Welcome to the Era of Design." So proclaims Adam Swann, head of strategy for Gyro NY in a Forbes posting May, 2012. In this he is echoing the voice of David Kelley and the Stanford d.school, Steve Jobs and Apple, Fast Company, BusinessWeek, and a host of companies large and small who envision "design as a broad and deliberately applied discipline, with the aim of creating simpler, more meaningful, rewarding experiences for customers" (Swann 2012). For those of us with roots in the more traditional design fields, this and other shifts in our technologies and core assumptions require deep reflection about how we teach and learn design, and how we might make that experience better in this new era. Our personal inspiration to redesign was born of frustration with the curriculum at hand, which was little changed from its 19th Century origins in Home Economics. Our division offered undergraduate majors in Fashion Design and Merchandising and in Interior Design which shared nearly a hundred-year history at our institution. We had recently added more interdisciplinary offerings in Design Studies (B.S), Design & Merchandising (M.S.) and in Human and Community Development (Ph.D.). Newer faculty had brought the assumptions of 20th Century practice in other design traditions into the mix, the most pervasive of which was the Bauhaus framework, a modernist movement that defined art and architecture for most of the 20th Century. This left our academic unit trying to redefine itself from a "pre-Bauhaus" past of Home Economics/Family and Consumer Sciences to a "post-Bauhaus" future of Design & Merchandising that would incorporate emerging epistemologies and

trends, while retaining the best values of all traditions. In other words, our path in the 21st Century remained unclear.

In their examination of changes in design practice during the industrial and information ages, Broadbent and Cross (2003, 455) credit the Bauhaus (and its pedagogy founded upon unifying art and technology) with providing the first "effective formula for design education" responsive to industrialization. They note that the Bauhaus emerged from the arts and crafts tradition "some 85% of the way through the Industrial Age" . They further speculate that, approximately eighty five percent into a 75-80 year information economy, a "model of design education fit for the information age" would emerge in the near future.

For us, this opportunity is presenting as a total faculty turnover nears completion. The new faculty, while small, is comprised of more diverse design disciplines and provides rich and creative energy for advancement and change. During this period of faculty turnover, our College and University have also welcomed new administrations, resulting in new expectations and visions at the highest levels. Added to these catalysts for redefinition is the next generation of students (products of changes in our educational, economic, and global systems over the past two decades) who have insatiable needs for technology-based, relevant, hands-on learning opportunities. Redefinition is fueled by a collective vision of positive, innovative change. Inspiration for massive change is all around us.

Identification: Design Problem-Culture and Context

Our transformative quest is, as always, subject to context and delimitations. Ours is a small design unit in a large mid-Atlantic public land-grant university. For those unfamiliar with the genre, the American land-grant system was created 150 years ago at the time of the American Civil War and Industrial Revolution. Its mandate was to bring agricultural and engineering education to the masses (almost exclusively men) in a time of rapid territorial and industrial expansion. Women of the time, if they were educated for a profession at all, were educated in separate teachers colleges, secretarial and/or nursing schools. Many opted to prepare for their anticipated role as wives and mothers through another popular academic option, Home Economics, where the curriculum generally included matters of food, clothing and shelter. Rooted within this tradition of Home Economics, our current programs in Interior Design (ID) and Fashion Design and Merchandising (FDM) entered the 21st century still embedded in the Division of Family and Consumer Sciences, in the College of Agriculture, Forestry and Consumer Sciences. Existing feeder programs, professional affiliations and alumni networks reflect those traditions.

In 2000, our University was emphasizing undergraduate student numbers and "learner-centered education." The system favored professionally accredited programs that transitioned students into clearly defined career paths. By 2005, our units were moving away from Home Economics/Family and Consumer Sciences and into a professionally oriented framework as Design & Merchandising. The internet was developing beyond its infancy, but social media was scarcely yet a concept. Like long-established design programs at our peer-institutions, we set out to train professionals to design, create and sell material objects using a combination of traditional lecture and studio courses. Peer programs, often located within dedicated design and/or art schools or colleges, appeared to have many competitive advantages such as strong pedagogical traditions (often influenced by the Bauhaus), a great number of resources

(including a multitude of design programs/faculties, dedicated support labs/shops and staff, etc.), and the *gravitas* of having already established a high value as design units during their relatively longer histories.

Having been in transition for less than a decade, our current design curricula address individual disciplines in the traditional manner but without the resources of more established design programs. Nationally, a weak economy is raising political concerns about the costs and value of higher education. Our university explicitly favors disciplines and initiatives aligned with external funding streams associated with Science Technology Engineering and Math (STEM) careers. Our University 2020 Plan tasks faculty to engage information savvy students in challenging academic environments while supporting them to excel in research, creative activity, and innovation, often with technology as a supporting tool for each goal.

Amidst such pervasive change, our design problem involves redefining our Division practice as a system as opposed to redevelopment of individual courses. We are seeking to establish design curricula that might effectively compete with or exceed the quality of design programs at peer institutions and that facilitate the realization of our University 2020 Plan within the resources (time, money, personnel, technology, and facilities) expected to be available over the next 5-7 years. Delimitations include the small size of our Division, the pre-tenure status of the majority of our faculty, the STEM bias of our University, and the conservative culture of our region. In short, we need a radical change with limited risk.

Conceptualization

Design research asks "How can we make it better?" After identifying the design problem, we set out to identify current best practices in design curriculum. We sought a benchmark. We began to review design curricula and program information within our two, university administration-identified groups of peer institutions.

Our Higher Education Policy Commission Peer (HEPC) list includes twenty U.S. universities. Our Big 12 Conference peer list includes nine additional U.S. universities. Among the total of eleven (six HEPC plus five Big 12) peers that offer both FDM and ID curricula, those curricula are co-situated within the same sub-college administrative unit in only five institutions including Baylor University, Kansas State University, Oklahoma State University, Texas Christian University (TCU), and Virginia Commonwealth University (VCU). Kansas State maintains, within separate colleges, both interior design and interior architecture programs. University of Missouri co-situates the curricula within separate sub- units (departments) of a single college (see Figure 2).

"Influenced by nineteenth century scientism,: Findeli observes, "design was considered at the Bauhaus (1919-1929) as artistic or esthetic theory applied to practice" (2001). Findeli posits that 'design as esthetics' was translated at the Hochschule Für Gestaltung (1958-1968) at Ulm into 'design as applied (human and social) science'. It is situated within on (e.g. art) or the other (e.g. family and consumer sciences) of these two traditions that we most commonly found our peer programs. We observed that co-situated ID and FDM curricula remained as units or subunits derived from Home Economics at four peer institutions (Baylor, Kansas State, Oklahoma State, & Missouri). It is important to clarify that our interest is not in steering completely away from the social sciences which are critical in many design practices. Rather our interest is to shift focus from applications of social sciences to the environment toward

design in which social science may be embedded (Findeli 2001). For us as Design & Merchandising, this means that design both informs and is informed by the merchandising realities of right product, right price, right place, right promotion, right people.

Peer Institution	Peer Group	Land Grant?	Public / Private	Carnegie Classification	Fashion Design / Apparel Product Development	Fashion / Retail Merchandising	Interior Design
West Virginia University (1)		**YES**	**Public**	**H (aspires to VH)**	**College of Agriculture Natural Resources & Design - Division of Design & Merchandising**		
Baylor University	Big 12	NO	Private	H	**College of Arts & Sciences - Dept. of Family & Consumer Sciences**		
Kansas State University	Big 12	YES	Public	H	**College of Human Ecology - Dept. of Apparel, Textiles, and Interior Design**		
Oklahoma State University	Big 12	YES	Public	H	**College of Human Sciences - Dept. of Housing, Design & Merchandising**		
Texas Christian University	Big 12	NO	Private	DRU	**College of Fine Arts - Dept. of Interior Design & Merchandising**		
University of Missouri-Columbia	HEPC	YES	Public	VH	College of Human Environmental Sciences - Dept of Textile & Apparel Management		College of Human Environmental Sciences - Dept. of Architectural Studies
Virginia Commonwealth University (2)	HEPC	NO	Public	VH	**School of the Arts**		

(1) Recently added 'Design Studies' major with Division of Design & Merchandising
(2) Also offers 'Design Studies' major within the School of the Arts

Figure 2. *Peer Institutions with Fashion Design & Merchandising (FDM) and Interior Design (ID) Programs co-situated within same colleges and/or academic sub-units. Source: Authors.*

Within our two peer groups with curricula co-situated, only TCU and VCU offered programs co-situated within a non-Home Economics associated unit. In some ways, our university's profile as a public institution that aspires to very high research activity is more closely aligned with that of VCU. In others, particularly with regard to STEM orientation and support of arts programming, there are significant differences. VCU's ID and FDM programs are co-situated with a multitude of art and design disciplines (e.g. communication arts, graphic design, kinetic imaging, design studies, etc.) within a School of Art. VCU's curricula iterate a traditional modern (i.e. late industrial age) design educational path that begins with the introduction of broad foundational knowledge in art. The VCU Fashion Design and Interior Design curricula share eight art courses with each other and with other majors within the school during their first year of study. Two of those same courses are also taken by first year Fashion Merchandising students. Our ID and FDM curricula share one. However, the general approach to design education was similar to ours. Over the course of the curriculum, through courses typically structured within a series of fifteen week semesters, disciplinary knowledge and skills are gradually expanded and further developed through synthetic applications to problems imbued with increasing complexity.

Whether the curricula are embedded in an aesthetic tradition (such as at VCU) or a social science tradition (such as Oklahoma State), foundational courses shared across

curricula provide benefits including economy of scale and early exposure to multi-disciplinary work. Both of these characteristics are increasingly valued within higher education and our contemporary society. With relatively minor curricula adjustments, closer integration within the foundation year of our FDM and ID curricula could also provide these benefits. However, we had previously established that this is not a time of incremental change. Also a matter of economy of scale, we noted during our broad review of our peers that increased student enrollment would likely make the establishment of (and ongoing support for) much-needed learning and research labs and workshops more cost-effective. However, the significant 'start up' resources required to support such growth appeared highly unlikely.

Perhaps the most important outcome of our review of peer curricula was a better understanding of whether our design and merchandising unit's situation within a College devoted to agriculture and natural resources is truly unique. Within our peer institutions, we counted fourteen FDM programs and eighteen ID programs (including both interiors programs at Kansas State). We noted that three FDM programs (at the Universities of Hawaii, Kentucky, & Texas-Austin) and no ID programs are situated within colleges associated with agriculture or natural sciences. Nearly half (six) peer FDM programs are located within colleges (or schools) with Home Economics lineage, while over half (nine) peer ID programs are situated within colleges (or schools) of design and/or architecture.

As a unit that aspires to provide a design education fit for the information economy, these distinctions raised important questions. To what extent should/could design graduates of a research University like ours compete with graduates of professional schools in our fields such as Parsons or the Fashion Institute of Technology? How do we sustain an outstanding design faculty tenured within a College traditionally rooted in agriculture and natural resources – that is the natural sciences? To what extent must we benchmark STEM programs as well as architecture, design, and business? How might we emulate the project-based transdisciplinary model pioneered at the graduate level by the Stanford d.school? Would the proposed framework be flexible enough to meet the needs of a rapidly changing environment?

After months of discussion on the subject and multiple attempts at benchmarking, someone suggested that we follow Steve Jobs advice: "When behind, LEAPFROG." Since our strongest point of alignment within our unique context was that ours were applied programs, in an applied college, in an applied university, we determined that we should benchmark other applied disciplines that prepare their students specifically to enter human-centered professions dealing with "wicked" problems (Rittel & Webber 1973). Further, we decided to focus on the broadest interpretation of the disciplines rather than on specific specialties.

Exploration and Refinement

We set out to determine who else has asked "How can we make it better" within a human-centered culture and process? Committee members were tasked to explore multiple offerings in one relevant discipline each and to return with exemplar academic programs for consideration. By doing this, we hoped to borrow excellence in curriculum design from a more fully funded enterprise. We found that medical educators had engaged in significant curriculum redesign in the last decades of the 20th Century and had now had time to assess resulting products and processes. In the end, the curriculum deemed most suited to our adaptation was a medical model being

implemented by the New University of Central Florida College of Medicine (UCFCM 2012).

The UCFCM first year curriculum is structured in modules that establish "a fundamental understanding of how the various basic science disciplines relate to the normal human body" (UCFDM, 2012). See Figure 3. Unlike typical university courses, the modules in the first year and beyond do not coincide with a typical fifteen week semester schedule.

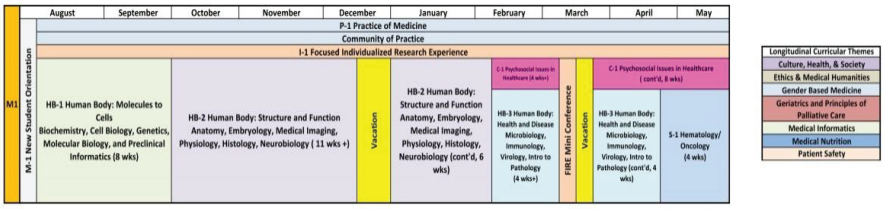

Figure 3. *UCFCM Year 1 curriculum from UCFCM Integrated Curriculum, 2012. Source: http://med.ucf.edu/academics/md-program/integrated-curriculum/*

The second year curriculum explores specific sub-systems of the human body, pathologies, and cultural influences to further inform accurate diagnosis. Relevant examination methods and communication skills are also introduced in conjunction with the second year introduction to specialties (see Figure 4).

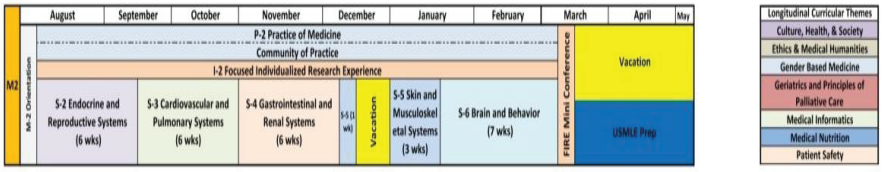

Figure 4. *UCFCM Year 2 curriculum from UCFCM Integrated Curriculum, 2012. Source: http://med.ucf.edu/academics/md-program/integrated-curriculum/*

During the third and fourth years of the curriculum, the instructional format shifts to clinical experiences delivered through a system of clerkships, selectives, and electives. Experiences in professional patient practice are complemented by basic science lectures, simulations, journal clubs, and conferences throughout the six core clerkships (see Figures 5 and 6).

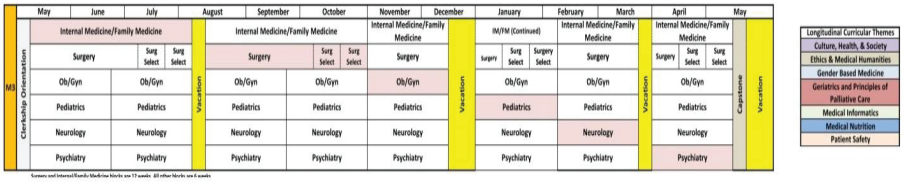

Figure 5. *UCFCM Year 3 curriculum from UCFCM Integrated Curriculum, 2012. Source: http://med.ucf.edu/academics/md-program/integrated-curriculum/*

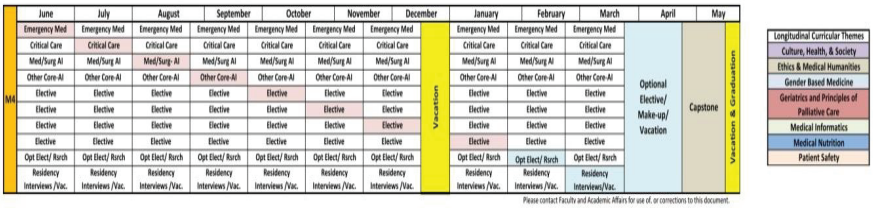

Figure 6. *UCFCM Year 4 curriculum from UCFCM Integrated Curriculum, 2012. Source: http://med.ucf.edu/academics/md-program/integrated-curriculum/*

Longitudinal Curricular Themes (LCTs) are interwoven throughout the four years to assure efficient effective and sustainable practice. These include Ethics and Humanities, Gender-Based Medicine, Medical Informatics, Medical Nutrition, Geriatrics and Principles of Palliative Care, Culture, Health and Society, and Patient Safety (UCFCM Integrated Curriculum 2012).

Definition and Modeling

So, how might this curriculum model be applied to our design and merchandising curricula? Both medicine and design are applied disciplines, addressing the question, "How can we make it better?" Both are engaged in solving "wicked" human problems with infinite variables and non-linear cause and effect. Scientific and technological knowledge are embedded within the processes, instruments and products of both trades; and medicine, like design, has its origins in art (Trousseau 1872). Both have a long tradition of applying critical thinking to identify and define the perceived issues and creative processes to arrive at a solution.

Where medicine and design diverge is in the focus of their practice. Medicine is devoted to maintaining or restoring human health within the body, hence the focus on basic human properties in the first year and on specific variations in bodily functions in the second year. Design and merchandising work to improve the quality of humans' interactions with their environments. In the industrial economy and its aftermath, this has been achieved primarily by developing and supplying human-constructed artifacts and environments that modify interaction to make daily living more efficient, effective and delightful, adding value to overall quality of life (see Figure 7).

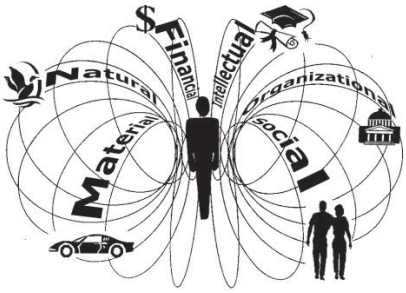

Figure 7. The Personal Resource Systems Management (PRSM) Model. Source: © B. McFall, 1998.

Within the culture of our current unit, quality of living has been interpreted as three personal aspects (mental, emotional and physical) interacting in six environmental dimensions (intellectual, organizational, social, material, natural, financial). In matrix format, this can be represented as three columns intersected by six rows, yielding eighteen discrete interactions within which experience may be assessed at any given moment. Findings within the columns sum to describe personal well-being. If summed across rows they describe environmental satisfaction. Matrices are cumulative over time and/or across populations. The total of either columns or rows over time would be considered total Quality of Life (see Figure 8).

	Mental	Emotional	Physical	
Intellectual				Intellectual Satisfaction
Organizational				Organizational Satisfaction
Social				Social Satisfaction
Material				Material Satisfaction
Natural				Natural Satisfaction
Financial				Financial Satisfaction
	Mental Wellbeing	Emotional Wellbeing	Physical Wellbeing	Total Quality of Life

Figure 8. *The Personal Resource Systems Management (PRSM) Matrix. Source: © B. McFall, 1998.*

Under this assumption, the UCFCM first year learning objectives might be translated into the first year of a design and merchandising curriculum devoted to gaining practical knowledge of how the various disciplines in the sciences and humanities may inform our understanding of normal human-environment interactions. This foundational year would be structured as a freshman core, common to all design and merchandising majors regardless of interest area and would promote learning in the

areas outlined in Figure 9. It also allows for the accommodation of transfer students with minimum disruption.

Y 1	Fall Semester (17 hrs.)			Spring Semester (16 hrs.)		
	Communication – Verbal/Written			Communication - Visual		
	Practice of Design					
	Community of Practice					
	Human/ Physical Attributes	Human/ Emotional Attributes	Human/ Mental Attributes	Interaction - Personal	Interaction - Environmental	Interaction – Balanced/ Sustainable

Figure 9. Translation of UCFCM Year One to Generic Design Curriculum Year One. (Longitudinal Curriculum Themes under development). Source: Authors.

As with the target medical model, the second year design curriculum would address variations on the basic theme, exploring specific categories of interactions and their common pathologies as well as cultural differences over time (historical) and across populations (age, gender, ethnic and other diversity). Critical and creative thinking and beginning communication skills would also be introduced in the second year. In this way, the sophomore year would serve to survey the wide range of professional opportunities comprising the broad field of design, allowing students to intelligently select their preferred points of engagement (see Figure 10).

Y 2	Fall Semester (17 hrs.)			Spring Semester (15 hrs.)			Summer
	Communication – Verbal/Written			Communication - Visual			Optional Study Abroad (highly encouraged)
	Practice of Design						
	Community of Practice						
	Human Diversity across populations	Cultural Diversity across populations	Assessment across populations	Human Diversity over time	Cultural Diversity over time	Assessment over time	

Figure 10. Translation of UCFCM Year Two to Generic Design Curriculum Year Two. (Longitudinal Curriculum Themes under development). Source: Authors.

With the declaration of specialty and/or major, the format in the third and fourth year shifts to practice-based experiences delivered through a system of projects, internships, lectures, simulations, journal clubs, and conferences. In keeping with the land-grant mandate for outreach, undergraduate projects are chosen to meet the needs of the local and/or regional community. Cultural and historical sensitivities would be consolidated, while critical and creative thinking would be tested and tempered in integrated project work during the junior year. Students would apply and deepen their functional expertise working in labs and studios to support ongoing projects. By first shadowing and then providing support functions, students would gain further understanding of the complexities involved in completing a viable design project (see Figure 11).

	Fall Semester (14 hrs.)		Spring Semester (14 hrs.)		Summer (6 hrs.)
Y3	Communication – Verbal		Communication - Written		Mandatory Internship
	Community of Practice				
	Practice of Design OPTION 1: Merchandising of a Vertical Project				
	Merchandising specialty course	Merchandising specialty course	Merchandising specialty course	Merchandising specialty course	
	Practice of Design OPTION 2: Interiors of a Vertical Project				
	Interiors specialty course	Interiors specialty course	Interiors specialty course	Interiors specialty course	
	Practice of Design OPTION 3: Fashion of a Vertical Project				
	Fashion specialty course	Fashion specialty course	Fashion specialty course	Fashion specialty course	
	Practice of Design OPTION 4: Design Studies Products of a Vertical Project				
	Minor course 1	Minor course 2	Minor course 3	Minor course 4	
	Practice of Design OPTION 5: Design Studies Services of a Vertical Project				
	Minor course 1	Minor course 2	Minor course 3	Minor course 4	

Figure 11. Translation of UCFCM Year Three to Generic Design Curriculum Year Three. (Longitudinal Curriculum Themes under development). Source: Authors.

Senior year – project year – would be about integrative dynamics, putting all the pieces together to shepherd a project from start to finish. Each project would have a faculty mentor as well as engaged community stakeholders and industry professionals. Each project should also be well supported by graduate assistants with training in the relevant design specialty (see Figure 12).

	Fall Semester (14 hrs.)	Spring Semester (14 hrs.)
Y4	Communication – Day of Design / Competitions / Portfolios / etc.	
	Community of Practice - Mentoring	
	Practice of Design: **Vertical Studio / Capstone Experience:** **Project Design & Management** Each student chooses one project area associated with his/her specialty area for a project being led by faculty and/or graduate students. The student engages in both design and management activities within a vertical studio group project, showcasing his/her given area of interest. Labs, workshops, and faculty resources will be available to support students in the production of professional-level, successful projects. ***Each student chooses <u>one</u> of the options below:***	
	Vertical Studio OPTION 1:	
	Project A	
	Vertical Studio OPTION 2:	
	Project B	
	Vertical Studio OPTION 3:	
	Project C	
	Vertical Studio OPTION 4:	
	Project D	
	Vertical Studio OPTION 5:	
	Project E	

Figure 12. Translation of UCFCM Year Four to Generic Design Curriculum Year Four. (Longitudinal Curriculum Themes under development). Source: Authors.

As with the original medical model, Longitudinal Curricular Themes would appear throughout the curriculum and would become most explicit in the feedback/assessment loop. They would frame initial programming at the beginning of each project and shape the critique upon conclusion. At this time, discussion is ongoing as to the precise nature of these inclusions.

Communication

Modeling the concept for a new curriculum is only the beginning of the extensive process of bringing that offering into the academic market. Between modeling and production, communication with stakeholders provides opportunities for enhanced analysis of the model prior to its initial introduction. Communication with experts required to deliver the product, with learners who will 'consume' the product, and with design and design pedagogy expert peers provides opportunities to 'test' the model and serves as a 'micro' assessment / feedback loop to inform reiteration of the model prior to its 'roll out'. This very document is one vehicle of communication, a process

that defies a strict linear sequence. For this discussion it might be helpful to visualize communication as concentric ripples on the water as a pebble breaks the surface, and to consider the context as it moves through small and intimate to vast and remote. As we are currently situated "on the water," we will for now merely identify those ripples and what we currently observe to be their key characteristics.

Intrinsic to the delivery of curriculum

One pebble toss involves delivery of content to our consumers, the students. How will the various learning modules be communicated going forward? We began this discussion with an acknowledgement of the disruptive nature of emerging information technology and social media. Indeed, it would appear that higher education as we have known it is reaching a "tipping point" (Gladwell 2000). The current generation of students has never known life without having information at their fingertips 24/7. This changes the very purpose and nature of academic communication. The rapid adoption of Kahn Academy, Udacity, EDx, and Coursera over the last 2-5 years has identified an education market hungry for media-savvy solutions. There appears to be much to gain with little risk by "flipping classrooms" (Sams & Bergmann 2012) such that information-intense lectures are delivered online, whereas homework to clarify and reinforce new knowledge occurs face-to-face. Reports also suggest that online learning, however cost-effective and convenient, will not be the whole or only form of communication in education going forward. Students continue to crave in-person social interaction and what they cite as "the full university experience." Our curriculum design provides meaningful student interaction with peers, faculty, the community, and practicing professionals throughout their academic experience. To help students translate these interactions into practical skills that bridge academic life and professional expectations, in years three and four of our curriculum model, vertical studios would pair upper-level students (juniors and seniors) with graduate students, faculty and practicing professionals to address a real-world problem.

The design task group and faculty stakeholders

Another pebble toss communicates the new curriculum model to the potential design content experts – the faculty. A series of conversations will be required to explore how existing expertise and assignments might fit the model. This means plugging in existing courses and faculty assignments where they may be used "as is" or with some modification, and highlighting areas for which new courses and/or labs must be created. In our university, up to 20% of the content of any course may be changed each year without triggering involvement of the peer Curriculum Review Committees of both the College and the University. Where possible, it is always easiest to remain within those formal constraints. For the moment the proposed curriculum model is largely delimited to existing courses from the university-specified General Education Curriculum (GEC's) and from the three majors housed in the Division of Design & Merchandising (Design Studies, Fashion Design and Merchandising, Interior Design). Where existing personnel cannot meet expanding expectations, new faculty lines have been or will be proposed and position announcements detailed. Some of those responsibilities have been incorporated into four tenure-track positions being refilled following faculty moves and retirements. Specialized FEAPs (Faculty Equivalent Academic Position) on annual contract or perpetually renewable graduate assistants with cutting-edge skills will better serve other tasks.

The College

Design & Merchandising is one of five divisions that form our College. Each college is led by a Dean, so communication within the College regarding the proposed design would take two forms: (1.) informing and gaining the support of the Dean, and (2.) encouraging engagement from our potential peer collaborators. Opportunities for engagement are substantial for many of these peers, especially those involved in Landscape Architecture, Resource Economics, Human and Community Development, The Community Design Team, Entrepreneurship, Horticulture, Construction, and Recreation, Parks and Tourism. Our expectation is that communication within the College will occur both informally between individual faculty members, and more formally among and between program, division, and college leadership and involving participating units as a whole. Separate conversations will be required with College administrative and support personnel including recruitment, development, research, facilities, marketing, and finance. New courses will require review and approval by peer Curriculum Committees at both college and university levels.

The University

Once the new curriculum design finds support at the College level, the offering must be championed among the University leadership. It is here that the abilities of the Dean and his/her staff as advocates become vital. University administrators often have priorities different from those of colleges and divisions. As a result, careful communication of the value of new curricula may be critical to their adoption and success. A very concise "elevator speech" may be a useful advocacy tool. A broader conceptual representation, showing both process tracks and fixed support functions, might also be useful for communication to this constituency.

Most resources in the university flow from the top down, and they do so unevenly. Favored programs are typically supported more fully. Designation as a Program of Excellence is generally the first step toward elite status in our University. Toward that end, internal assessments and communications often convey merit as do disciplinary accreditations and public rankings by one's peers. Designers of the new curriculum should study the criteria closely in this iteration with an eye toward sharpening competitive advantage. This might also be the time to adjust the proposal to expand opportunities for accreditation, build enthusiasm among student and industry evaluators, or structure participation in high profile national competitions.

The State, Region, Nation and the World

In the end, the final and most continuous judgment of any academic offering comes from our ultimate stakeholders – our external disciplinary peers, our students and alumni, and the markets that will hire them. Historically, academia was positioned as the gatekeeper of knowledge. Universities earned their reputation as "ivory towers" by communicating one way through the faculty "sage-on-the-stage." This generally took the form of classroom lecture, funded research and/or formal outreach. For generations, these venues have been stable and familiar, accessible to a small but growing number of privileged individuals, and valued for their contribution to society. With the growth of information technology and social media over the past two decades, that traditional world is vanishing rapidly. It is impossible to predict exactly how this scenario will play out, however, it is imperative that educators make efforts to position themselves on the leading edge of this change.

Production: Making It Real

The production phase of the design process allows designers, clients, stakeholders, and others to see the design in action. Implementation of curriculum changes in academic systems cannot be a "flash cut" where a new design is fully implemented at one time. Curriculum changes must often be rolled out incrementally. The implementation of our redesign would occur over a 4-year period with each successive year building upon itself. Parallel to the undergraduate curriculum change would be changes in graduate programs to support the new vision of design.

As part of an iterative process, the production phase is subject to changes as are all of the previous phases. Technology will be added. Facilities will be reconfigured to better support and to better communicate new ways of working. The new curriculum will undergo continual evaluation and assessment as the first wave of students work their way through the newly designed curriculum structure. Future iterations and redesigns of the curriculum are not only expected, but, by design, required. The design research question "How can we make it better?" is one that will continue to drive our quest to align the academic needs of our students with the ever-expanding interdisciplinary design world.

Assessment: Concluding Thoughts

We are in the midst of a design process, reiteratively working between modeling and production. As a design unit situated within a college with a strong agricultural tradition we faced extinction several years, and nearly an entire faculty, ago due to a perception among our college peers and administrators that we were no longer relevant. That challenge inspired us to chart a course toward greater relevancy. To increase our value among peers, we would shift from a family and consumer sciences curriculum that originated in the pre-industrial agricultural economy to a design curriculum fit for the post-industrial, information economy. We realized at the start of this course, however, that we had little capital to support growth and/or to expand teaching and research resources. We had to redesign our curricula for maximum positive impact, with minimal financial resources, and where we were situated. Accepting, for the moment, the archetype of design as a trilogy of science, art, and technology (Findeli 2001) we conceptualized that our situation would not be conducive to move toward the tradition of dualizing the trilogy to art and technology, (as the Bauhaus had done). Alternatively, dualizing the trilogy to science (i.e. social sciences) and technology, as occurred at Ulm, was too closely aligned with the home economics tradition from which we turned. We also recognized that still influential 20th century design pedagogies focused on the embedding of art or science into industrially produced objects, a practice that might be reinterpreted in an information economy. Short of a new design archetype, which perhaps should be considered later, we conceptualized the need to develop a curriculum that maintained balance among the science, art, and technology trilogy and was no longer limited to the design of physical objects and environments. We sought a benchmark for innovative delivery of products and services that improve human quality of living. We looked first within the design disciplines and then more broadly within human-centered applied fields. At the University of Central Florida, we discovered a medical model that redefines the relationship between 'medicine' and its specialties, that resists the fitting of all courses (or modules) into a uniform format and/or semester-based cycle, and conceptualizes

learning of content in webs and with strands rather than in lines with layers. We believe this model is fitting for an increasingly interconnected, asynchronous, and informed society. As we translate the UCF medical curriculum into our own design curriculum model, this paper provides a 'micro feedback loop' through which our design and design pedagogy expert peers may offer assessment for consideration as we continue to reiterate between modeling and production. We not only welcome participation by you, our reader and colleague, we encourage it.

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Designing FunWritr: unpacking an affinity-based, professionalizing, graduate-level educational technology design experience

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Abstract: In this paper and presentation we describe, unpack, and reflect upon the dynamic, evolving processes of collaborative, democratized educational technology design that led to the creation of an open-ended literacy development and language acquisition environment named FunWritr. When the project began, each member of our group was either in a graduate program for educational technology design or interested in matriculating into such a program. Over the course of five years we have worked together, growing as designers, developers, and researchers of educational technologies. Reflecting on our authentic, self-guided, evolving curriculum of experiences, we recognize processes and unpack factors that contributed to our growth and evolving philosophy of affinity-based, collaborative, sustainable, educational technology design. In describing and theorizing about our experiences and outcomes we have come to understand avenues for cultivating growth in design education that go beyond classrooms, fixed hierarchies, grades, and semester-based projects. Our interactions have led us to identify and theorize about six interrelated guiding design parameters for educational technology creation.

Keywords: design, technology, affinity-based, education, student-led

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Introduction

The field of Educational technology (ET) looks into the efficacy of various technologies to overcome challenges new and old in formal and informal educational environments. When novel approaches to meeting such challenges are desired, groups of ET designers and researchers take up the call to create, implement, and evaluate new technologies leveraged for educational purposes (Barab, Thomas, Dodge, Squire, & Newell, 2004). These are complicated, time and resource intensive undertakings that are rarely realized by a lone individual. Such endeavors often demand a team of designers, educators, developers, and researchers working collaboratively over extended periods on a wide range of tasks (Akerlind, 2005; Campbell, Schwier, & Kenny, 2009; Hung, Smith, Harris, & Lockard, 2010; Tracey, 2009). ET design groups such as these are often initiated and spearheaded by university faculty members who are able to bring sufficient resources, credibility, experience, and leadership to bear on the ambitious endeavor of ET design. Graduate students in ET programs typically participate in these types of research and design projects –in doing so they gain valuable insight and experience in an array of activities related to creating ET in addition to learning about the process of successfully disseminating findings. Unfortunately, not all graduate students are able to participate in traditional research groups due to a lack of access, scheduling mismatches, work or family responsibilities. Additionally a lack of technical expertise or research experience may preclude others from being invited to join projects. Furthermore some graduate students may demur membership in established groups due to differences in interest and/or epistemology.

Those who are able to join existing research groups often have less control over the direction of the research than they may like, they also may not be able to self-select their role within the group. Student member diversity in faculty-led research groups is largely up to the faculty member; also the range of research/design endeavors assigned to a specific student member is often largely determined by the faculty member in charge. Additionally, entering research led by a seasoned faculty member can be intimidating to the graduate student who is just entering research. In our case, we feel that the type of student-led, affinity-based group we created and continue to maintain affords a more democratized atmosphere wherein the process of and responsibility for carrying out the tasks of the research group is the responsibility of those members interested in getting it done. Student-led affinity-based groups offer their participants the chance to both lead and collaborate in academic and scholarly experimentation, growth, and wayfaring.

A literature review reveals that while a few studies have inquired into research related to computer-supported collaboration (see Johnson & Johnson, 1989; Stahl, 2005; Streeck & Mehus, 2003), research into student-initiated and led affinity-groups for education technology research and design are scarce with the most relevant and recent articulation of this construct coming from the field of computer engineering (Gates et al., 2009). In our paper, we seek to build upon existing scholarship by juxtaposing our experience and findings with the Affinity Research Group Model (Gates et al., 2009).

Our group, the Language Learning and Technology Research and Design group [LLTRDg] shares some attributes with the student affinity group model (SAGm) in that like the SAGm we articulated attainable, pre-determined objectives, we met outside of class periods, we worked to build and maintain a group culture, and we endeavored to work together toward the attainment of the objectives we set. Additionally, we point to

open communication, teamwork skills, existing research experience, and some existing technical skills as factors that played important roles in supporting both our overall group success as well as group success within the SAGm. However, in contrast to the SAG model, our level of contact with and ties to non-student mentors and role models was less formalized and more task-specific than in the SAGm.

Group Genesis, Maintenance, and Activities

Began in 2007, the LLTRDg is comprised mostly of current and former Instructional Technology PhD and Masters students in the University of Texas at Austin's Curriculum and Instruction department. Over the past five years, we have explored the ways computer technology (esp. natural language processing and unbundled APIs) can be leveraged to support language learning and literacy growth via collaboration and play via a design project that began by questioning the dominant narratives about the role of ET design being that of innovating at the pedagogical and not curricular level. Over time the FunWritr project emerged from our meeting to constitute our first and ongoing ET research and design endeavor. In the subsections below we break group formation and activities into different periods.

Period 1: Genesis (Oct. 2007-Oct. 2008)

In the Fall of 2007 one future member of the group sent out an email inviting other interested members of the UT-Austin ET community to meet to discuss ideas for designing language learning tools. At the time the long term viability of this group was in doubt as the group was exploratory. Three people met every few weeks during the semester to determine areas of mutual interest within educational technology and language learning. By August of the next year the two remaining members put out a call welcoming new members. Two incoming IT master's students joined and we established a weekly meeting time spending several weeks sharing our interests, previous teaching experiences, and favorite language learning resources with each other in order to build mutual understanding, a sense of community, and direction.

Period 2: Growth, Direction and Effort (Nov. 2008-Mar. 2009)

This phase was characterized by growth, direction, and effort. First, we came to a general consensus that we should begin work on the design of an application for language and literacy development that had been brought forward by one of the groups founding members. Second, we spent time articulating the ideas that made up this design opportunity and presented our initial thoughts at an Instructional Technology Department Brown Bag meeting as well as at a Doctoral Seminar for the Department of Language and Literacy both at the University of Texas. These two opportunities to tell others about our ideas and plans served as an initial catalyst for group effort and direction. Third, our presentations and word-of-mouth worked to create interest in others for joining the group, which had grown from 2 people at the beginning of the year to six. During this time we also drew on the ADDIE (analysis, design, development, implementation, and reevaluation) model for design as well as from the tradition of design-based research (Wang & Hannafin, 2005). Design-based research also helped us maintain a focus on theorizing about design as well as our collaborative design processes.

Period 3: IRBs, Conferences, and Growth (Apr. 2009-Aug. 2009)

As a group, we spent the late spring through late summer of 2009 using presentation proposals as a way to further externalize and detail our technology creation ideas. These efforts were done as not only a way to further articulate our design but also to meet the interests of the group's membership, many of whom had stated an interest in presenting at conferences. Part of the approach to determining what would get done was to require that any task not only hold the potential to advance the larger ET design project but also the task had to offer a some of the members carrying it out the chance to grow as designers, researchers, and/or developers. In this way, even if the conference proposal or design documents were rejected or went unused, the experience of creating them held value for group members. So, while our initial conference proposal submissions were not accepted, other tasks that held opportunities for growth as well as project advancement such as the creation of our research design and request to conduct research in a local school were accepted. By the end of August 2009 we were ready to begin pre-implementation classroom observations and advance our ET design project from a mocked-up idea to alpha/beta application design and development. Additionally, we added two members, both master's students in Instructional Technology at the University of Texas at Austin.

Period 4: Research with an Eye on Design, Design with an Eye Toward Research (Sept. 2009-April. 2011)

By the early Fall of 2009 our ET design idea, now called FunWritr, had an approved IRB to conduct research in a local elementary school to better understand the creative and participatory practices that go on in public school classrooms. We felt this type of research would support our design efforts even as the design and development work we began in this period would eventually allow us to conduct research in classrooms on the design of the software. In order to undertake preliminary data collection as well as application design and development, we began holding two different weekly meetings, one for the research endeavor and one for development. Some group members attended both meetings and others based their attendance on availability, interest, and goals, keeping abreast of developments both groups via a shared listserv. During the Fall of 2009 members of the research arm of the group spent 18 hours observing during language arts, center, and computer lab periods –making notes or jottings and later expanding them into fieldnotes (Emerson, 1995) before analyzing them together in an iterative, comparative fashion (Anfara, Brown, & Mangione, 2002; Strauss & Corbin, 1998). The pre-implementation research we conducted was carried out both in hopes of informing our design (Barab et al., 2004) as well as in the spirit of interest in contributing to what the field of ET know about technology's role in impacting creative and participatory literacy practices in public elementary school classrooms. More than this however, these dual-role efforts also allowed members of our group to gain insight into working on research and design projects whether the ET design idea was realized or not. On the design and development side, we recruited three interns from the university's computer science program to work with us. As with our ET design affinity members we worked to understand what the individual interests and goals these three interns had in order to ensure that they were able to accomplish these goals even as they worked with us to realize the development of our FunWritr design. Two of the three worked on the client side of design and development while one other individual

worked on database design and server side development. Two of these three interns worked with us for multiple semesters, and one continues to work with us after his graduation from the UT CS master's program.

Period 5: Refactoring, and Theorizing about ET Design Education (May 2011-Oct. 2012)

The resultant application which emerged from the efforts during period four, while encouraging, were not scalable. We have entered and remain in a cycle of server-side-code refactoring on the design and development side. Also during this time we engaged in several efforts to better understand what we have learned from this sustained, multifaceted, group ET design endeavor. With an eye on understanding both the nature of our ET design group as well as the nature of ET design, we went through one survey-based and one theory-based reflection. In the two following sections we lay out our notions, observations, and theories.

Reflection: ET Design Group

We asked each member of the group to address four different questions. Our answers show a range of familiarity with research, inquiry, and application development. What follows is a summary of question-prompted reflections about our experiences in the group.

QUESTION 1: WHY DID YOU JOIN THE GROUP LANGUAGE, LITERACY, AND TECHNOLOGY RESEARCH AND DESIGN GROUP? WHAT IF ANYTHING DO/DID YOU GET OUT THE GROUP?

Expectedly, having a chance to explore issues of literacy, language learning, and technology was something that drew many members to the group –as was the chance to collaborate on an educational software development project. Others pointed to the chance to refine and develop soft skills such as collaborative and communicative work skills. Academic and emotional support was identified as a latent benefit of group membership as member coursework and experiences overlapped, affording a highly supportive space and a very empathetic audience for concerns. The open nature of the group allowed opportunities for members to give valuable input with little fear of being rejected or overshadowed. Group members entering or contemplating entry into graduate programs in educational technology were exposed to the process of IT research as well as current trends and innovations in the field. Each member was led in unique ways to the intersections of theory, design, and research in an academic context replete with the challenges associated with designing, developing, and implementing educational technology in a classroom with the goal of chronicling, reflecting, theorizing, and explicating that process to the Educational Technology field and beyond.

QUESTION 2: HOW DO YOU LIKE THE WORKING STYLE AND ATMOSPHERE OF THE LLTRDG?

The group functions with the understanding that most members must struggle to fit even a two hour meeting into their busy week so work outside this meeting period is celebrated but optional. This approach was both cause for concern for some members as well as a source of appreciation in others. In essence, we believe our democratic and open management and supportive collaboration style fosters individual and group growth in terms of goal acquisition as well as enabling a sound decision making process.

QUESTION 3: WHAT BENEFITS DO YOU SEE IN PARTICIPATING IN THE LLTRDG?

The group members pointed to improved critical thinking and technical skills as well as a sense of community and belonging within a large IT university department. Exposure to the processes, habits of mind, and tools of development and research in educational technology were the most commonly given beneficial factors among members –affording insight into how one might not only consume but also produce scholarship in the field. From IRB completion to wireframes, literature reviews to collaborative writing, conference proposal submissions to exposure to Subversion, WordNet, Google Groups, and CherryPy members experienced a cross-pollinating effect with each contributing to and learning from the group's collective knowledge base. Through this experience we have supported each other becoming not only colleagues but friends as well.

QUESTION 4: WHAT DO YOU THINK OF THE COLLABORATION AND COMMUNICATION BETWEEN RESEARCH AND DEVELOPMENT GROUPS?

Period four of our group's existence brought with it a number of new members as well as a need to hold separate weekly meetings, one for planning site visits, collecting data, and analyzing it and another meeting for application planning and development. While this increased the efficiency of our group efforts on both the research and development fronts, we wondered if it would change the group dynamic in deleterious ways.

Group member responses to this question indicated that there was minimal collaboration once the groups split; however, this did not prove detrimental in that much of the application design planning had already been completed. As mentioned above, communication between groups took two forms; a single listserv serviced both the research and development endeavors. Also, a few members attended both group meetings and were able to relay messages and preferences between them.

Reflection: Toward a Theory of Congruence in ET Design

Through our experiences and via reading the ET design literature we have come to appreciate just how challenging and complex designing and developing FunWritr has been. The design of educational experiences is influenced by metanarratives about education, by learned beliefs, guiding intuitions, and pragmatic constraints. Yet upon reflection we were surprised at how often a great number of inter-related education and technology-related elements aren't explicitly considered (Yanchar & Gabbitas, 2010). Our affinity-based research and design group has worked to think about how to integrate six interrelated factors in the design process. A review of the literature brought us to Garrett (2009) who outlines four factors to consider when designing language acquisition applications, namely: learning theory, educational context, pedagogy, and technology. To this list we added curriculum and development and with reflection and a review of design documents and meeting notes worked to understand and articulate our positions on these factors –positions which emerged over time and continue to evolve and coalesce. We have found that working toward inter-factor congruence had direct and latent benefits for our design process (Der-Thanq, Hung, & Yu-Mei Wang, 2007). What follows are brief summaries of our positions on each of these factors.

Curriculum

While ET design often springs out of a culture of goals, objectives, and assessments (Demski, 2011; Staples, Pugach, & Himes, 2005), we desired to design a literacy development and language exploration application based on the curricular construct of study as a mode of inquiry (McClintock, 1971). This led us to support language growth and metalinguistic understanding via self-directed, open-ended (Roy, 2003), scaffolded exploration and wayfaring (Ingold, 2007), guided by a focus on intellectual qualities and reflection on what knowledge and experiences are most valuable (Pinar, 2012) instead of which skills and what information students should know.

Theory

As a theory of learning, constructivism resonates with our perspectives on the educational endeavor as an unpredictable process of contemplative experiential knowledge construction (Papert, 1980). Through interest and curiosity, people construct meaning via a process of connection-making between beliefs, remembered experiences, and contextual interactions (Jonassen, 1991). We see literacy development and language acquisition as uniquely experienced (Smith, 2004; Stahl & Hayes, 1997), affective, social process (Au, 1998; Smith, 1994). We draw on theories of implicit literacy and language acquisition that forefront comprehensibility, interest, and engagement (Cassidy, Valadez, & Garrett, 2010; Krashen, 2003) while still respecting the role noticing plays in deepening metalinguistic knowledge (Truscott, 1998).

Context

Employing an ethnographic approach to understanding the educational context into which our designed application would be introduced resonated with our perspectives on knowledge (Noblit, Flores, & Murillo, 2004; Guba & Lincoln, 1998). Ethnography (Wolcott, 2008) allowed us to conduct wide-angle, open-ended, design-guiding inquiry (Barab, Thomas, Dodge, Squire, & Newell, 2004). Our subsequent ethnographic analysis found that most of the space for literacy and language education was dominated by teacher-led activities, however we did identify a few low-key, student-directed moments. The student-directed moments happened predominantly during computer center time, silent sustained reading (Krashen, 2006), and ESL writer's workshop periods (Calkins, 1986). These instructionally relaxed, low-stakes moments were congruent with our other design parameters (Der-Thanq et al., 2007), influenced our pedagogical decisions, and became the target context for which we designed.

Pedagogy

Aligning for congruence with curriculum and learning theory, we drew on pedagogies highlighting open-endedness and exploration (Dickey, 2010; Hannafin, Land, & Oliver, 1999), pedagogies of wonder with multiple trajectories toward understanding (Duckworth, 2006), multimodal approaches utilizing non-textual communicative channels as a way of eclipsing and critiquing the meaning of written text (Derrida, 1997; Kress, 2010), pedagogies that encouraged expression manipulation at different grain sizes (Jewitt, 2006), and used student writing/expression as a primary catalyst for interaction (Roy, 2003). We were guided toward interactions that juxtaposed local meanings and global representations (Schleppegrell & Colombi, 2002), toward approaches that nurtured metalinguistic noticing (Truscott, 1998) whilst supporting curiosity and authorial orientations toward text and language (Smith, 1994). Lastly, we used scaffolds that leveraged and engendered comprehension (Durkin, 2003)

while inspiring appreciation for the inherent messiness of language (Coles & Hall, 2001).

Technology

From the beginning, it has been our belief that as a field, ET does not need iRobot or HAL 9000 to support literacy development and language acquisition. Instead, ET can serve learners well in terms of supporting or scaffolding student-driven inquiry within open-ended environments via educational redesigns of the technologies at hand, namely API-accessible content repositories and knowledge bases, natural language processing tools (Bird, Klein, & Loper, 2009), and invisible mashups designed specifically for educational purposes(Liu, Horton, Olmanson, & Wang, 2008).

Development Process

We added the development process to our collection of ET design factors, while not commonly considered a design parameter by itself, the approach to and process of development influences the points at which and the extent to which design trajectories may be altered. An extreme or agile programming orientation (Stober & Hansmann, 2009) allowed us to collectively continue to modify and calibrate the design based on refinement in our positions on the other design parameters, things we were seeing in our ethnographic research, as well as recent developments in emerging technologies. Instead of designing wireframes of all of the functionality up front, we were able to influence the nature and direction of development through our bi-weekly development sprints or planning sessions. As mentioned above, this allowed us to take advantage of insights we gained throughout our period of participant observation in a local elementary school classroom, while also ensuring that student-members of the group joining the group after development had begun were able to contribute their ideas via our iterative development cycles.

A Brief Description of FunWritr

This section gives a brief overview of the designed ET application. Figure 1 below gives a snapshot of the application's architecture. FunWritr's user interface is Flash-based with a Python/CherryPy backend pulling from a MySQL database. The interface design of Funwritr was influenced by the fact that our users are elementary school children. Working with a teacher at a local school, and observing her students using other writing software as well as performing a range of literacy tasks we worked to create an iteratively designed web-based application that uses the semantic relationships between lexical items in a freeform "playground" environment. Depth and light were used to establish a sense of open-ended space within the established boundaries of the browser window. Variations on muted primary colors connect various functions visually; blue is used mainly to connect text and image results, yellow for word disambiguation.

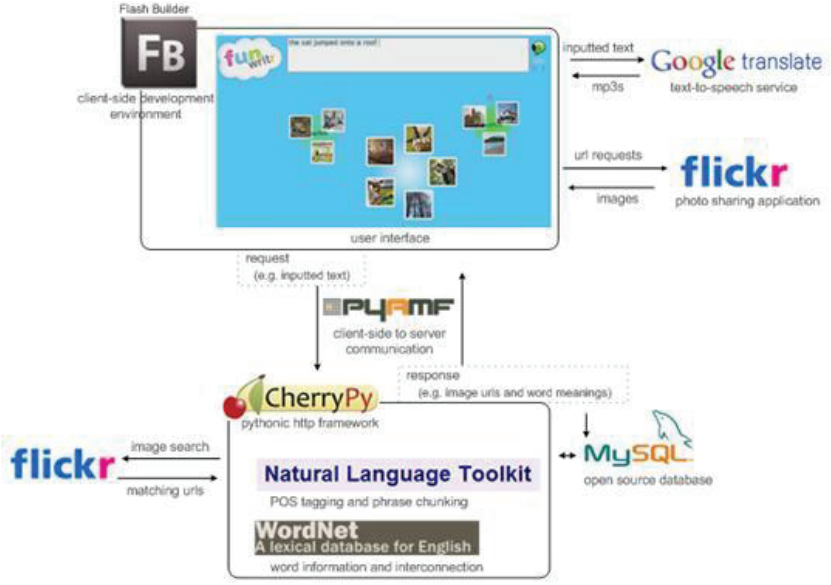

Figure 1. Overview of FunWritr Architecture

Vis the use of existing natural language processing tools such as grammar parsers (NLTK), semantic ontology databases (WordNet), and image collections (Flickr), FunWritr gives users the chance to see visual representations of the words and phrases they write. As learners produce text it is parsed and semantically-organized, modally-rich content is returned. FunWritr is image-centric, and organized around metalinguistic aspects of language.

The client-side of the application required a design that was stable, flexible, and fast enough for our users purposes and patience. To realize this, each component of the project was modularized and connected to a central control method that serves as the backbone and guide of the client-side of the application. The main components include the input box, image bubbles, and server communication. All three modules communicate exclusively with the control module, which allows for easier programming and debugging while providing a more deterministic, stable control flow.

The input box has several functionalities. Firstly and most crucially, it needed alerts the module of spacebar events which are used as a trigger to send newly written text to the server-side part of the application via PyAmf for processing. Secondly, the largest chunk of recognized grammar closest to the cursor is highlighted and corresponds to the displayed images. Finally, the composition area also displays the parts of speech associated with each word and each highlighted phrase.

Image bubbles contain graphic representations of highlighted words and phrases. These images are dynamically loaded from Flickr and displayed in a semi-randomized way. A separate container class manages these bubbles, positioning, adding, and removing them as required based on user actions. Styles for all graphical components are managed in a separate module to ensure a clean seperation of code, design, and content.

The Flash/browser application is connected to a python backend that takes care of the parsing and analyzing of texts. We established a protocol between the client-side

and the python backend that allowed for a robust flow of information between the processes while minimizing performance hits. Some tasks, such as word disambiguation necessitate a substantial performance cost. Therefore we try and do these as infrequently as possible. Word and phrase information is cached within the Flash application and stored in the server-side database to improve response time. Additionally, session and transaction information get logged as a way to recreate, organize, and coordinate messages between Flash, the python backend, and the database.

As stated in an earlier section, the application is designed to use student writing as a catalyst for interaction and feedback. As the user enters text, a collage of images is returned to reflect the meaning of the phrase closest to the cursor (see Figure 2). Additionally, nouns, verbs, adjectives, and adverbs within the highlighted phrase are displayed in its own three-image collage around the periphery of the center phrase collage.

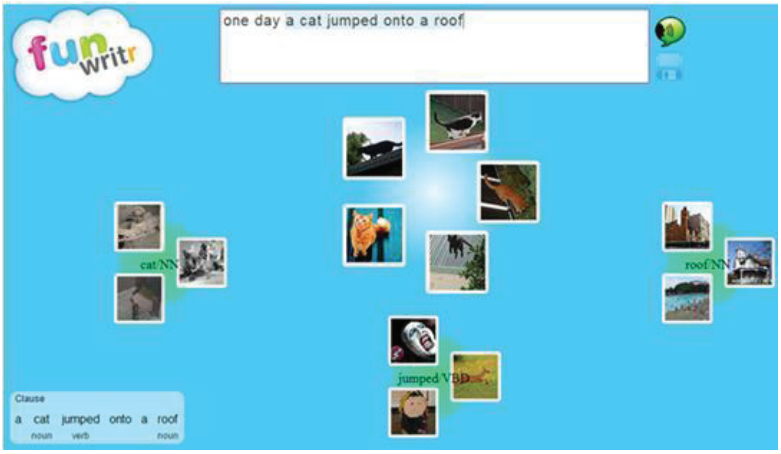

Figure 2. FunWritr Composition Space

In Figure 2 above, each three-image word-based collage in the composition space (cat, jumped, roof) is clickable, activating a word meaning and disambiguation carousel/environment that displays images, definitions, and similar words for each distinct meaning of the word. In Figure 3 below, each meaning of the noun 'cat' is displayed in it's own panel. We designed FunWritr to employ several strategies to ensure the images returned are appropriate for the classroom environment. While using a dynamic, open-ended dataset like Flickr creates the possibility that potentially inappropriate content could be displayed in the course of an interaction we employ several strategies to mitigate these risks. Firstly, we filter, flag, and replace the 1250 words most likely to return potentially inappropriate content –swapping in relatively equivalent inoffensive words in their stead. Also, our image sorting algorithm strives for relevance over interestingness which we feel further reduces the potential for objectionable content. Finally we request images that fall in the category of 'safe content only' as defined by the Flickr community.

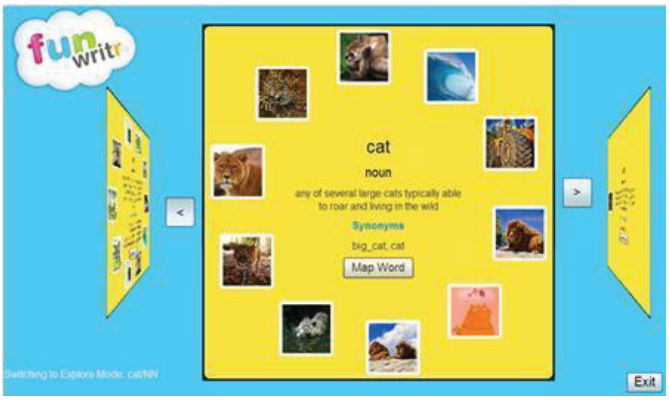

Figure 3. Clicking 'cat' in Figure 2 yields a word meaning disambiguation carousel

Specific meanings or senses of a word in Figure 3 are explorable via the ontological connections between particular meanings of a word and other words within the same semantic family. For example, Figure 4 shows a student who has navigated from 'cat' to the more specific-yet-related 'big cat,' showing the parent (feline) and child (lion, jaguar, etc.) connections in a clickable multimodal environment.

Figure 4. Clicking 'Map Word' in Figure 3 yields an interactive ontological map

Initial Use and Functionality

This section gives a brief recounting of FunWritr's current status and trajectory. We are currently refactoring the server-side code so that we can begin introducing a beta version of the application into several different learning spaces. In testing our current version with a number of elementary school students we came to the conclusion that in order to use it with entire classes of students we needed to improve its performance and stability (as it crashed with regularity and slowed noticeably when more than one person used it simultaneously. In our work with students we found that their patterns of use varied greatly. Some used it primarily as a composition space while others

preferred to become language tourists, exploring ontologies. Still others used it to generate pictures they wanted to see.

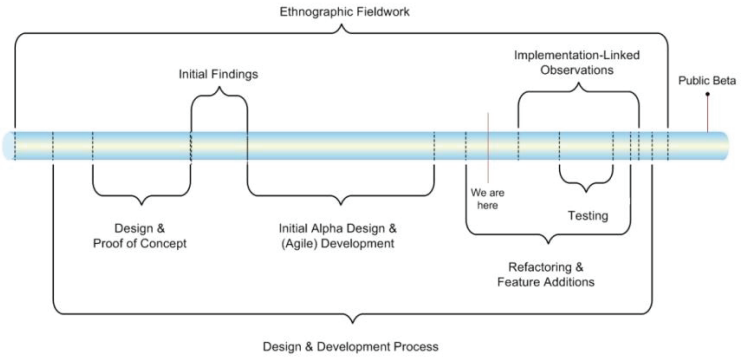

Figure 5. Timeline of the project from inception, to present, and beyond

Conclusion

Based on our experiences in working together to design the ET application FunWritr, to write conference papers, make presentations, and an analysis of member-generated reflections, we feel that unfunded, student-initiated research and development affinity groups hold encouraging potential to serve the ET field as an untapped and innovative approach to research and design education. Over the past four years we have explored and experimented with new ideas pertinent to our field and potentially beneficial to young learners. Through the interwoven individualistic and group learning process of design and production, we produced relevant research while developing transferable and sought after ET competencies and skills. In retrospect, our group offered and continues to offer the possibility of experimenting ideas via trial and error in a supportive ET design context where failure is as much an opportunity for learning and growth as success is. We have opportunities to cultivate qualities of leadership, collaboration, and communication. Qualities that are indispensable to the field of ET research and design.

Furthermore, in thinking about and employing a number of inter-related ET design elements, we have been able to sidestep the critique that advances in technology drive ET development to the detriment of pedagogy (Heift & Schulze, 2007). Instead of pitting pedagogy against technology, we have shown how multiple factors can implicitly and/or explicitly, powerfully influence the creation of ET applications (Garrett, 2009). By taking an explicit, deliberate orientation to inter-factor resonance (Der-Thanq et al., 2007), we feel we have designed an epistemologically, theoretically, and pedagogically congruent application as well as ET design process that incorporates sound curricular, learning theory, pedagogy, contextual understandings, recent socio-technological developments, and the best development methodology available given our affinity-based ET design orientation.

Implications

The iterative, collaborative, shifting act of designing educational technologies for real-world contexts puts designers and developers in the heady and humbling position of creator. The instructional systems, digital worlds, and microworlds (Papert, 1980) that emerge from their efforts require a great deal of time and effort to create. By working together in affinity-based ET design groups, students of ET design can contribute to the field, build community, grow as ET designers and researchers, and add marketable skills while still in school. With minimal levels of mentoring and institutional support other groups like ours can be created and supported.

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Programming Sketches: a bricolage approach to teaching computer programming in design education

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Abstract: Many architecture schools have started to teach computer programming as part of their design education. Their main pedagogies follow a conventional computer science approach, which has a high failure rate and is less effective for novice learners. This paper describes a novel approach to developing a curriculum, "Programming Sketches", to teach computer programming to architecture students in the context of design education. A bricolage-based approach with an atelier learning environment was explored. Instead of focusing on learning the knowledge of computer programming language, students were prompted to develop their own ways of transforming design thinking into a programming structure with an incrementally repeating manner. The reconfiguring and externalizing process of students' varying design work and the iterative development of programming structures made students' learning progress transparent. Incremental iteration is at the centre of this successful progress. The daily exercises decompose debugging and make the error-finding process quick and easy. These processes reduce the burden on instructors by permitting easy detection and correction of students' errors. This study describes a successful learning experience of novice students of computer programming and discusses how to apply pedagogical variations for cognitively varying learners.

Keywords: Bricolage, Computer programming, Design education.

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Introduction

Susman (1994) argues that human history is the history of tool development and extensions of the human body. A tool changes not just the way a person uses his body but the way the user thinks and understands the environment around him. Architectural history could be understood as the history of design tool developments and extensions of architects' practice. Albrecht Dürer's (1525) perspective machine enabled architects to measure the sizes of objects in varying distances and compare them proportionally and get better control over objects and space. This new capability has changed the way architects understand space and objects as they actually are (Burke 1986).

The changes of tools have transformed architects' understanding of design and the way architects design. The recent digital technology is transforming architecture practices (Kalay 2004) and the way architects reason about architectural forms and their capabilities (Picon 2010). Use of computer programming to develop new computational tools, in contrast to the use of mouse clicks to operate prebuilt CAD software, and working with these computational tools, have changed the practice of architecture radically and provided new visions and tectonics. The systematic use of computer programming has created a new boundary of architectural perspective and led to an evolutionary process that gives high-level control over commercial software and complex geometries (Terzidis 2006). Architects started to have a new partner for architectural conceptions; although, it is in an early state.

The US National Academies (2003) made recommendations for a new biology curriculum. The recommendations included a computer science curriculum for higher education, such as courses for teaching future biologists computer programming, algorithms, and visualizations. The purpose of teaching computer science is rather simple: National Research Council do not want new biological researches to be bounded by off-the-shelf software and applications. The off-the-shelf software packages are not able to support all new ideas. Researchers who know how to develop their own tools make the most improvements in the body of knowledge, compared to those who depend on "preconceived" software. Although they become essential parts in biological research, pre-existing tools constrain the research activities. The boundaries include not simply methodological procedures, but also conceptual and logical capabilities (Felton 2002).

In contrast to the biology curriculum that already has adapted computer science subjects, architecture schools only recently have started to teach introductory computer programming as part of their design education. Their main pedagogies are following a conventional computer science approach which has a high failure rate and is less effective for novice learners (Bennedsen and Caspersen 2007). This paper describes a novel approach to developing a curriculum, "Programming Sketches", to teach computer programming for architecture students in the context of design education. A bricolage-based approach with atelier learning environment was explored. Instead of focusing on learning the knowledge of computer programming language, students were prompted to develop their own ways of transforming design thinking into a programming structure with an incrementally repeating manner. This study illuminates the successful learning experience of novice students of computer programming and discusses how to apply pedagogical variations for cognitively varying learners.

Bricolage

Theoretical Background

Bricolage is a method of constructing a new object or making a solution for a problem using available tools and materials on hand. Some real-life examples of bricolage activity are using broken branches instead of chopsticks to pick up food, sitting on a flat rock instead of a chair, and burning dried leaves for fire while camping. If we wish to provide useful examples in the fine arts, Marcel Duchamp's *Fountain* (1917), and Andy Warhol's pop art, including *Marilyn Diptych* (1962) and *Campbell's Soup* (1968), may well illustrate the meaning of bricolage.

In the context of architecture, Le Corbusier's projects, Christopher Alexander's design process, and post-modern architecture could illustrate the meaning of bricolage. Rowe and Koetter (1984) explain Le Corbusier's design process as the selecting of historical elements of architecture and re-assembling of them in his projects, plus identifying the project's contexts and redefining the found historical elements. Louridas (1999) describes how Alexander proposed design patterns with which anyone could design buildings and cities as harmonious as naturally grown towns. For Alexander, a design process was to identify a new design pattern through iterative manipulations of classic patterns. A design could evolve and become a new norm by selective overlaying, juxtaposition, combination and recombination of existing patterns.

In contrast to the modern architecture that utilized monotonous and hierarchical design, postmodern architecture allowed pluralistic design approaches and used multiple design elements borrowed from historic architectures for a single project. Postmodern approaches freely manipulate the original meanings and functions of traditional architectural elements following the characteristics and the site contexts of a project (Louridas 1999). For example, *The Arthur M. Sackler Museum* (1985) by James Stirling is probably a good example of pluralistic uses of historic elements sensitive to the project environment. Due to these selective and pluralistic processes, postmodernism is considered to be bricolage.

Claude Levi-Strauss first described bricolage in his book, *The Savage Mind*, to illustrate the nature of mythological thinking. He explained that mythology was a result of human invention and is composed of previous human experiences. The elements of story in mythology are assemblies of elements in human lives that were re-composed and redefined within the context of a new story. Levi-Strauss (1968) described a "bricoleur" as a problem solver in a primitive tribal society. The number of his tools was small. Materials that he could utilize were limited. In contrast, the problems that he needed to solve varied widely. Bricolage was probably a natural result in this harsh environment. The essential process of bricolage was a dialogue between a bricoleur and his tools and materials. Through this conversation, he could reconceptualize the purposes of tools and restructure the nature of materials so that they became useful to provide a solution for varying problems contexts within his confined situation.

Bricolage Approach

Much research has studied students, who are not familiar with canonical/hierarchical thinking, experiencing "intellectual wars" throughout the introductory programming course. Students were forced to become another person and these experiences led them to negate the canonical instruction (Turkle and Papert 1990).

In terms of learning goals, a bricolage method of instruction should allow diverse ways of learning computer programming. Students should be able to learn programming following their mental models of programming as an extension of their design processes. For example, some students understand programming as city planning, some as fabrication processes, some as data processing, and some as mathematical manipulation of pattern making. Design students may prefer to develop their own ideas instead of solving given problems.

In terms of learning processes, students should experience an evolutionary thinking that they cannot imagine through the dialogues between themselves and programming language. Students need to organize and reorganize their design thinking and programming repeatedly.

In terms of instructional method, students should vicariously experience coding. Accordingly, they can be asked to watch the instructor's live-coding, the developmental process of an algorithm, instead of simply hearing explanations of its finished forms (McLean and Wiggins 2010). In bricolage instruction, Students also need to visualize or materialize their design thinking (Stiller 2009).

Programming Sketches

Learning Goals

Lakoff and Johnson (2003) argue that metaphors structure the way people perceive and understand. This workshop uses a computer programming practice as a metaphor to understand design and creative design processes. The incrementally iterative software design process will be used to provide novice designers a mental model of design as an evolutionary process, overcoming the prevalent waterfall model (Perkins and Grotzer 2005).

Just as the knowledge of computer programming has recently been highlighted from a new perspective, that it improves learners' general problem solving skills (Wing 2004), the use of computer programming may extend the boundary of design and significantly improve design competency. The incremental process of developing software will provide novice designers with chances to reframe design perceptions and to experience design thinking in analogical and metacognitive ways. The practice of designing programming structures will probably transfer students' design knowledge into computational concepts, and their programming exercises will, reciprocally, improve students' deep understanding of underlying complex causalities in design processes.

Educational Strategies

After surveys of the theoretical backgrounds of bricolage and of educational experiments that utilize bricolage in programming education, six educational strategies are identified to teach introductory computer programming to architectural design students:

1. Object to Think With: Students propose projects with which they transform their design ideas into programming language. In contrast to instructor's typical problem sets, student- driven projects increase their level of engagement and improve the level of personalization. Although students propose initial ideas to convert into computer programming, they will continue to develop concrete ideas throughout the workshop. Any radical changes in design ideas are welcomed and encouraged.

2. Atelier Environment: Students are asked to learn programming as if they were learning to sketch or paint in an atelier. Spending time with programming is the most critical factor in learning programming the way they learn to draw. Structured programming is introduced as a framework, as in a standard programming course. However, the use of structured programming is suggested as a template, as if it is an empty sketchbook, within which students build up their own codes.

3. Daily Coding Exercises: Cognitive changes require time. Instead of radical changes of mental models of programming, incremental iterations are applied. Students learn programming through daily coding exercises instead of biweekly problem-sets or examinations. The exercise reduces the burden of "cognitive wars" that many novice learners might experience (Turkle and Papert 1990).

4. Sketching and Diagramming: To externalize students' design thinking and to provide cognitive aids while developing a computer program, sketching and diagramming exercises are prompted, which make students' coding process easier by externalizing their design and encouraging analytical understanding of their design thinking.

5. Limited Range of Programming Syntax: The programming language Python is selected as a target educational language mainly because of the language's unusually minimal amount of syntax. Of the small amount of syntax, only the base forms of structured programming are taught. This limited set of syntax prevents any confusion and allows students to reconfigure the meaning of programming syntax in the context of their projects. Students reconceptualize the purpose of programming and identify new uses of the given programming language. Students learn computational concepts through trial-and-error approaches by writing small codes repeatedly. Online reading material is provided for students who want to read additional references.

6. Real-time Developments: The instructor's real-time coding provides a chance for students to experience the developmental process of algorithms as if they are writing the code.

The main goal of these strategies is to accommodate students' varying learning styles so that they can have cognitively comfortable experiences while learning computer programming.

Course Structure

The workshop took place in fall 2011 at the Department of Architecture, Massachusetts Institute of Technology. The course consisted of three two-week modules. The main content of the first module was procedural programming including topics such as variables, functions, and structured programming. The second module taught object-oriented programming (OOP) including class, instance, inheritance, and association. The last module teaches software development process using examples of biological systems such as cellular automata, Lindenmayer system, and flocking algorithm.

The workshop had six weekly classes. Each class ran three hours with two sections. The first had a lecture explaining the background theory of computer programming and related design theories. To promote design thinking, many architectural precedents that had elements similar to computational design were presented, such as the recursive garden design of Taj Mahal (1653), the modular theory of Durand (Villari 1991), and contemporary projects using generative algorithms.

Module 1: Procedural Programming

	Shawn	Jane	Tim	Kelly	Molly	Linden	Mayson
9/26 Mon	Shawn927.py		Tim927a.py		Molly927a.py		
9/27 Tue	Shawn928a.py Shawn928b.py	Jane0928.py	Tim928a.py Tim928b.py	Kelly928a.py	Molly928a.py Molly929a.py		Mayson928.py
9/28 Wed	Shawn929.py	Jane0929.py	Tim929.py	Kelly929.py	Molly929b.py Molly929c.py		Mayson929.py
9/29 Thu	Shawn930.py			Kelly930.py	Molly930.py		Mayson930.py
9/30 Fri	Shawn1001.py			Kelly1001.py	Molly1001.py		
10/1 Sat	Shawn1002a.py Shawn1002b.py	Jane0930.py Jane1001.py Jane1002.py			Molly1002a.py Molly1002b.py Molly1002c.py		Maysoncores.py
10/2 Sun							MaysonCores2.py MaysonPArray.py
10/4 Tue	Shawn1004.py				MollyCombine.py MollyCombine.py	KochProc.py Koch1004.py	Mayson1004a.py Mayson1004b.py
10/5 Wed	Shawn1005.py	Jane1004.py Jane1005.py			MollyImport.py MollyProgArea.py	Koch1005.py	Mayson1005.py
10/6 Thu	Shawn1006a.py Shawn1006b.py		Tim930.py Tim1001.py Tim1002a.py Tim1002b.py Tim1002c.py	Kelly1002.py Kelly1004.py Kelly1005.py Kelly1006.py	MollyCombine2.py		Mayson1006.py
10/7 Fri	structure.py splitCurveAreaMacro.py				defCombine.py	Koch1006.py Koch1007.py	
10/8 Sat	Shawn1008Structure.py				defCombine1008.py		
10/9 Sun			1006Functions.py experimenta.py 1003daily.py 1004Functions.py 1005Functions.py copycode.py		defCombine1009.py	Linden1009Koch Linden1009Peak Linden1009Rot Linden1009Tri	

Figure 1. An archive of students' daily coding exercises in the first module (the procedural programming). Source: The workshop archive.

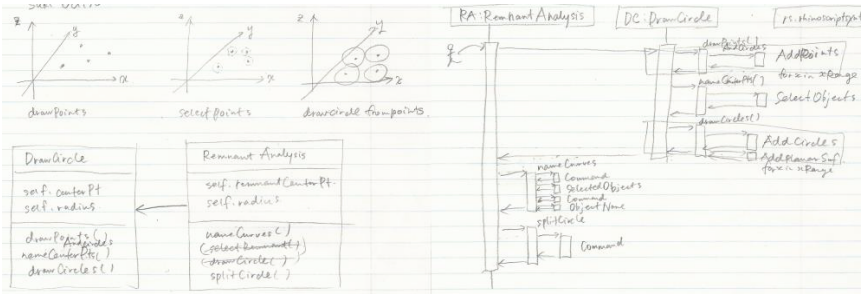

Figure 2. Examples of a student's daily sketches, class diagrams, and sequence diagrams. Source: The workshop archive.

The second part was the instructor's real-time coding to explain computational concepts in demo codes. The instructional goal was illustrating the developmental process of various algorithms, not the finished forms of codes. To achieve this goal, the

instructor showed students demonstrations using developmental diagrams and analytical sketches. At the same time, students were prompted to create their own sketches and diagrams for software design.

After each class, daily coding exercises were followed (Figure 1). Students were asked to write a short code every day using a function which is the base module of a structured programming. It might take approximately an hour for novice students. Fragmenting an assignment from a medium-size program into small chunks of daily exercises helped students to identify logical errors and programming mistakes with ease (Figure 2 and Figure 3). Consequently, students could focus on programming without frustrations. The fragmented codes also helped the instructor understand students' codes fast and easily. This method prevented students from generating messy codes with logical errors that would make both the instructor and students easily become exhausted.

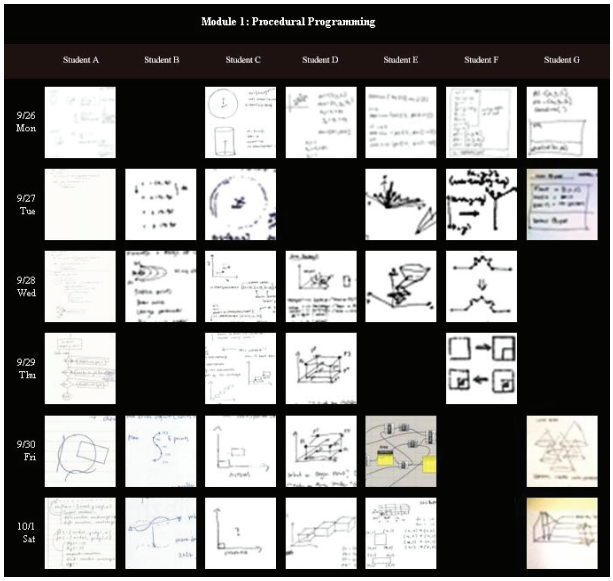

Figure 3. Examples of students' daily sketches and diagrams in the first module (procedural programming). Source: The workshop archive.

The purpose of assignments was to let students develop a computational model of their noncomputational design ideas incrementally. They completed small parts of their original design within the range of their limited programming knowledge. At first, students were asked to develop a skeletal code, almost empty but having logical functions that could illustrate the main algorithm of a program, without an error using their limited programming syntax and usability. Then, students were asked to re-develop their codes while they were gaining more programming knowledge.

In terms of the bricolage perspective, students need to redefine their design thinking and their programming structure bi-directionally. Students might need to extract only small chunks of the original design and to complete a code that could be tested quickly. Students might, on the other hand, selectively re-organize certain parts to test the overall computability of their original design.

Students' programming fluencies were measured in two ways. On one hand, the instructor evaluated students' codes to measure whether they could purposefully organized a program using functions, classes, and data structures, and whether they could add comments appropriately. On the other hand, students' final design projects were evaluated to measure whether students could successfully transform their design ideas into programming structures.

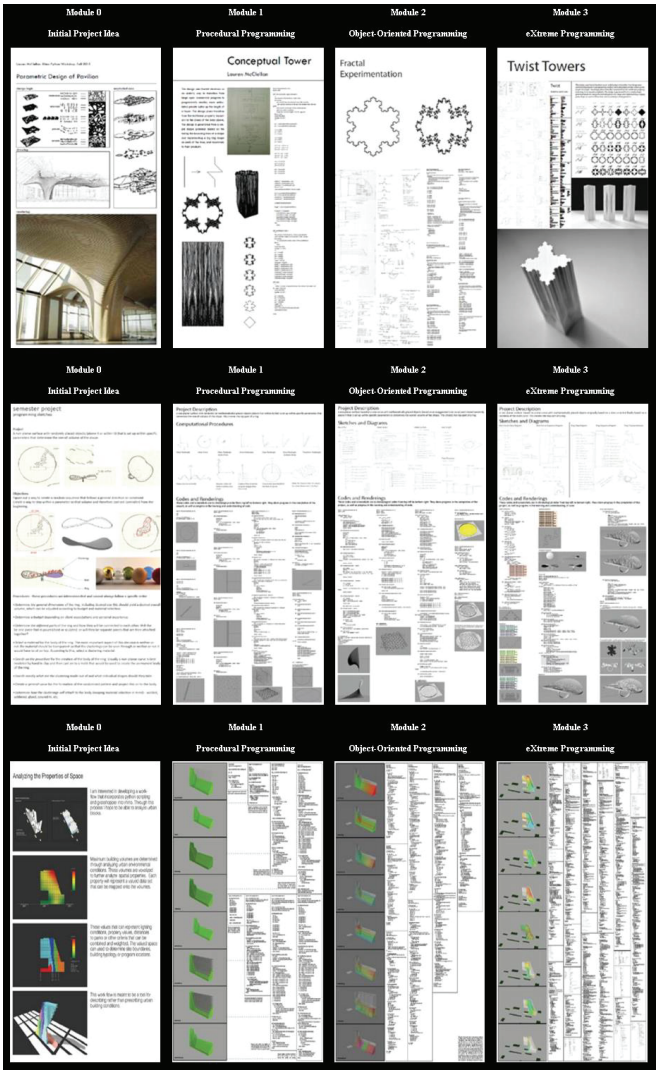

Figure 4. Three students' examples of their project developments over three modules (The module 0 is a student's initial project proposal). Source: The workshop archive.

Findings

Overall Results

Forty-five students applied for the workshop, and eight students were randomly selected. The students had a wide spectrum in their academic and professional backgrounds. One student took an introductory programming course three years ago, and two students had a minor experience with a visual programming language, Grasshopper. Most students had no background in Python, the target programming language.

The workshop started with eight students and seven students successfully completed the course. One student dropped at third week. The main reason was due to her lack of experience using computer-aided design software, Rhinoceros 3D, which was the main tool for writing the Python programming language. She later explained that the unfamiliarity of the software substantially increased the difficulty of learning the programming language and caused her to drop the course.

It is widely reported that object-oriented programming (OOP) is difficult to learn for novice programmers (Bennedsen and Caspersen 2007). Most students, however, learned the idea of abstraction and modularity of programming and wrote working codes successfully for their design projects. Two students almost instantly got insight into modular thinking on the first day of learning OOP. It appears that the concrete understanding of modular concept and structured programming in the procedural programming might improve their learning of OOP.

Students naturally have shown varying developmental processes; however, their learning curves are highly dependent on their frequency of exercises. A positive relationship between the frequency of code submissions and the number of lines of code was observed. The more frequently students submit their codes, the more lines they can handle. The number of lines that students could handle was beyond multiple hundreds.

Advantages

Student-driven projects increased their level of engagement in programming. The relationships between students' personal motivation and their development of programming skills were clearly observed. One student was working for her master's thesis which helped her to maintain a single project throughout the workshop; she showed a consistent increase in the complexity and sophistication of her programming. Another student worked for her personal jewellery fabrication, which significantly increased the level of engagement throughout the workshop. Although any physical models were not necessary, she fabricated her project, and had additional projects, both of which were not at all a requirement. Her motivation drove her to continue the work outside of the boundary of the workshop. A third student also worked on his architectural project which is a simulation of the internal patterns of the urban condition in a building. The number of lines of code he could handle successfully was over three hundred lines, which is impressive, considering that this workshop was his first programming course. Most importantly, he extended codes without increasing their complexity. He later told the instructor that the daily coding with OOP was highly efficient and conceptually clear, so that he could continue his work without difficulties.

For novice students, typical biweekly problem-sets cause many problems. Even when problems are designed for novice programmers, the size of a problem is too large

for many students to solve easily. Students may accumulate errors and logical problems, and their approaches for solving a problem are varying and not straightforward. The weekly feedback from office hours or any additional lab sessions is too late to be timely and may cause many frustrating moments for students. Accordingly, students spend many hours trying to identify trivial errors, such as typos and misuses of syntax. The daily exercises eliminate those errors. Students' learning can become highly effective and they can speed up their learning progress.

Some students need to change their projects frequently while their understanding of programming is increasing. They need to reconfigure the learning goals and the size of projects considering their limited time and programming knowledge. One student naturally extended her understanding of programming from this workshop to other classes and combined multiple course projects successfully.

The process of externalizing students' thinking using sketching and diagramming is effective in correcting bugs in their codes and identifying logical errors. Unified modelling language (UML) was especially useful in understanding complex relationships in programming codes and their design ideas. Many students identified and corrected errors, and were able to extend their codes by themselves while drawing UMLs. Diagramming and analytical sketching ideas made the process of transferring design thinking into programming structure smooth and transparent.

Students' programming backgrounds were different, and their learning curves covered a wide spectrum. The fragment-sized exercises improved students' learning by allowing the instructor to spend more time in supporting various learning styles than correcting errors in students' codes. Understanding various styles of students' learning, design thinking, and programming logic is a time-consuming process. These varying cognitive processes could not be managed without modular and timely feedback.

Disadvantages

Students who were familiar with canonical thinking showed conceptual misunderstandings with the bricolage-based structure. They needed to have a concrete final goal even before they started the workshop. It appeared that they had difficulty in understanding the concept of the evolutionary process and could not accept easily the bricolage as a proper learning and design process. Those students who expected a traditional style of programming lecture spent time searching sample codes and reading many online tutorials, instead of directly learning by doing.

Not all students submitted their daily codes regularly. Students in the architectural design program explained their lack of time during weekdays as due to their heavy studio work. First-year students especially experienced a hard time because of their intensive core studio schedules. Accordingly, their learning showed relatively low performance compared to students in non-architectural design programs.

Students' initial learning curves were dependent on their familiarities with the programming environment. Students who rarely used the computer-aided software package, Rhinoceros 3D, had problems, and they needed additional exercises to be comfortable with the software. Other students who were already fluent in using the software took advantage of their knowledge by making advanced geometry into a programming structure.

Those who experienced a visual programming language showed a tendency to resist sketching and diagramming exercises. Some students preferred to work with a visual programming language and then translated the graphical codes into the Python codes. For them, the graphical codes were sketches and diagrams. They actually submitted the

visual codes instead of sketches. These tendencies disappeared when they started to learn object-oriented programming. This was mainly because the visual programming language did not support OOP and students' attempts at translation were not possible any more. The translating habits also made some students' learning of OOP slower than for those who did not have any programming experience. Yet the previous programming knowledge enabled them to accelerate their learning speeds during later stages.

Discussion

Further Studies

Several issues have been identified. The first is how to extend the six-week pilot study into twelve to fourteen weeks of a standard full semester-long course in higher education. It is necessary to consider additional computer science contents for the extended period. Fundamental algorithms, numerical modeling, and simulation may be a reasonable fit. The second issue is how to collaborate with traditional architectural design studio education. Should the instruction in computer programming be independent, as with other technology and history classes? Should architecture schools invent a computer programming collaborative design studio?

The developments in online and mobile technology make the time-consuming management of students' code a minor issue. Yet, dealing with students' varying learning styles is still not an easy problem for instructors. There is no dominant way to understand the design process, and the spectrum of students' design thinking is extremely wide. The standard engineering and science school-based, so-called problem-solving approach to teach computer programming may not be effective in teaching design school students.

Conclusions

The use of a bricolage approach significantly improved novice programmers' learning of computer programming. The reconfiguring and externalizing process of students' varying design work and the iterative development of programming structures made students' learning progress transparent. Incremental iteration is at the centre of this successful progress. The daily exercises decompose debugging and make the error-finding process quick and easy. Also, these processes reduce the burden on instructors by permitting easy detection and correction of students' errors.

Previously, Stiller (2009) used a bricolage approach to introductory programming in a computer science department, and she did not recommend this approach for students in that kind of school. However, the successful results of this study recommended for introductory computer programming courses in design schools. Bricolage was historically used for art and design education, and accordingly might fit well in architectural design education. Design, as Alexander (1964) maintained, is a problem-setting and problem-defining process. The bricolage approach to teaching computer programming may be a good solution for this unique domain of teaching design students highly technological knowledge, including computer programming.

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Reflections and prospects about the relationship between master thesis and design project in interior architectural education

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Abstract: The Bologna process, initiated in 1999, propelled an ongoing reform of the European higher education. One of many processes is the integration of design schools – formerly belonging to a polytechnic or beaux-arts tradition – into academia. It presents challenges to universities and design schools alike. Commonly, many debates centre around the issue of research: output media, 'measurability' of output and the relationship between research and education. In this paper we would like to focus on the latter by discussing the set-up and organisation of our master programme in interior architecture. Reflecting about existing material of our students stimulated us to explain the strengths, weaknesses, opportunities and threats of our current approach. We also propose a line of reasoning about re-organizing the set-up of master thesis and design project at our department in the years to come. In our view, this line of reasoning will allow our students to better blend their research with the design project.

Keywords: interior architecture, philosophy of design curriculum, master thesis, master design project.

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Introduction

The Bologna process, initiated in 1999, started a reform of the European higher education that went beyond its initial intention to calibrate programmes and diplomas (European Union 2010). In European higher education, the weight of study programmes is expressed in ECTS credits (European Credit Transfer System) with one academic year usually containing 60 credits. Architecture is commonly offered in 5 years: 3 bachelors (180 ECTS) and 2 master years (120 ECTS). For interior architecture the bachelor programme is of the same length, but the master programme often represents only 60 ECTS credits.

One of many processes that Bologna initiated was the integration of design schools - formerly belonging to a polytechnic or beaux-arts tradition - into academia. This creates challenges to universities and design schools alike. Both tend to see opportunities and develop, for example, an historical argument that universities return to their Renaissance concept of studying the Liberal Arts in all its disciplines – including fine arts, drama, architecture etcetera. But despite these unequivocal aspects, there are equally concerns on both sides. Commonly, they have the issue of research as subject of debate: the media in which output can be manifested (e.g., recognised journal papers versus a musical composition or a painting), 'measurability' of output (e.g., ranked journal and citation index versus an exhibition organised by others of one's work as an architect) and the relationship between research and education.

In this paper we would like to focus on the latter by discussing our master programme in interior architecture.

Where do we come from?

We started our reformed master programme in 2008, following an act of parliament that stipulated the integration of all higher education programmes with more than 180 ECTS credits. Our interior architecture school formerly belonged to the beaux-arts tradition, but as it offers a 4-year programme, it had to prepare itself for becoming part of a university faculty in 2013. It was clear that this integration process was not to affect the specificity of our programme: the quest for a balance between 'objective' and 'subjective types of knowing'. And as the discipline of interior architecture is seeking a stronger body of theory (Marshall-Baker 2000; Clemons & Eckman 2008), this integration-process into academia provided an almost existential framework. Dickinson et al. (2009: 3) state that "interior design is a relatively new field of knowledge, particularly when we look at the induction of interior design programmes at the university level" and Friedman (2001) continues when he indicates that "there is confusion over the true definition of research and how valuable some interior design educators and practitioners find research to the design process." The basic concept of our master programme was therefore to link individual research of the students directly to their design project.

Entering our master programme, students have to choose one out of four units, which each consist of a thematic seminar and a design studio. The four units coincide with the thematic selection of our PhD research areas: retail design, scenography, adaptive reuse of buildings and domesticity. The unit that master students eventually choose will 'colour' their master project.

The master consists of two parts: 'Master Thesis' and 'Master Design Project'. The first one contains the research part and it accounts for 10 out of 30 credits; the

remaining 20 credits are for the Master Design Project. In terms of timing, master students immediately start working on their thesis at the beginning of the academic year (mid September), which they need to have finalized by the end of May (i.e., within a time frame of about nine months). In an ideal scenario, students also start reflecting about and working on their master design project in the same time period. In practice however, most students start to really work on their master design project in January (i.e., a time frame of about five months). At the end of May or at the beginning of June, they need to publicly defend their thesis and design work in front of a jury composed of design professors and renowned practitioners.

What kind of research?

Currently, interior architecture as such is a relative young discipline which still lacks a specific body of knowledge especially in relationship to architecture (Abercrombie 1990; Clemons & Eckman 2008, 2011; Edwards 2011). As a consequence, research in interior architecture typically and mainly relies on theoretical and methodological knowledge of relevant adjacent disciplines. By using information from these disciplines, researchers in interior architecture strive to add to design knowledge (Petermans & Van Cleempoel 2010).

Taken that into account, most of our students' theses of the last five years concern research about interior architecture, whereby they typically start with choosing a particular topic, object, building or environment that they want to explore within the framework of their master thesis. The path which they follow to start collecting information about their topic of interest is being influenced by the unit wherein they have engaged themselves in their master year (respectively retail design, scenography, adaptive reuse or domesticity), but in general terms, they usually describe, explore and explain the phenomena which they study while relying on knowledge from adjacent disciplines such as for instance architecture, philosophy, product design, environmental psychology or marketing. They all are being stimulated to study and evaluate these knowledge sources with the eyes and the mind-set of a soon-to-be interior architect.

The central idea of this set-up and organisation of our master programme in interior architecture is thus that the results of the thesis should help to inform and guide the student's design process. We have operated this concept for the last five years and tutors have noticed that many students wrestle with translating the findings of their thesis into their design project.

Faced with this challenge, we want to discuss our current philosophy with regards to the interaction between master thesis and the design project within our four thematic seminars. Building on existing material of our students, we explain the strengths, weaknesses, opportunities and threats of this approach with regards to the organisation and progress of master thesis and design project. Building on our accumulated insights originating in the work at our department, we propose a line of reasoning about the re-organizing of the set-up of master thesis and design project at our department in the years to come. In our view, this line of reasoning will allow our students to better blend their research with the design project.

Where are we now?

In this section a SWOT analysis is used as a means to identify the key internal and external factors of our current approach with regards to the organization of master thesis and design project. Examining and reflecting about students' works from the past

few years inspired us to help clarify the strengths, weaknesses, opportunities and threats of our current method. As usual with SWOT analyses, issues that can be a 'strength' for one aspect can be a 'weakness' for another.

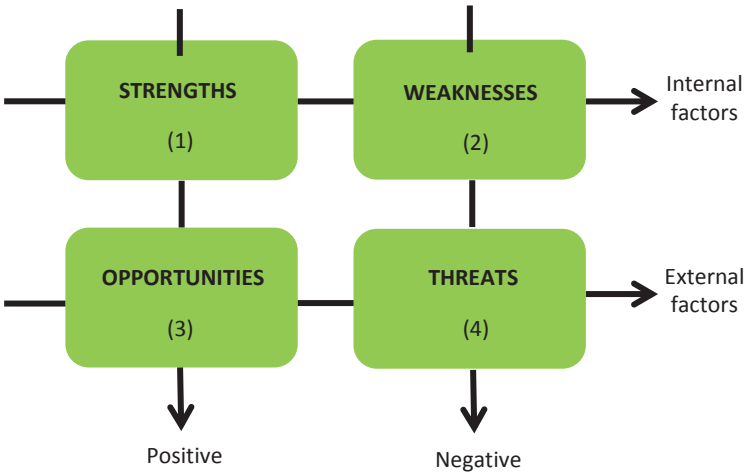

Figure 1. SWOT analysis.

For each SWOT element, we formulate factors that can be traced back (i) to an individual person (i.e., a student), or (ii) to our interior architectural department and the choices that have been made in the last few years to define the design curriculum and the organisation of master thesis and design project.

(1) Strengths:

- Topic selection based on **personal background and student's identity**: when students choose a particular unit, master thesis and design project on the basis of their personal interest and identity, they usually are well motivated and passionate to truly dive into their topic of interest. Indeed, after three bachelor years, most students have a fairly good idea which topic interests them or which direction suits them, inspires and triggers them to further explore not only in their master year but also afterwards, in their future professional career. Knowing and realizing that can then be a motivation for making a choice for a particular unit, triggered by the idea of challenging oneself.
- **Collaboration with external parties**: by doing research on a particular topic students can get the opportunity to work with renowned designers, to study in-depth illustrious case studies etcetera.
- **Developing a strong portfolio:** translating their research results into an appealing design project allows students to develop a strong portfolio, which is important for their individual development as an interior architect.

- **Coupling of master thesis to design project:** as described in the first sections of the paper, in 2008 our master programme was thoroughly reformed. Master thesis and design project have been rethought, whereby the central idea is that the results of the thesis should help to inform and guide the design project. In the authors' viewpoints, since the thorough reform of the curriculum, the overall quality level of master thesis and design project has risen. This evolution almost certainly has been influenced by the fact that since the reform of our curriculum, there has been more attention towards teaching students research skills and methods. As a consequence, from 2008 to date, there are several examples of master students' work that nicely illustrate the additional value of coupling thesis and design project.
- Depending on the unit that they choose, students' design projects can originate in an **existing problem situation that is present in design practice** (e.g., proprietors of a particular building who are looking for a 'suitable' reuse, a city that is searching for the creation of a new and original interpretation of a particular place specifically focused on youngsters etcetera). Students thus have the feeling to be working on a very concrete and socially relevant research topic. In these projects, the research questions are already explicit from the start, which makes the link between master thesis and design project stronger and in many cases also leads to stronger design projects.

(2) Weaknesses:

- **Multitasking and time management**: next to working on their master thesis and design project, master students also need to invest a substantial period of time in the first semester of their master year to conduct an internship at a design studio. This first real confrontation with the daily design practice does indeed usurp a lot of their resources, but combined with the perception of having sufficient time due to the deadline tends to interfere with working on the master thesis - especially given the relatively "long-term" deadline (May).
- **Intake of first-year students**: currently, students who start studying interior architecture have a very diverse educational background. On the one hand, students in interior architecture seem to be attracted by the creative singularity of a future interior architecture profession in which they – evidently – need to be properly trained. On the other hand, interior architecture is an academic education, which legally 'obliges' universities to train and 'develop' students in a way that clearly differs from professional bachelors in interior design that are organised at university colleges. Currently, many universities that organise interior architectural education struggle to find an equilibrium between attention for practice and theory. As a consequence, the communication about 'do and don'ts' to future students is not always that clear, so that various first-year students seem to have incorrect expectations when they start. In addition, interior architecture currently does not truly have an academic appearance, which also influences the intake of first-year students. As a consequence, in the master year, supervisors are being confronted with a group of students with a very diverse educational background, which undoubtedly influences

the work they do in the framework of their master thesis and design project.

- **Familiarity with supervisors leading to projects "aimed to please"**: many of our master students know the master unit's supervisors already from courses and studios in their bachelor years. As a consequence, they have a relative good idea about 'what to expect' from the various supervisors: they often know their work and this seems to give a number of students the idea that their master thesis and design project need to meet the expectations which they seem to have with particular supervisors. As a result, many of these theses currently are rather confirmatory; students clearly have the idea that they have to work out their thesis according to a particular frame which they do not easily break through. As a consequence, many theses seem to be rather 'executive works' (i.e., in the sense of 'I study and report about issues which I think the supervisor thinks are important') and do not seem to result in innovative pieces of research that truly contribute to the body of knowledge of our discipline.
- **Identification with subject of master thesis**: if students choose to focus on a particular research topic that is being proposed by a particular supervisor but which not fully suits or interests them personally, they often find it rather hard to truly get into their stride. In addition, they do not seem to fully immerse or engage themselves into their research.
- **Despite the explicit coupling** of master thesis to design project, they are still too frequently considered as **separate entities** and in their executions effectively decoupled from one another. This decoupling leads to several negative outcomes: a decrease in the perceived relevance of the research activities for the design project, students who get caught up in their research lose sight of the project, or research results that are in essence no longer applicable to the design project.
- '… **design is not only an art, but is also a science that can utilize empirical evidence'**[1]: as a design discipline soon to be integrated in a university context, interior architecture struggles with the search for finding an equilibrium between so-called 'scientific' and 'artistic' research methods. Master theses in interior architecture currently mostly try to work according to the framework and viewpoints of well-established 'scientific' methods. Hence, there are few students who explore how 'artistic' research methods could help them to reach their goal, namely to work out a thesis whose results help to guide the development of their design project. Our department thus needs to further reflect about the use of so-called 'scientific' and 'artistic' research methods as means that help our master students to obtain their goal, namely the development of a good and consistent master thesis and design project that both contribute to the further development of the body of knowledge of interior architecture.
- **'The medium is the message'**: currently, a master thesis typically is a written document in the style of an academic paper. The current style and structure of the medium seem to intimidate some students.

[1] Citation from Dickinson et al., 2009

- **Well-defined contents**: currently, students need to follow a prescribed table of contents which they need to fill in with their research findings, that can be more theoretically or empirically inspired. The end results are rather 'decent' master theses, which seldom are being translated in truly innovative design projects. They seem to not dare to take risks, in this respect.

(3) Opportunities:

- **Integration in a university context –'audience' specific opportunities:** 'migrating' architectural and interior architectural education from university college to a university level communicates another 'message' or 'image' about our core product, namely our education and research, which potentially appeals to more foreign students or to people from professional practice. Possibly also the intake of first-year students will change for the better, due to this evolution.
  Integration in a university context – 'department' specific opportunities: as from September 2013, architectural and interior architectural education in Belgium officially will be integrated into a university context. This development undoubtedly will influence and fortify the research character of the discipline, which will be translated in the further development of research in interior architecture and contributions to the discipline's body of theory.

(4) Threats:

- **Rumours and reputation**: it is self-evident that students talk about the diverse design studios and their respective supervisors. In an ideal scenario, 3rd year students who need to make a choice for a particular studio for their master year do not let their choice for a particular studio be influenced by these kinds of talks. In practice, there will always be students who choose for a particular studio while basing themselves mainly on rather pragmatic arguments.
- **Collaboration with other parties**: getting the possibility to come into contact with external parties or to get inspired by external parties can hugely distract students from their main research topic. Sometimes, students also do not have truly realistic expectations with regards to the participation and potential contribution of these external parties.
- **Nearby integration in a university context versus 'you can go your own way…'**: the inescapable movement of integrating into a university context seems to worry many students and supervisors. They have the idea that the integration will force our design department to fit within a particular, well-defined and established university frame wherein the existing 'freedom' of filling-in a master thesis and design project in your own way will be abandoned. In addition, the integration in a university context might lead to a form of self-censorship by students and their supervisors, whereby the notion of 'research' is defined too narrowly, based solely on the scientific protocols and methodological rules valid in other academic disciplines.

Where do we want to go?

Our ambition is to stimulate students to produce even more qualitative and innovative projects and also accompanying research theses that are more representative of interior architecture as a design discipline. Specifically with regards to the intertwining of master thesis and project, we currently distinguish at least two main obstacles to reach this goal. On the one hand, the wide variety of types of projects, as already apparent in the four units, and, consequently, the broad range of issues student-designers have to deal with, are often not easily reconciled within the prescribed unitary structure and trajectory. On the other hand, the current lack of a solid conceptual, methodological and communicative framework of interior architecture as an academic discipline tends to push our students towards more traditional, "safe" research avenues, which, although certainly fruitful to some extent, do not tread onto what can be considered the core of a design discipline.

To address these obstacles, we have thoroughly reflected about the issue where we want to go with our master theses and design projects. Therefore, we want to propose to explicitly present students different types of trajectories that they can follow in their master year.

While acknowledging the fact that each project (and thesis) is unique, there are certainly identifiable types of projects: projects that share a similar structure, design process and methodology. Although this categorization, as visualized in figure 2, is by no means clear-cut, in our situation, this roughly corresponds to our four units that were discussed earlier in the paper. In essence, for each unit, a prototypical skeleton-structure and temporal path for the thesis-project are proposed with the following assumptions:

(i) The different functions of a thesis (contextualize and document, justify and transcend) can appear in different stages or parts of the thesis-project. For example, the "new" knowledge can be found in an innovative application of a new material for a piece of furniture versus the spatial and historical analysis of a to be reused building.

(ii) A particular set of necessary aspects needs to be addressed in each thesis-project (at least to a minimal degree), this to ensure and maximize relevance for the discipline: a broader theoretical framework (e.g. the concept of "experience economy"), conceptual reflections on spatial issues (e.g. how can "experience" be translated in a store design), and practical aspects from the "lowest" level of detail (scale 1:1, such as constructive details of a cashier desk) to the "largest" level (scale 1:50, such as the area to implement a certain store concept).

(iii) Given the limited amount of time and energy available to a student-researcher, not all projects will allow all of these aspects to be completed to the same degree. The relative importance of these aspects, i.e., the amount of time and energy students invest in each of these aspects, should reflect the specificity of the design challenge. The proposed "standard" distribution for the four different prototypical trajectories can be seen in Figure 2.

(iv) The proposed skeleton-structure for the research should still allow for the necessary freedom to address the questions that arise during the project, but there needs to be sufficient attention to 'designerly' research methods (e.g. artistic research). This offers opportunities to not only do research *about* interior architecture, but also research *by* design *in* interior architecture.

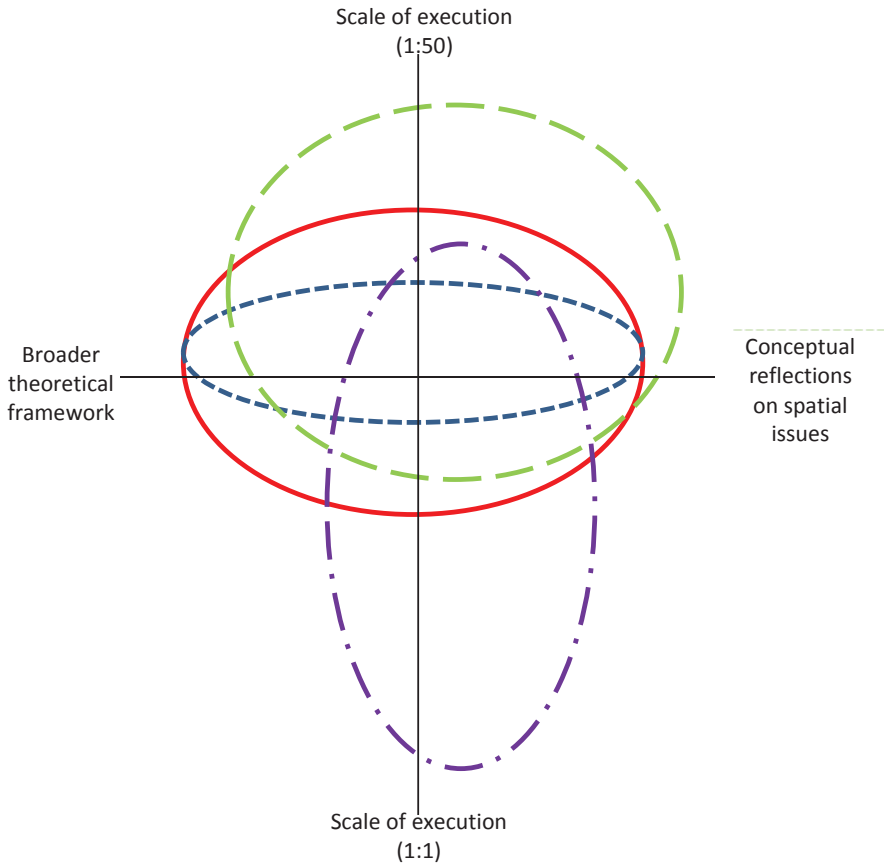

Figure 2. Different trajectories for master thesis and design project.

Currently, figure 2 makes a rather rigid distinction between the trajectories that can be followed for each of our four units, whereby it seems that students need to strictly follow the trajectory that we now have visualized for each unit. However in practice, it should and will be possible for all students to choose the trajectory that best fits the pathway they have in mind to develop their project.

At the end of the third bachelor year and at the beginning of the master year, students should be presented with all proposed trajectories and when choosing a particular project, they also subscribe to a particular trajectory. Importantly, these trajectories are not totally rigid, but allow for flexibility depending on the progress of the project. They mainly serve as scaffolds, to support students in their endeavour to create innovative and qualitative interior architectural projects.

Discussion

By explicitly offering students different possible trajectories, displaying the variety and richness of interior architecture as a design discipline, students could be encouraged to develop a more 'open' view on research and explore more 'designerly' research methods. Although these methods are typically more difficult to formalize and often have different aspirations, they should adhere to the same kind of rigour as other, more classical methods. Indeed, if a student wants to make use of a specific method, it should be used correctly. Artistic freedom can be no excuse for sloppy research, just a scientific thoroughness can never be an excuse for bad, uninspiring design. This implies that during the bachelor years, the student needs to be made sufficiently familiar with scientific and artistic, 'designerly' methods that can be combined in the master project.

Ultimately, the ambition is to inspire more students to create and present 'hybrid' research, both in content and in form: they are invited, depending on the chosen project, to interpret existing data or to generate new data regarding for example the intended users, or the properties and possibilities of used materials, but also to more overtly explore design possibilities by visual and lateral thinking and by other more intuitive, 'a-rational' approaches. In their presentations, students should also be challenged to explore the boundaries of the medium of a paper, exploring other forms to present their research results. This can be imbedded in a wider tendency within academia itself, especially in the humanities, to critically evaluate the dissemination of scholarly work in the digital age (see http://hackingtheacademy.org/scholarship-and-scholarly-communication).

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The "Nature" of Design Education: teaching design fundamentals in an outdoor classroom

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Abstract: This paper and presentation will detail the on-going research and development of an innovative, card based system named "Fundamentals in Nature." This system is used to teach design fundamentals in an outdoor classroom. Through developing appreciation for the natural world, design students develop skills that are more conceptual, sustainable, well rounded and connected. The need for this approach is supported by research revealing the current generation of students are losing touch with their natural environment. While this curriculum was initially aimed at educating college level design students, it is scalable to teach younger students and the general public. By utilizing the outdoors as a classroom, participants are able to experience first-hand relationships between design and the natural world. This unexpected relationship fosters an expansive thought processes. The natural environment combined with the collaborative nature of the exercises, creates a strong foundation for sustainable design concerns in future designers.

Keywords: Design curriculum, design fundamentals, outdoor classroom.

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Introduction

Design educators have a well-established tradition of teaching the fundamental principles of form. The elements and principles of design are the basis of ubiquitous visual language. While many theorists approach the specifics of this language differently, they all acknowledge its importance as a foundation for the education of visual communicators. Early 19th century Gestalt theorists such as Max Wertheimer, Wolfgang Kohler and Kurt Koffka have been lauded for their studies that inform the perceptual aspects of visual language. Their studies of perception brought understanding to unique physical and psychological aspects of sight. Through their research, they developed seven Gestalt Principles of Perception: figure ground, equilibrium, isomorphic correspondence, closure, proximity, continuation, and similarity. These principles form much of our understanding of visual perception and are the underpinnings of design education.

The Bauhaus (Das Staatliches Bauhaus) and Basel School (Allegemeine Gewerbeschule) are both recognized as cornerstones of design education. Walter Gropius established the Bauhaus in 1919 at Weimar, Germany. Several Bauhaus instructors published books on design education that emphasized the premise of design elements and principles. Wassily Kandinsky published *Point and Line to Plane* in 1926. Kandinsky saw his book as a systemization of his theoretical ideas in which he sought to establish certain analytical methods while taking relational or compositional values into account. His goal was to illuminate how the basic elements are viewed. Johannes Itten wrote *The Art of Color*, *The Elements of Color* and *Design and Form*. In his writings he recognized the basic laws of color and form, proportions and texture, and rhythm as the foundation of his concept of art education.

The Basel School's (Allegemeine Gewerbeschule) graphic design program developed from the rich heritage of the Swiss graphic design scene of the 1950s and 1960s. Two revered instructors from this school also produced books that underscored the importance of foundational elements and principles of design. Armin Hofmann published *Graphic Design Manual Principles and Practice* in 1965. Hofmann believed line, plane, surface, color, material, space, and time should be presented to students as a coherent whole. His addition of this new dimensional view called for an extension of the principles of design.

In 1967, another instructor from the Basel School of Design, Emil Ruder, released *Typography—A Manual of Design*. In his book Ruder illustrates the elements and principles of design through examples of his work, student work and historic reference. He illustrates through typography design elements and principles such as: point, line and surface, form and counter-form, proportions, contrast, color, unity, rhythm, spontaneity and fortuity, variations and kinetics.

Instructors from these established schools have not been the only ones to promote the elements and principles of design as the essential basis for design education. In 1972, Wucious Wong authored *Principles of Two-Dimensional Design*. He hoped to develop a visual logic by which students could be led to understand the elements of design, the possibilities of organizing them and the limitations. In 1973, the MIT press published *A Primer of Visual Literacy* by Donis A. Dondis. The goal of Dondis' book was to examine the basic visual elements and the psychological and physiological implications of creative composition. Dondis parallels visual literacy with verbal literacy, stating that visual literacy must operate within the same boundaries. One of the more recent editions to this list of foundational design books is Christian Leborg's 2006

release of *Visual Grammar*. Leborg pulls from the theorists and authors before him such as Wucious Wong and Donis A. Dondis and develops his own unique perspectives of syntax. Each of these books builds upon the premise of a visual language based on the elements and principles of design. This tradition of design education has stood the test of time and laid the foundation for contemporary design education.

Today the elements and principles of design continue to be the foundation used to help students learn how to express themselves visually, create compositional control and communicate most effectively. The elements of design, such as: dot, line, shape, color, tone, texture, scale, dimension, surface, volume, letter form and format continue to be the basic building blocks we introduce to students for form creation. While the principles of design (or compositional aspects) such as: direction, balance, rhythm, movement, contrast, emphasis, concentration, harmony, sequence, radiation, transparency, weight and positive/negative space are the variables we introduce to help students shape the relationships between the elements most effectively. Introducing students to perceptual understanding with the Gestalt Principles of Perception (figure ground, equilibrium, similarity, isomorphic correspondence, closure, continuation and proximity) helps students consider how to utilize design elements and principles to communicate most effectively based on human cognition. This foundation of teaching design fundamentals unites designers throughout history and around the world.

However, a changing student demographic calls for further consideration of the ways in which visual language is taught. Do the traditional methods of teaching the elements and principles of design address the changing educational backgrounds of students and their learning styles? While contemporary graphic design students benefit equally from a solid understanding of the elements and principles of design, they are very different from the students of the 1920s—or even the 1970s. How might we take our understanding of the current generation into consideration when teaching design fundamentals?

One of the largest and most impactful advents in the field of graphic design has been the introduction of the computer. The computer and vast technology of the software which accompanies it has not only changed the way design is produced and practiced, it has had a large role in shaping the individuals that now fill the seats of classrooms. The design students of today are from the 'Net' generation (those born between 1977–1999) who have only known a life embedded with technology. The 'Net' generation has had access to super-realistic video games, the Internet, e-mail, instant messaging, online communities, videos, and music that can be downloaded at will. This level of interactive technology is shaping the 'Net' generation's culture, values, and world outlook. In teaching, not only is it important to consider the information that needs to be delivered, but also the nature of the audience receiving it. What then might be a unique and valuable way of delivering information to such a 'plugged-in' generation? Is it possible to conceive educational formats that would reconnect our students with their very real surroundings?

Perhaps the natural world can provide the connection technology has severed for this generation? In *Last Child in the Woods,* author Richard Louv states today's 'Net' generation "is aware of global threats to the environment, but their physical contact and their intimacy with nature is fading." (Louv 2005, p. I) His book investigates the increasing divide between youth and the natural world and the environmental, social, psychological, and spiritual implications of that change. The evidence of a generational

break from nature is growing in the United States and elsewhere. Louv cites several examples in his book:

> In 1986, Robin Moore, a professor of landscape architecture at North Carolina State, chartered the shrinkage of natural play spaces in urban England, a transformation of the landscape of childhood that occurred within a space of fifteen years. In 2002, another British study discovered the average eight-year-old was better able to identify characters from the Japanese card trading game Pokéman than native species in the community where they lived: Pikachu, Metapod, and Wigglytuff were names more familiar to them than otter, beetle and oak tree. Similarly, Japan's landscape of childhood, already downsized, grew smaller. For almost two decades the well-known Japanese photographer Keiki Haginoya photographed children playing in the cities of Japan. In recent years, "children have disappeared so rapidly from his viewfinder that he has had to bring this chapter of his work to an end," Moore reports. "Either indoor spaces have become more attractive, or outdoor spaces have become less attractive—or both." Moore, who is president of the International Association for the Child's Right to Play and director of the Natural Learning Initiative, cites such causes as poorly designed outdoor spaces; the rapid growth of domestic air-conditioning since the 1950s; apprehensive parents who keep their children close to home; state-mandated school curricula that do not allow time for study outdoors; and the overly structured lifestyle of many families. (Louv 2005, p.33)

In *The Green Imperative* Victor Papanek theorizes that "deeply embedded in our collective unconscious is an intuitive awareness of our relationship to the natural world. This awareness has gone through drastic pendulum swings throughout human history. However, mankind seems more distant now than ever. As Papanek points out, "During the last century two major changes have occurred that contribute to the human disconnect from the natural world. First, we have nearly all—at least in the northern half of the globe—moved indoors. There are still jobs that take us outdoors, but even a farmer plowing their field sits in an air-conditioned cab, and most of us spend our time in homes, cars, workplaces, or public buildings. The second change is that we have now attained the power to change the natural order of the earth and throw it out of harmony." (Papanek 1995, p. 15)

The 'pendulum swings' of man's relationship with nature is visualized in man's use of nature in art. Primitive man made use of the natural elements to depict themes of their relationship with the natural world on the walls of caves. Baroque artists perceived a harmonious ideal in nature as represented in oil painted landscapes. In the 18th century the concept of the sublime as an aesthetic quality in nature distinct from beauty was brought forward. The 19th century artists ushered in concerns with ideas of truth and beauty. It was also in the 19th century that a dramatic increase in industry caused an adverse impact on the environment that was immediately visible, which many 19th century authors penned concern about. Later in the century, avid outdoorsmen and naturalists like John Muir, encouraged people to enjoy the beauty of the wilderness. In the 20th and into the 21st century there were dramatic shifts in the attitudes towards nature. Over the past few decades there has been a transition from representation of nature to fashioning or utilizing it, as seen in the works of Robert Smithson and Andrew Goldsworthy. Their work represents both a new take on the picturesque, and a development towards a less framed way of depicting nature. Today many artists focus on nature in their work through the lens of urban issues and

environmental investigations about sustainability. Artists today take into account both the crisis facing nature and the crisis in the definition of nature. (King 2010)

In the space of a century, the American experience of nature has gone from direct utilitarianism to romantic attachment to electronic detachment. At a time when many are seeking emotional satisfaction from their computers while sitting indoors, exposure to the natural world provides a foundation essential for the human experience. Art Historian, Elaine A. King asserts, "Nature—as with a painting, sculpture or building—only becomes significant when we make an active connection with it. Like a canvas in a gallery, a landscape or aspect of the natural comes to life in the eyes of the people who look at it. The act of observation in nature and not as a virtual experience brings about a very different experience that is capable of sometimes posing questions. In return, the observer confers meaning on the works of nature, and, artists and the hybrid forms produced through human action on the environment, and transmit that meaning to others." (King 2010)

Design educators have a unique opportunity to develop a rich connection through nature by bringing the design classroom outdoors. This gives students the chance to experience the natural world, as they never have before. It removes students not only from the indoor classroom environment, but also the computer. Students in this outdoor experience are asked to use traditional hand skills such as drawing and sketching to express their experience and explore design fundamentals. Using the outdoors as both the content and context for the exercises reinforces design fundamentals and fosters a better understanding of the environment. This first hand experience provides a relationship between design and the natural world, helping students expand their thought processes through an unexpected connection. As students learn how to observe and better understand nature, an inherent concern and respect develops. This reconnection with nature will create a design approach based on value and a deeper respect for the environment and audience, as well as establish a foundation for the tenements of sustainable design. At the core of our humanity is the fact that our survival and existence is inextricably tied to the natural world. This is a lesson students of all disciplines must learn. It is all too easy to forget, as we surround ourselves in a man-made existence that becomes our superficial reality.

Methods

Initial investigations for this project involved defining and understanding sustainability's relationship with graphic design, focusing specifically on environmental aspects. Ultimately, it was determined the changes that needed to take place would not occur until individuals felt vested and connected. The focus became narrowed to reconnecting design students with the natural world. This connection establishes a sense of concern and responsibility as they develop into professional designers. Several avenues of this methodology were explored, distributed, and field-tested.

Initial investigations evolved around the concept of guiding students to nature. The idea of creating a guidebook to the natural world was first explored. This guidebook had a series of documented methods that involved immersion in nature, which instructors could duplicate, modify, or enhance.

Development for the natural guidebooks began by creating a taxonomy of nature and travel guide materials. These materials were found to share key characteristics. One of the most important was allowing individuals to enter experiences or environments new to them with a degree of knowledge and certainty. Such a

foundation establishes a base for exploration and discovery. Instructions on how to use the book or guide are often located in its introduction. Most guides contain history, maps, facts, and trivia. Their format is often small for ease of portability, and text and image are typically equally weighted.

Writing the methods for these guidebook proved to have many challenging aspects. Initial approaches were inspired by the Situationists' derivé practice. In this practice, the Situationists aimlessly wander with no destination, soaking up a city's ambience. It was found that these methods encouraged experimentation and experience, however they lacked connection and meaning for participants. The next approach looked at methods that utilized childhood memories of a natural play area contrasted with a current visit to the same place. Continuing to move forward by examining ideas centered on experience, methods focusing on the senses were next explored. While these methods better focused participants on the natural world, they were still vague and lacking in an effective connection.

The idea of a guidebook was re-evaluated. A guidebook alone would not get students outside. Instead, an opportunity for a wholistic or completely immersed experience was needed to help make a connection with the natural world. It was at this juncture the importance and relevance of Gestalt theory became apparent. Gestalt's theoretical base is the belief that an approach to understanding and analysing all systems requires recognition that the system (or object or event) as a whole is made up of interacting parts. The parts can be isolated and viewed as completely independent and then reassembled into the whole, but no part of the system can be changed without modifying the whole.

Gestalt psychologists have contributed valuable experimentation and research in the area of perception, collecting data and analysing the significance of visual patterns. They are also interested in how humans see and organize visual input and articulate visual output. The way in which elements come together creates the meaning and purpose of the visual statement and carries strong implications for what the viewer receives. Gestalt ideology takes into consideration not only the visual foundations upon which design is built, but it also echoes one of the most valuable messages the natural world has to teach us: that everything is connected.

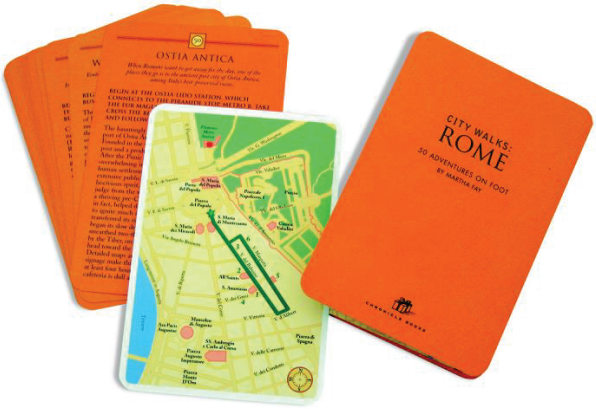

Figure 1 "City Walks: Rome," a precedent discovered while studying guidebooks

Gestalt theory, combined with the precedent "City Walks: Rome," (figure 1), informed the final content and form of the project. "City Walks: Rome" was not a book, but a box of cards that created a non-traditional travel guide. Each card contained a description of a one-day, self-guided walking adventure with insider information about a Roman neighbourhood and a map on the reverse side. Another set of instructional cards encountered during the research process was the IDEO Method cards. IDEO is an innovation and design firm that uses a human-centered, design-based approach to help organizations generate products, services, and capabilities. The IDEO cards offer discrete methods that can be used to keep people at the center of the design process. They are an example of a flexible card based system that supports the design process and exploration of a range of design methods. The IDEO cards help structure design thinking, employ observation skills, encourage exploration and utilize methodological prompts. All of these are key features to a robust design investigation and important to include in the "Fundamentals in Nature" card system. Both the IDEO cards and "City Walks: Rome" provide a way of presenting information that is flexible, portable and engaging to the viewer—ideal for an outdoor classroom environment.

At this juncture, the potential form and content were realized for the "Fundamentals in Nature" card system. The form would be a deck of educational cards, and the content would address design fundamentals (elements, aspects of composition, and Gestalt Principles of Perception). The next phase involved gathering specific content for the cards that related to nature. Then the system and methods structuring the use of the cards was developed. Initial trials had students go to a natural area with the cards, find an example of the visual grammar listed on the card and create a visual record of it. This route was rejected because of its didactic nature that introduced theory to students before they had an opportunity to discover and experience environmental conditions on their own. Josef Albers' *Interaction of Color* was recognized as a pedagogical precedent. Alber's teachings emphasize the importance of experimentation and discovery before the introduction of theory. A series of three task cards were developed which sent students to a specific natural area. This approach provides opportunity for individual discovery within a structured task. This left the understanding of foundational design grammar to occur after their task. After each student completed their individual task they reassemble as a class to be introduced to the theories of design fundamentals and begin to apply them to their designs through a process of co-construction. In this manner a framework for the card system was developed which emphasizes intuition, experimentation, theory, and then the application of these ideas to create an artefact representative of their experience.

Figure 2 The card system, named "Fundamentals in Nature," was composed of a booklet to present the card system to instructors and accompany cards comprised of four categories: Task cards, Element cards, Composition cards, and Gestalt Perception cards.

Project Realization

After developing the "Fundamentals in Nature," it was determined additional components were necessary for its introduction to students. Therefore a companion booklet was developed to provide directions to the instructors.(figure 2) The booklet addresses several topics: descriptions of card categories, suggested use of cards, suggestions for inclement weather, a complete supply list, bibliography, and discussion topics for possible outcomes.

The "Fundamentals in Nature" card set is comprised of four categories: task cards, element cards, composition cards, and Gestalt Perception cards. The student begins with a task card. There are a range of tasks that focus on different activities in the outdoors. (figure 3) Each task category has three task cards representing three steps in the process. The first step leads the student to an intuitive approach; next they apply a theoretical approach and finally, develop a visual solution. The task cards guide the student through the steps of the experience; while the element, composition and Gestalt perception cards introduce the formal aspects of visual communication. Each task card describes a task on the front and provides a visual of design precedent on the back, along with interesting facts and details of the precedent's designer. The front side of the element, composition and perception cards show a visual example and written definition of the element or principle they represent. The reverse side of these cards integrates aspects of the natural environment, providing natural facts and learning points.

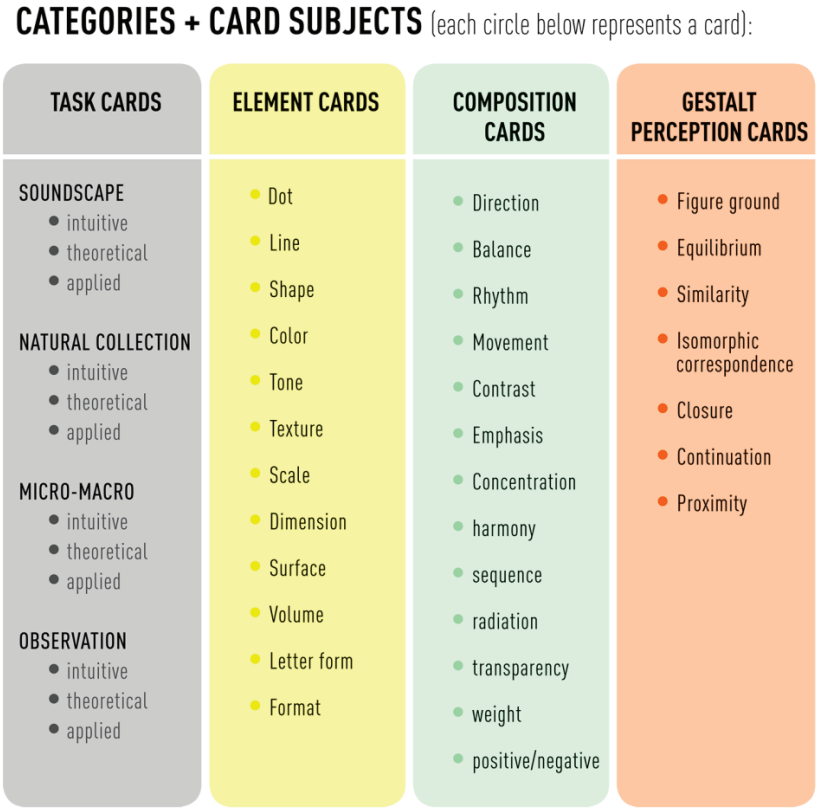

Figure 3 The "Fundamentals in Nature" card set is comprised of four categories: task cards, element cards, composition cards, and Gestalt Perception cards.

For example, if the student starts with the 'Soundscape' task category they are instructed to go out into the natural environment and visualize sound with the first task card. A precedent is given on the back of the card to help get them started. On the 'Soundscape' task card the precedent provided is the work of Wassily Kandinsky. After the student has completed the assignment on the first task card, they return with their classmates, and view one another's sketches. At this point the student receives the other card categories (the element, composition and Gestalt Perception cards). The rest of the cards depict elements and principles of design, which the students can use to discuss possible improvements for their work. Through co-construction the entire class begins to understand the theories and formal aspects at work within their compositions. The second task card instructs them to apply what they have learned from the element, composition and perception cards by adding to, or recreating, their initial composition. In the final step, the third task card (of the 'Soundscape' task) asks the student to create a poster representing and communicating their experience of the 'Soundscape.' This final step encourages students to consider their relationship to their natural surroundings while exploring the challenging task of visualizing abstract thoughts and design concepts.

The card series is structured for use in an outdoor classroom. Ideally this means an area that allows students to easily immerse themselves in the natural world, where man-made sounds, structures and objects are at a distance. However, a natural classroom does not always entail travelling to a dedicated nature area. It may be as simple as exploring one's own backyard.

After using the "Fundamentals In Nature" card system, students will have a greater interest and respect for the natural world and have learned about the elements and principles of design and Gestalt perception. This approach adds value and conceptual connection to the teaching of graphic design.

Figure 4 The first field trial of the card set done with high school campers was taken to the third level 'Soundscape' task card for which they created a computer-generated representation of their experience.

Field Trials

Field-testing "Fundamentals in Nature" has been implemented through a series of over-night art and design camps held at the University for high school students (ages 15-17). Both trials explored the 'Soundscape' task with students of the same age. The trial showed not only potential improvements for the system, but also the possible scalability for their use over a range of ages and populations.

To enhance the learning opportunities and reinforce the environmental aspect of the experience, a professional naturalist was enlisted. The naturalist led a nature hike which ended in an open area where the 'Soundscape' task series performed. The beginning of the nature hike escorted students through a native prairie. This provided an opportunity to educate them regarding the loss of 99% of the native prairie landscape of their home state. Most of the students were unaware of this important environmental fact and its repercussions.

The first field trial using the 'Soundscape' task with the high school campers took the students through to the final phase of the task in which a computer-generated poster of their experience was created. (figure 4) It was found with this age demographic the emphasis of executing the final artefact on the computer diluted the initial environmental experience. With the introduction of computer technology, these young students were less vested in initial theoretical investigations and the reiterative design process. As soon as the computers were introduced, their desire was to focus on the technological tool—not the design process. Also important for this demographic was limiting the number of element, composition and perception cards. The concepts introduced on the cards were new, so it was better to introduce them in a small quantity. This approach was less overwhelming and students were more easily able digest and understand the content of each card. Post project write-ups from these

students focused almost solely on the computer techniques learned and little of the design fundamentals and environmental experience. This reinforces the research and understanding of this generation, who are digital natives, focused on technology. When something as intriguing and comfortable as the computer is introduced to these students, it takes careful consideration of the structure of the experience to move beyond technology.

In the second field trial of the same age demographic (15-17 years old) the final iteration was limited to a final composition in colored pencils. (figure 5) This differed from the first field trial by eliminating the distraction and learning curve of the computer to generate the final piece. This allowed the students to focus and invest in the reiterative design process through hand renditions. Final compositions from this process were stronger: more expressive and compositionally complex. At the end of the exercise, students seemed to recall a more thorough balance of design fundamentals tied with their natural experience. These observations were compared through the students' post-project write-ups.

Figure 5 In the second field trial of the same age demographic the final iteration was limited to a final composition in colored pencils.

Conclusions and Future Directions

In both field trials, students cited spending a period of quiet time while they sketched natural sounds to be both unusual and enjoyable. Several students said it was not typical for them to take time in silence to contemplate and reflect. While it may seem banal to some, this is an important part of the design process that many of the current 'plugged-in' generation do not benefit from due to existing cultural constructs. The age groups in the initial field studies were young for an advanced approach to form and concept; however, the card system proved effective as a framework for discovery and exploration. It is worthwhile to consider how these experiences might become a strategic part of design curriculum.

Initial trials of "Fundamentals in Nature" reinforced the importance of this project lies not in a polished artefact, but rather the process and path that led to its creation. This is an importance difference between design education and the professional practice of design. Focusing on solid process ensures design students are prepared with solid methodology to address the varied challenges they will face as professionals. In order to best prepare students for the future, design curriculum must invest in a thorough understanding of design basics. Equally important for future designers is emphasizing the reiterative process and engaging them in environmental and societal discussions. The need for students to have a thorough understanding of technology cannot be ignored; however the focus must be on balance. Once a strong

understanding of the environmental and societal consequences of design and the value of a reiterative design process are firmly in place, technology may then be added.

Young designers must be taught the importance of balancing the needs of the environment, society, economy, for future generations. Students educated with a focus on technology to develop highly polished artefacts will not be suited to meet this challenge. We are wise to no longer blindly embrace technology as the answer, but understand and consider its advantages and disadvantages. Research is now uncovering the detrimental effects of technology on the environment and children who have grown up enmeshed in a plugged-in era. These are the students currently filling design classrooms. This project demonstrates innovation in design education, and how concerns for the environment and society may be included in curriculum development. It is an opportunity to make considerations of sustainability as a part of the educational process and discussion, not a specialization. This adds value and experience to design education by focusing the students on their relationship to the natural world. This approach illustrates how design can be taught in a meaningful manner by focusing on experience, process, and conceptual connection.

"Fundamentals in Nature" has significant opportunities for expansion. Many of the directions could be encapsulated in an accompanying Web site. A Web site would create an opportunity to provide the design instructor with more examples, discussion points, and references. While each task card presents an art or design precedent relating to the nature of the task, a Web site could create the opportunity to provide a greater range and depth of visual precedent as well as discussion points. The Web site could be an area to present examples of designs that balance the needs of economy, environment and society.

Through the development and initial field-testing of "Fundamentals in Nature," the potential value of its contributions to design education and its scalability has been established. Future directions will entail further development through field trials with a range of demographics. It is hoped a publisher may be found to make "Fundamentals in Nature" available for design education purposes and public use.

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Contextually Teaching Motion Design

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Abstract: *Motion design (also called motion graphics) is an underdeveloped subject within design education. Often taught as part of a separate elective course, housed in a computer lab and taught by graduate students or adjunct faculty, this subject is often associated with long planning hours, tedious software exercises, and inadequate formal results. However, at Kent State University, we believe that motion design has significant value for the design student's education and deserves integration into design curriculum. Integration of motion into curriculum has exponential value: it teaches systems thinking, research skills, and information design. We are entering an exciting time in graphic design, when motion, interaction, and information are merging to form innovative products and applications. An understanding and familiarity with motion can help a designer anticipate movement and navigation through an interactive space or a three-dimensional environment. Designers with a clear understanding of motion can think in time and are prepared to clearly communicate information in a way that is applicable to current technology. An understanding of motion can broaden a designer's ability to draft scenarios, prototypes, and visual representation of complex information to the client or audience.*

Keywords: motion design, strategies for teaching, information design, sequencing, expressive, and authorship.

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Introduction

A graphic designer's education has continued to grow increasingly complex. The skills, knowledge, and requirements placed on young designers far exceed the credit hour requirements for a bachelor's degree. Academic programs are forced to encompass so much that educators often look for ways to highlight, focus, and collapse information to offer students the most relevant learning outcomes in a reasonable amount of time. Embracing motion as one of the core principles of design education will serve the student long after the final project has been graded.

This area of design is often called motion graphics. Many educators and designers regard this term as primitive because the word "graphics" limits the scope of our profession. Graphics is just one element among many in motion design artifacts, and this area of design is anything but simple. Motion graphics is complicated and in-depth, which is why it lends so much to a design student's education. It is time to redefine and rename motion graphics and embrace what it has to offer. In this article, I provide many examples of how we expanded out curriculum in this way.

By using the scale of context devised by author and designer J. Christopher Jones (Jones 1970, 31) in *Design Methods,* each project in the class I teach, Kinetic and Sequential Design, increases in complexity through skill level but also approaches context in a more complex manner. Contextually teaching motion design is a strategy that explores the facts, motivations, circumstances, and the audience of a message, going beyond traditionally abstract principles and delving into a framework that mimics real-world problems that students may face as a designer.

As Professor Meredith Davis explains, “Design problems may be viewed at different levels of complexity. Jones argues that the problems of post industrial society reside at the levels of systems and communities, while our (design) methods are stalled at the levels of component and products” (Davis 2012, 59). Our first project focuses on a component—a word and how its motion defines the meaning. The next assignment approaches the product level, embracing an entire motion sequence that must educate the viewer. The third project is at the systems level, as it addresses interrelated products as students design a television spot that must serve both the television network, the film it advertises, and the audience. The final assignment approaches the community level; it touches on interrelated systems, serving communication to a specific audience and describing a motivational message meant to change behavior, attitudes, and ideas.

To learn how to apply animation principles and motion, students are assigned three separate intensive motion projects that focus on content, context, message, and audience:

- "How-to" lessons—Students incorporate still motion animation as a means to learn editing, sequencing, and information structure.
- TV spot—Student develop a TV spot in order to learn narrative, interpretation, expressive typography, and basic audio integration.
- Informational and persuasive messages—Students create messages and develop research skills and authorship, and they learn information design strategies.

As the above project examples demonstrate, the integration of motion into curriculum has exponential value. Students are introduced to systems thinking, research skills, prototyping, and information design. During this exciting time in graphic

design, motion, interaction, and information are merging to form innovative new products and applications. Preparing students to create in this format is not only exciting but also professionally rewarding.

Redefining motion graphics

I was introduced to motion graphics during my junior year of design school at The Ohio State University. In Professor Brian Stone's type in motion class, we learned about kinetic typographic principles and elements. Type became animated and emotional, dancing with rhythm and synchronized with music. The project results were dramatic, evocative, and lyrical and captured the attention of an audience.

Although my interest grew I noticed that many students dreaded the prospect of completing an animation, finding it tedious and labor intensive, especially using the software tools available at that time. I also noticed that many traditional designers rejected this new format, preferring to work in print to create identities, posters, brochures, and advertisements and had little need for exciting non-static elements, such as speed, gravity, acceleration, pausing, or pacing.

Fast forward nearly a decade (during which the curious student became an assistant professor) and I find myself teaching Kinetic and Sequential Design, focusing on motion and the principles of animation, to sophomores, juniors, seniors, and graduate students. I introduce students to the fundamentals of motion through a series of lectures, projects, software tutorials, professional examples, and in-class exercises.

The more I teach and learn about this area of design, the stronger I advocate for changing the term "motion graphics" to "motion design." It is clear that this area encompasses far more than the term "graphics" implies. *Motion design* integrates graphics with typography, light, color, sound, and kinetic movement interwoven with time. Messages are built through a sequence of events in which a message, feeling, or idea is communicated. Many people would recognize motion design as a TV spot, film title, or film trailer. In the book Graphic Design: The New Basics, by Ellen Lupton and Jennifer Cole Phillips, time and motion are defined together. "Motion is a kind of change, and change takes place in time. Motion can be implied as well as literal, however. Artists have long sought ways to represent the movement of bodies and the passage of time within the realm of static-two dimensional space. Time and motion are considerations for all design work, from a multipage printed book, whose pages follow each other in time to animations for film and television, which have literal duration" (Lupton and Phillips 2008, 215).

Motion design's rich history began in the mid-1800s with the development of the zoetrope and thaumatrope, optical toys for children. With influences rooted in early photography, theater, and film, it has evolved with technology as its use continues to spread. Motion is employed within interface designs, such as in the way icons on a mobile phone function or in the way movements of a fingertip can initiate action on a screen through gestures and touch. Motion can be a visual and reactive cue used in interface designs, responsive environmental signage, games, and mobile devices.

Structure and learning objectives

In my introductory course in motion called Kinetic and Sequential Design, I aim to expand students' visual vocabulary in time-based media and cover the elements of motion, the role sound plays, and the integration of photography, video, and animation. Students are introduced to the principles of animation, the picture plane,

representation, time frames, semiotic representation, and storyboarding. We study the application of motion design and how it is technically implemented. Students are introduced to Adobe After Effects animation.

Students investigate where their messages will live and how they are created. We look at the various uses for motion design through a situated lens: to educate and inform, to entertain, and to persuade and motivate. Students move beyond the creation of random motion and use motion as part of the message, not as an afterthought. Students learn how to create time-based messages that communicate, motivate, and evoke emotional responses with meaning. The goal is for students to grasp how motion design can enhance visual form, communication, and meaning through a richer, more memorable experience.

This course is structured into three projects that become increasingly complex with each assignment. Expectations are outlined in class and through online handouts that document the learning objectives, project rationale, requirements, and deliverables. Students are given two to five weeks to complete a project, depending on the complexity and nature of the assignment.

The role of strategy and process

An important aspect of the course is for students to learn a defined and professional process, not just to create visually stimulating movies. Students are required to present various artifacts from strategic points within their process before turning in a final movie. They use these artifacts to establishing a visual reference for their work, aiding them in finding the appropriate direction and communicating with a client the vision and trajectory of the project. I use the following definitions to describe each of these elements:

- **Storyboards**—a visual representation of an animation panel by panel, similar to a comic book. A storyboard is a series of pictures that shows how each shot in a scene will be filmed. Storyboards are a common way to communicate a sequence of events.
- **Style frames**—"A style frame captures many of the graphic design elements used throughout the project. The typography, colors, patterns, illustrations, and photographs chosen for the project are often included" (Lupton and Phillips 2008, 228). A style frame is one key frame of the storyboard that describes how the sequence will appear; it hints at transitions, camera angles, and perspectives that will be included. A style frame allows motion designers to get specific about formal details before moving forward with executing the animation.
- **Motion tests**—a short motion sequence that displays transitions and how objects will move, generally short, lasting five to ten seconds. Motion tests help young designers break their workload into manageable and less intimidating segments of time.

Teaching technical aspects

Teaching motion design can be a technically intensive task, but there are many ways to alleviate the stress. One strategy is to present students with short, in-class tutorials that walk students through simple tasks in software chosen for that semester. We currently use After Effects, iMovie, Quicktime Pro, and Flash. Tutorials are thirty

minutes or less and are accompanied by short handouts showing screenshots of the interface with each step.

In teaching about technical tools, using online references can save time and clarify information. Lynda.com is a useful software video library with an expansive online collection covering Adobe software. Instead of having a book, we have a class subscription. Each student has his or her own login and password, and I assign video tutorials for the students to view. An added bonus is that Lynda.com updates its collection with each new release of software, so instructors no longer scramble to put together new lessons when a new version of software is released.

I use a simple and flexible social networking site or blog as an online classroom space (Figure 1). Ning supports participatory interaction and has capabilities similar to Facebook, a platform with which most college students are familiar, and they quickly adapt to the environment. Interaction and engagement are fluid, open, and simple. Students can see activities, lectures, tutorials, examples, and assignments provided for them.

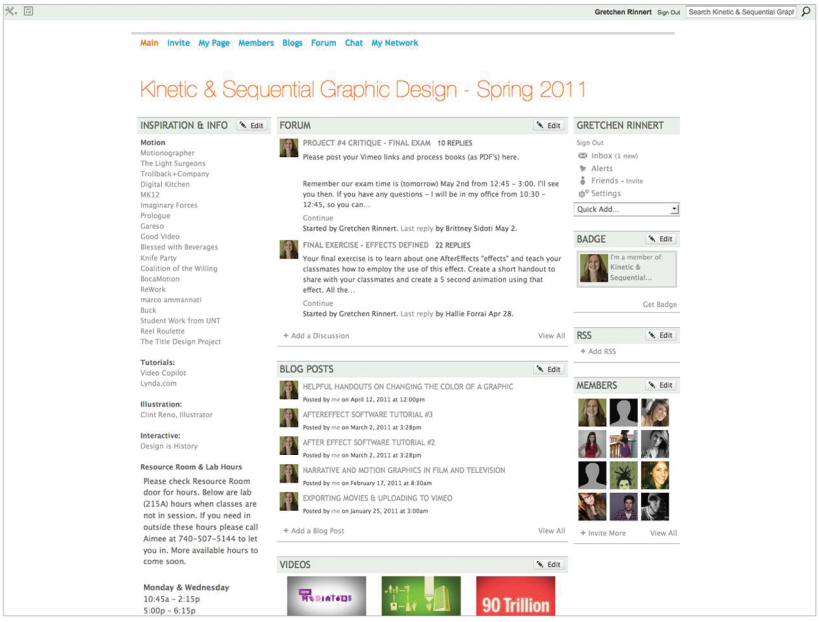

Figure 1. Screeenshot of Ning interface, an online classroom. All online activity is documented through this closed social networking site.

We also use Vimeo, a video portal website (Figure 2). Combining these two web resources provides the perfect combination for class critiques and sharing of files, art, process artifacts, and questions. Students use Vimeo to host their work and disseminate to peers, potential clients, or employers. The Vimeo platform allows students to build an online motion portfolio that they may easily integrate into their personal web portfolio or blog.

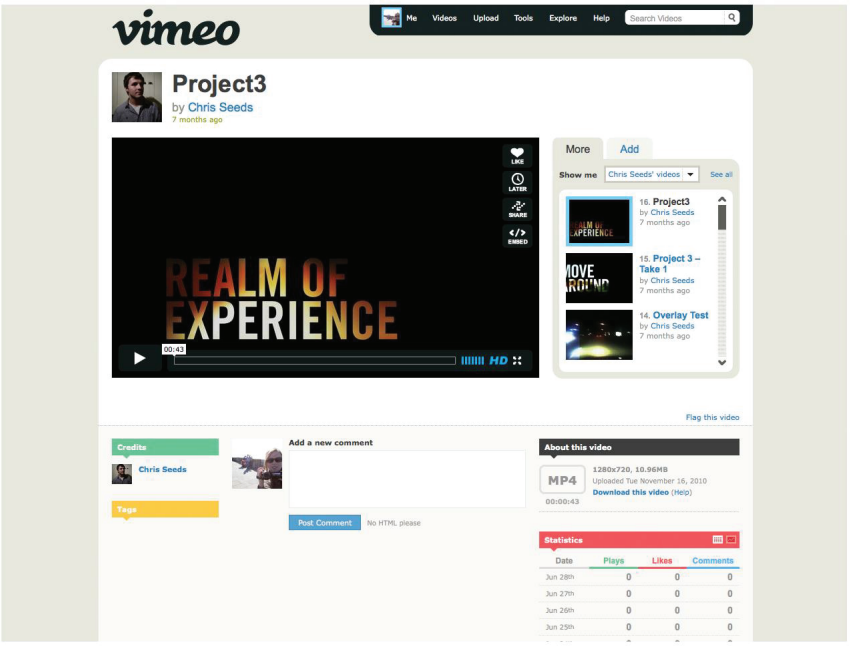

Figure 2. Student work posted on Vimeo by student, Chris Seeds.

Developing software comprehension through low-stakes exercises

Exercises and a warm-up project are used to introduce students to kinetic movement, behaviors, reaction time, and animated compositions. These short projects help students learn how to use technology tools without the pressure of focusing on the aesthetics, formal qualities, and getting the "right" answer. These exercises are brief—students spend no more than two hours on each—and ample in-class work time is allotted.

Several exercises are hands-on and help students to think in motion and time outside of the computer and software tools. For instance, one exercise has students make a thaumatrope with two images that animate to create movement (Figure 3). This simple project moves students off their computers and has them work with paper and a simple transition. Students also create a flip book for another exercise in preparation for animating in After Effects.

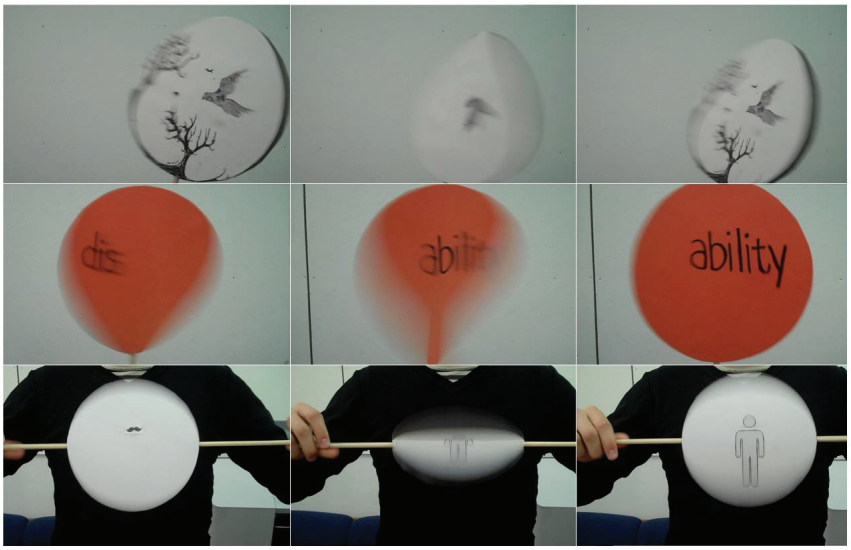

Figure 3. Thaumatrope Exercise Recorded in Class

Other exercises focus on software mastery and comprehension. In one of the exercises, Effects Defined, students learn how to use one After Effects "effect" by researching the steps for application. Students may use references they find, software books, the Internet, or Lynda.com. Students create a simple animated demonstration of their chosen effect. They must create a handout that walks their classmates through a basic demo. This aids the students by helping them to learn self-teaching techniques for understanding and using the software independently. Students must be willing and capable to teach themselves new software tools in order to be independent and successful designers.

We also use in-class exercises as an opportunity to generate friendly competition and gauge software aptitude. Students are asked to complete a software challenge during class. Students are given a list of tasks. Most of the tasks are simple and have been covered in class or through assigned tutorials. They may include sequencing images, masking, adjusting opacity, kinetic movement, and transitioning a word on and off screen. The final step is for students to render their movie and upload it onto Vimeo. Students are given a limited amount of time to complete the challenge, and bonus points are given to the first three students to complete the competition. These exercises are useful because the students practice software skills they need, they are encouraged to work together, and the professor can assess whether the students are up to speed on their technical proficiency. These types of exercises replace test-based assessment, which is inaccurate in measuring the skills of designers, who tend to be problem solvers.

Class Projects

The course has three main assignments, each approaching motion design from a different context and focusing on a specific graphic element. Projects have independent learning goals that build on each other to create a scaffold-like learning experience. Students are given about 4 to 5 weeks to complete each project.

PROJECT NO. 1: INFORMATION TRANSLATED

The first assignment is called Information Translated and focuses on image. Students are introduced to communication through a sequence of images by using stop motion techniques. Students select a basic task or journey to communicate. Sample topics include how to sew a simple pillow, how to change a tire, the journey to a coffee shop, or the journey to work. These simple events and tasks are manageable and straightforward, allowing students to focus on the communication and not on abstruse details. The goal is for students to communicate through images, not typography, learning how to show rather than tell the audience intricate details and specifics.

This project is split into two parts, a storyboard poster (Figure 4) and a sequence built out of a series of images, either a stop motion or still frame animation (Figure 5). Students focus on translating the information and consider color, hierarchy, shapes, light, composition, and scale. They author original photography for this assignment and demonstrate knowledge in basic editing, sequencing, framing, timing, and composing. Typography is to be used minimally and treated as a secondary element to enhance the message rather than being the focus.

Figure 4."How to mount trucks to a skateboard" by Dan Ross. This poster shows the sequence of images that will eventually become a short informational movie.

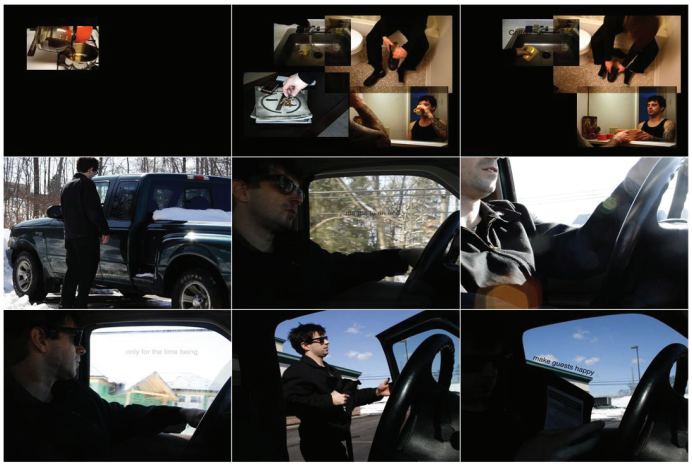

Figure 5. "A Ruby Day" by Blake Ferguson. This project represents a narrative execution. It takes us through a short moment of a person's life. We learn how he feels and we develop empathy for this character.

PROJECT NO. 2: NARRATIVE TRANSLATION

The second assignment, Narrative Translation, is a narrative exploration that focuses on structure, interpretation, voice, expressive typography, and basic audio integration. Students learn to create and make emotional and compelling messages while exploring typographic principles in time as a way to reveal a personal experience.

Students select a film from a list of classic titles. Most titles are dated, and often students have not seen a single film from the list. Students are encouraged to pick a film that is new to them so they begin their project free of preconceived ideas and visual expectations. Students are assigned to watch the film and respond by writing a critical analysis. This requires the students to reflect on the tone, style, underlying moral, metaphors, and message. Students analyze the intended audience and select two short monologues from the script.

The assignment is to advertise the film's re-release on American Movie Classics (AMC). The sequence should hint at the story and give the audience a prelude to the narrative and enticement to watch the film. The students are asked to consider how they may enhance or reinforce the communication by the addition of design elements. They are allowed to use excerpts from the film, art, graphics, or concepts as well as the actual video content (Figures 6-8).

Figure 6. "Memento" by Todd Wendorff. This spot focuses on intonation and transition and delivers a powerful excerpt from the film.

Figure 7. "One Flew Over the Cuckoos Nest" by Clancy Pannell. This sequence resembles a music video by combining modern music and film clips that share a common thread of mental instability.

Figure 8. "Scream" by Roxanne Kilbourne. This TV spot uses audio from the original film that includes both sarcasm and comic overtones. This example is both memorable and inviting as it draws our attention to the lighter side of the plot while representing the horror genre through color, type, and pacing.

The students begin to consider the message beyond the software as they gain more control in After Effects. By this point they have completed several demos and exercises, and they are beginning to feel more confident in their work as their skills and knowledge grow.

This assignment is particularly successful because students identify how systems thinking can be applied to designing messages in motion. Students learn that a motion design project is an elaborate sequence tied together by similar kinetic movements, transitions, and typographic form, creating a unified message.

Project No. 3: Persuasive Information

The final assignment, Persuasive Information, focuses on information, authorship, visualization, motivation, and persuasion. Students are asked to create a message that persuades a viewer by selling a campaign message, a political idea, a debated topic, or a public service announcement (Figures 9-10). Students are encouraged to develop their own design voice and are required to author not just the visual aspects but also the script. They must conduct research on their self-selected topic and record a unique voiceover.

Because these messages are to be persuasive, students are encouraged to integrate emotion into their messages. Motion graphics can be a powerful tool in persuasion, communication, and motivation. The use of emotion is critical in motion graphics. "Emotion is a necessary part of life, affecting how you feel, how you behave, and how you think. Emotions make you smart. Without emotions your decision making ability would be impaired. They work through neurochemicals that bathe particular brain

centers and modify perception, decision making and behavior, changing the parameters of thought " (Norman 2004, 10).

Emotion affects our experiences, thoughts, and memories. Playing with emotion is not only entertaining and fun but also educational; students learn how powerful their designs can be in manipulating and changing the perceptions and thoughts of their audience. The introduction of color can change the mood of a message. The use of a voiceover creates a tone of decisiveness and authority. By incorporating music the gaps and pauses in a message are unified, especially when soundtracked to animation. This final assignment is challenging and allows students to flex their creative muscles as they work with typography and information graphics to develop and direct a focused message. Many students use this project to create a message that expresses a strong personal belief or idea. Students often become passionate and highly knowledgeable on their chosen subject matter. This assignment is an opportunity to explore ethical message making and how the shape, voice, and tone of the message can change opinions and ideas. It provides an excellent opportunity to discuss the responsibility of designers to relate accurate and credible information that does not falsely represent a one-sided opinion.

Figure 9. "The Importance of Educating Girls" by Khou Vue. Using a clear message paired with elegant music and a childlike voice, this sequence explains a persuasive message.

Figure 10. "Rethinking Measurements" by Ben Dansby. This project demonstrates the message through motion and voiceover by overwhelming the viewer and visually representing the chaos of the imperial measurement system.

Reflection & Analysis

In the past our students have struggled to move beyond the print form and static interpretations of their design work. They avoided screen-based artifacts and most went on to pursue a career focused on print. Our new motion curriculum has been in place for over four years and since we have noticed the following shift:

- An increased integration of motion and interaction into studio projects.
- Enrollment in a senior level course in interaction design nearly tripled from 2009 to 2012.
- Students now use storyboarding as part of their process to think through ideas.

Alumni and students were interviewed to gauge personal experience and value of the curriculum as well as to understand how they apply these skills now as professional designers. Amy Peck, an MFA graduate in 2012 and a design professor at Lakeland Community College offered this perspective,

> I found the coursework extremely valuable. The progression of projects made sense and really built upon each other in complexity from the beginning of the semester to the final project. I found myself wanting to use all that I had learned… from stop-motion animation to camera/lighting effects and kinetic type. The main reason I decided to go back to school and earn my MFA was to be able to teach full-time at the college level, but I also went back so that I could learn more about web and motion design, as they were two aspects of graphic design that I had not been exposed to during my professional career.

Students learn a different skill set, one unique to screen based design. Alex McClelland, a 2012 graduate and now a designer for American Greetings explained, "One of the main things I took away from the class was how crucial and effective the order and timing of something can be in getting your message across." Catherine Zedell, a BFA senior scheduled to graduate in 2013 stated, "Kinetic and Sequential challenged me to think in a different way. I had to think in terms of pacing and rhythm as well as consider all the design principles."

Eric Celedonia, a 2009 graduate and a mobile interface designer in Austin, Texas described how it prepared him for his professional career,

> Designing for motion was one of the most difficult and exciting challenges I had in college. It got me to consider the full range possibilities of every element I added to the screen. The skills I learned while using Flash and After Effects were huge bonuses in my professional life. I was able to help marketing teams create advertisements and pitches with motion graphics at my current job, as well as my previous. It was certainly my greatest selling point when entering the mobile design field. With no experience in mobile or software design, I was able to land my job referencing the skills and portfolio pieces from I had gained from my kinetic course work. Now I am able to apply these skills in my efforts to create unique user experience that are both intuitive and entertaining.

We believe that the motion design curriculum at Kent State University is eminently useful, and we have been honored with an invitation to exhibit student work in the upcoming third edition of a motion textbook by Professor Jon Krasner of Fitchburg State University, *Motion Graphic Design: Applied History and Aesthetics.* This undergraduate text presents an aesthetic investigation into how design principles and history can be applied to the field of motion graphics. Professor Krasner will feature student work from our curriculum, showing still frames in print and video animation on the companion DVD. The book is scheduled for publication in Spring 2013.

Conclusion

The skills students use in a motion design classroom are transferrable and applicable throughout their careers. To be exposed to motion design gives young designers a strong foundation in editing, storytelling, information design, authorship, and informational structures. More specifically, these skills reinforce the students' ability to use design to explain through a sequence.

At a basic level, students learn that motion messages should be built around a core system unified by color, typography, style, voice, pacing, and rhythm. Their grid is based on time, sequential relationships, and transitions. If the system fails it is obvious—rather than communicate, the message distracts or annoys the viewer. Motion design offers extremes. When it fails, it is like a car accident—we cannot help but watch and cringe—and when it succeeds, we are compelled to watch and are satisfied. Students learn to discern both extremes by dissecting examples in class. Students learn about the motion system and how it is applied, and they compile research through observation, by collecting secondary research, and they explore their message through distinct stages in their visual development in the form of storyboards, style frames, and motion tests.

After this class, students were able to take animation principles and motion design concepts and leverage them in diverse ways. They become more comfortable with motion, sequence, and storytelling. Motion understanding broadens their ability and range, enabling them to draft scenarios and prototypes to visually represent information in layered sequences. Their understanding carried over to print-based projects as they started to consider layers and flow in printed text, and began to consider interactive text and image sequences in websites, TV spots and animated information graphics.

In upper-level interaction design classes, students often apply stop motion to explain difficult or complex ideas. Recently, a student used stop motion to describe the context for a new iPad application that helps teenagers improve their nutrition through game play, competition, and community sharing. He used stop motion to prototype a scenario. His movie was meant to explain to a developer how he imagines the interaction. If he were working with a team, he would be able to communicate to his creative director and usability designer how the application should function, and together they would be able to develop a unified vision for the project.

The ability of a designer to use motion design techniques to communicate ideas to workplace team members will advance the development of new paradigms. For example, a senior design student is using motion to describe an innovative concept for advertising that would eliminate the need for a TV spot by taking product placement and embedding it into video content on Hulu or Netflix. By using motion he can describe the activity and show how it will work, what devices should be integrated, and how screens will transition and relate. The design team will understand the new concept before a single line of code has to be written.

Motion design skills prepare students for designing in the future and for the world beyond print. Students will be capable of building messages and elaborate branding structures and will be able to create systems of typographic form, message, and delivery that move beyond the television screen and onto electronic paper, gestural interfaces, and designs for the 21st century.

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A “filing system” for teaching research skills in interior architecture education

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Abstract: Creating physical environments for humans, more specifically the design disciplines of interior architecture/design, involves a wide variety of aspects to be considered: material, technical, cultural, psychological, artistic... It is therefore important to provide students with the necessary tools (research skills) not only to address the different types of problems and questions that arise during this creative process, but –ultimately- also to ensure the continuing development of interior architecture as a profession and as an academic discipline through the development of its proper research methods. However, we have been coming across a number of obstacles and challenges in our effort to integrate the teaching of research skills in our interior architecture educational program. Here, we report on our experiences in an ongoing project in which we have tried to tackle these issues by providing students, starting in their first year, with a type of “filing system” in which we have specifically structured the information on relevant research approaches and methods.

Keywords: interior architecture, research skills, Design curriculum, Research informed designed education - Design education informing research.

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The general context – the ideal of the academic student as researcher-designer

Successfully creating physical environments for humans, the core business of the design disciplines of interior architecture and design[1], requires a considerable time and energy investment in order to develop the ability to synthesize at the spatial level the wide variety of aspects to be considered: material, technical, cultural, psychological, aesthetical, semiotic... The reform process of higher education in Europe, initiated by the Bologna Declaration in 1999 (European Union 2010), has had a profound impact on the teaching and training of interior architects in Flanders (Belgium). As of the academic year 2013-2014, the academic degree programs for interior architects, more specifically those programs consisting of three bachelor years (of 180 ects-credits) and one master year (of 60 ects-credits), will migrate into a university context. This integration is the culmination of a process of 'academisation', in which the research component of these educational programs has been gradually developed. Indeed, the overall vision on the relation between research and education at the academic level is quite clear: although the primary aim is not to educate researchers per se, the core argument is that "it is only by being embedded in scientific research and by actively doing research that students attain the higher order cognitive skills necessary in the performance of high-qualified professions […] Through the confrontation with researchers and a research environment, students attain the scientific habitus and drive to attain and apply knowledge" (based on Van Damme 2010). Applying this to the domain of interior architecture, the objectives are clear: at the level of the individual, the interlacing of research and design should lead to improved performance, while at the more general, collective level, this integration should ensure the continuing development of interior architecture as an academic research discipline and, ultimately, as a profession.

A decade ago, the curriculum of our school, as did many others, did not visibly include research as a necessary competence or separate set of skills. In the course of the 'academisation' process during the last five years, the curriculum has been adapted to incorporate explicit research skills. More specifically, the idea was to introduce first-year students to research and different research methods in a separate course, i.e. allocate some space in the curriculum to give them a conceptual framework and some basic research skills, and then to rehearse and to retake these skills in various forms during the two remaining bachelor years in the context of their work in the design studio and in other courses. For example, in the second bachelor year students have a group assignment in a course on human sciences in which they address a particular topic (e.g., emotional and behavioral effects of atmospheric lighting) by doing some form of empirical research (e.g., observing or interviewing customers in store). In the same year, they also have a course on cultural theory, in which they are asked to write a paper or create a website to present the results of their specific artistic and/or art historical research. In the third bachelor, research skills are linked to the four themes in which our master students can specialize: they have to develop and present an innovative out-of-the-box concept for a *retail environment*, to analyze functionally and historically a given piece of *furniture*, to assess the specific typology of an historical

[1] Although interior architecture and interior design have different connotations in some situations, for the present context they are interchangeable, so both terms will be used.

building in the light of a possible *re-use*, and to give a phenomenologically inspired account of a museal or theatrical *scenography*. Mastering these diverse research skills should allow them to be incorporated in students' work and research in the design studio. All of which should then accumulate in the master year in which students should demonstrate to be able to conduct research in the domain of interior architecture (resulting in a so-called 'master thesis') and also to execute a design project (the 'master project') under supervision, but largely independently. The general idea here is that the research in the master thesis should inform and guide the design project, i.e. the results of the master thesis should be "translated" in the master design project, hereby exemplifying the ideal of the researcher-designer.

The reality – obstacles and challenges

Reviewing our experiences regarding the integration of explicit research skills in our educational program of the last five years -starting with the appearance of research skills as a separate entity in the curriculum- a number of issues have emerged that somewhat nuances the ideal picture as sketched above. Although in general the development of the research component in our curriculum has definitely been positively evaluated, we have been confronted with some obstacles and challenges in this respect:

- *Limited possibility for deep processing of research*. As is the case in many a design discipline, the design studio and surrounding practice-based courses (e.g., sketching) constitute the core of the educational program and take up the majority of available time (and ects-credits). Moreover, given the holistic nature of a discipline simultaneously addressing multiple criteria (e.g., functional, technical, aesthetical, psychological…), it is important to provide students with the necessary background knowledge to understand these criteria (i.e., theoretical courses on construction, art history, human sciences…). Consequently, there was relatively limited time remaining for thoroughly focusing on research and research skills per se and this time was scattered throughout the curriculum. This limitation made it simply not feasible to explicitly address all the different research approaches that could be relevant for designers or to discuss in detail the underlying philosophical and epistemological frameworks. For the same reason, existing textbooks on research methods for interior designers (e.g., Botti-Salitsky 2009; Dickinson & Marsden 2009; Groat & Wang 2002) were rather difficult to fully integrate in the curriculum.
- *Compression of the range of research possibilities*. Students have many opportunities during their four years to actively engage in research: autonomous research projects in theoretical courses, specific assignments in the framework of studio projects, and most notably of course in their master thesis. However, we observed that many students, with regards to research assignments or design projects with a significant research component, lack a sense of exploration in this regard: they tend to stick to what they know. That is, although students in principle have a myriad of options with regards to research approaches and methods, from a technical, material study to artistic exploration, they tend to shy away from using methods that were not explicitly touched upon in the context of specific courses on research methods. In

combination with the previous point, this of course results in a considerable compression of the range of research strategies our students actually employ.

- *Decoupling of research and design*. In this paper, we do not attempt to address the issue of the exact relationship between research and design (e.g., is design in itself research?) or even impose a sharp distinction between the two. However, it is assumed that, regardless of the fact that the two components are to some degree autonomous and have different end goals, research in the domain of interior architecture should be at least minimally relevant for the design process. Of course, ideally they should entertain a strong, maybe even symbiotic relationship. Unfortunately, the direct link of explicit research and the design process, with as a prime example the "translation" of master thesis results into the master design project, is not always interpreted as such: in many cases, students do not fully grasp the relevance of research components to the design process or fail to recognize that many activities during the studio work can in fact be considered research activities.
- *Lack of knowledge accumulation*. Across the years, students regularly work on similar topics and research questions. Some repetition is of course inevitable and in some cases even advisable, but one does expect some knowledge accumulation to occur in that the experiences and research findings of the older generation of students are being "used" by the newer generation. However, students do not easily find the relevant knowledge generated by the students in previous years.

In our opinion, these obstacles and challenges mirror to a certain extent the current state and identity of the academic discipline of interior design itself. As a fairly young discipline it is still in the process of establishing a stronger body of theory, including the relationship of design versus research, and of looking for appropriate 'designerly' research methodologies (e.g., Clemons & Eckman 2008; Dickinson, Anthony & Marsden 2009).

In sum, given the tight curriculum, the wide variety of types of projects and so the broad range of issues students as researcher-designers have to deal with, and the current lack of a solid conceptual, methodological and communicative framework of interior architecture as an academic discipline itself, additional efforts seem to be needed to ensure an appropriate teaching of research skills to future interior architects.

The dream – ambitions and requirements

To address some of the obstacles that we have come across over the last years, a number of initiatives have been set into motion. The overall ambition – the dream – remains the same: to provide students at the individual level with all the necessary skills to produce ever more qualitative and innovative interior designs and in this way also to ensure the steadily increase of the discipline. Here, we want to briefly discuss the specific goals and assumptions underlying our new approach to teaching research skills. It is important to note that what we describe here is a meta-level approach: we do not focus on specific ways to teach any particular research skill, but rather provide the overall strategy or system in which research skills can be integrated throughout the curriculum.

- Students need structure; from a didactical point of view, the goal is to prepare students for their master thesis from the first bachelor year onwards, by giving

them first a relatively simple and easy to use framework to tackle the wide variety of (research) questions that arise while designing and then by consistently using and expanding this framework in the following years.
- Students learn from examples; to stimulate inductive learning students should have an archive or organized overview of examples of actual research. By including relevant examples of other student research in this review, knowledge accumulation can be stimulated.
- Students should have a list of references to standard works where they can find more extensive and detailed information. This is especially important for research strategies that cannot be discussed in the regular courses.
- Students should be made aware of the very different research approaches and methods at their disposal and, ideally, it should also stimulate them to start using a broader variety of approaches and help them to recognize research opportunities while designing. This implies that the system should be closely attuned to the design process.

Translating these strategic assumptions and ambitions into more specific, operational requirements, the following aspects emerge. First, the system should be both *exhaustive*, i.e., able to accommodate all the different types of research strategies and tactics relevant for interior designers, and *open-ended*, in terms of being able to incorporate new methods and techniques. Second, the system should be able to function as a *meta-reference guide* by providing pointers to relevant sources. Third, a *modular* system can be both easily adapted and extended, but can also stimulate novel combinations. Finally, it should be relevant for designers. This not only implies entertaining a close relation to the design process, but it should also be accessible in the way students work. Traditionally, a researcher is expected to start from a finely tuned research question embedded in a solid theoretical framework and then to carefully select the most appropriate research method to find the most suitable answer. In reality, students, including design students working on their master project/thesis, tend to work with a much more "I want to do something with photography"-type of attitude. In other words, even in an autonomous research project – a research project in which the topic or research question can be independently determined, so does not originate from questions in an ongoing design project – the entry point into a research cycle, can be pretty much in any of the different stages comprising the traditional research cycle.

The filing system – framework and implementation

Taking the previously described ambitions and requirements into account, we have tried to develop a framework and an accompanying implementation to introduce and integrate research skills in the curriculum.

Framework

The basic idea is to establish a (fairly) simple, modular, open-ended framework that can function as both operational support in guiding research and structuring device for a body of relevant examples. In essence, our suggested approach is to impose a type of *faceted classification* onto the research process, involving three components: i) carve up the research process into distinct attributes, hereby focusing on research activities, ii) reduce the complexity in each attribute by making explicit the type of potential

implementations, and iii) use this reduced matrix as a coding system to categorize existing research.

The starting point is at the lowest level of the 'research activity', i.e. what the student-researcher actually *does*. Whether it is searching the internet for the technical specifications of a certain material, interviewing a wheelchair-user on the accessibility of restaurants, or simply playing around with the color palette for their proposed design for an airport lounge bar, regardless of how small-scale such an activity might be, it can always be interpreted as being embedded in a structure in which five elements are involved: a question, an approach, a data collection technique, a method for data analysis and a way of communicating. Clearly, not all elements are necessarily explicitly defined as such or executed equally thoroughly (e.g., a quick google search versus a full-fledged literature study or a written report versus a short conversation).

Next, for each of these five attributes the same principle applies: the element can be operationalized or specifically implemented in many ways, but there are in fact only a very limited number of *types or categories* of possible implementations. By adding this abstraction to the framework, i.e., by explicitly introducing a superordinate level, we arrive at a fairly simple framework with five attributes, each of which can be realized by two or three types of content. The idea is, then, that by training students to view research and their research activities through this lens, including relevant activities during their work in the design studio, this limited framework can provide a support during the process of actually implementing and executing a research.

We will briefly discuss the elements in the framework and will illustrate the framework by a sequence of examples that all center on the same topic: Le Corbusier's Villa Savoye.

1) Focus: Process, Design, User

The driving force behind each research activity is a research question, although in daily practice this question typically remains implicit. A designer "just trying something" can be interpreted as doing research, but without the label and without consciously formulating a research question. In the domain of interior architecture, any research question has a focus on one of three relevant aspects: the design Process (P), the Design itself (D) or the Users of the design (U). These aspects are of course reminiscent of the triad Process-Product-Performance. Obviously, there is research that can be relevant for a designer but that does not directly focus on these three aspects. For example, research on the history of a company when working on their new store concept or on the developmental stages of children for a designer of school furniture. These research topics can indeed be relevant to designers, but they primarily reside in other research domains, not that of interior design.

Villa Savoye: a focus on…

(P): the general design philosophy of Le Corbusier or on the specific process leading up to this particular building.
(D): the design itself, for example in relation to other modernist buildings of that time or on the materials and colours that were originally used in the interior.
(U): how the first users appreciated the building or on how and why it developed into the architectural icon it has become.

2) Approach: Describe, Act, Create

The research approach is the basic structure of the research activity: how do you proceed? Regardless of the epistemological framework, there are only three standard

approaches in research: i) to Describe (D), i.e., you observe "the world" as it is, ii) to Act (A), i.e., you actively interfere and change something specific in "the world", be it real or virtual, and iii) to Create (C), i.e., you design or create a new "world". The approach that is used, is of course intimately tied up with the research question and thus the kinds of statements that one wants to make.

The basic approach of 'describing' is one in which the researcher attempts to somehow map the world. This can occur in many guises but the important part is that the researcher does not willingly interfere in the world: you look, you observe (directly or indirectly), you measure, you question, you interpret, but you do not intervene.

The basic approach of 'acting' also has many appearances, but the essence is always that the researcher willingly imposes a particular change in the existing world (or in his or her relationship to the world), be it real or virtual, and tries to capture the consequences of this change. This change mostly involves a specific part or element of a larger whole.

Finally, in the basic approach of 'creating' the researcher will design, or will try to design, a completely new "world". In the case of interior architecture, this 'world' is in most cases some kind of spatial design (which again can be virtual or real). This approach resembles the approach of acting because the researcher actively acts upon our existing world, but where 'acting' is focused on a particular aspect (fragmentary), this approach focuses on the whole design (holistic).

***Villa Savoye*: an approach of….**

(D): charting the effects of architectonic principles in later modernistic designs or an evaluation (e.g., by a random sample of the public) of the esthetic qualities of this building compared to other buildings of Le Corbusier.

(A): systematically changing construction parameters in a software model to investigate how the original design could be improved with respect to comfort and energy consumption.

(C): creatively reappraising the building by trying to translate the insights of Le Corbusier into a contemporary design.

3) DATA COLLECTION/GENERATION: EXISTING, DIRECT, INDIRECT

Whether they are images (e.g., sketches of pictures), words (e.g., in interviews or your own ideas and theories jotted down in a notebook), numbers (e.g., surface measures), or complete designs, in each type of research (i.e., in each of the three research approaches) some sort of data collecting or generating is involved. The actual techniques to do this are both numerous and radically different in nature. Here, we propose to classify the possible types of techniques in terms of the involvement of the researcher in the actual generation of the data. More specifically, there are three ways to go about data collection and generation: i) making use of Existing data (E), e.g., sampling an existing picture archive, ii) Direct collecting or generating of new data (D), i.e., generate the data yourself such as a researcher who photographs the most important constructive elements to document a site, or iii) Indirect collecting or generating of new data (I), i.e., having other people generate the data, such as in the technique of photo elicitation in which users of an interior are asked to take pictures to capture their experience of the space.

Together with the next attribute, this forms the core of our approach. Whereas the former two attributes of Focus and Approach are more conceptual, this attribute concerns a very concrete action. Indeed, here, only actual activities and techniques

appear (i.e., the things the designer-researcher actually *does*). Examples of data collection/generation techniques are:

- Artistic creation
- Photography
- Audiovisual registration (film)
- Image manipulation (e.g., Photoshop)
- Interview
- Literature study
- Designing (logbook)
- Sketching
- Questionnaire
- Behavioral observation
- Case study (technically, a case study is not a data collection technique per se, but is an example of a descriptive research in which, by definition, a combination of different data collections techniques is being used)

Villa Savoye: data collection via…

(E): a systematic inventory of all existing publications in architectural journals that refer to the villa Savoye.

(D): the creation of different renderings of the interior by manipulating the colour palette or conducting interviews with leading interior designers on the influence of Le Corbusier on their own work.

(I): asking a class of design students to capture the genius loci of the place through sketches or the creation of a short film illustrating the *promenade architecturale*…

4) DATA PROCESSING: OPEN, CLOSED

Collecting (or generating) data is the first performative act, the second is to analyze these data through one or more specific methods, depending on both the research question and the nature of the data collected. The many specific methods that exist can roughly been categorized in Open methods (O), in which a certain amount of flexibility is possible (i.e., the analysis can be adjusted to the data) and Closed methods (C), which must proceed through distinct, pre-defined rules.

Again, this step involves effective actions the researcher-designer performs, although the illustrative list of methods of analysis here remains fairly abstract because the actual execution will of course depend on the type of data. The added level of classification for this attribute, Open versus Closed, is also quite abstract (in fact, the most abstract of all attributes), but it does force students to reflect on the nature of their interaction with the data they collected. Examples of techniques of data analysis are:

- Phenomenological analysis
- Analysis by means of the NARA-grid
- Narratological analysis
- Semiotic analysis
- Statistical analyses
- SWOT-analysis
- Comparative analysis
- Visual essay

Villa Savoye: data analysis via…

(O): a semiotic analysis of the texts and designs of Le Corbusier (collected previously) in order to determine the basic syntax of modernism or a phenomenological analysis of the sensations and perceptions of a first-time visitor to the Villa.

(C): a frequency analysis of the academic versus practice-oriented publications referring to the Villa Savoye to assess the relative importance for theory and practice or determining the most interesting vantage point to observe the interior by ranking photographs taken during a previous visit.

5) COMMUNICATION: LANGUAGE, IMAGES, DESIGNS

In educational or academic settings, research usually needs to be communicated in some way or another. Moreover, even in daily design practice, in which communicating the results of the research activity is mostly implicit or informal, there seems to be an increased demand for the arguments supporting design choices – in other words, making results and conclusions of the prior research explicit. It is important to stress that research in interior architecture can also be communicated in different ways:

i) through Language (L), i.e. text and numbers, as they appear for example in traditional research report comprising of verbal descriptions, graphs, and tables; ii) through Images (I), i.e., a visual essay consisting of a carefully designed sequence or superimposition of images, and iii) through Designs (D) themselves: an exhibition, models, installations, …

In sum, we want to present students with a framework in which a research activity, no matter how small-scale, is always a combination of the following elements: Focus (Process, Design or User), Approach (Describe, Act or Create), Data collection/generation (technique + Existing, Direct or Indirect), Data analysis (technique + Open or Closed), and Communication (Language, Images, Designs). Next, we discuss how this framework will be presented to students.

Implementation

Our implementation of the framework has led to the development of a "filing system" that consists of two parts: a "manual", i.e. a bundle of texts with details on how to interpret the different attributes and values, and a (virtual) "filing cabinet", i.e. a coded inventory (currently still a simple excel file) listing an ever growing body of examples of relevant research labeled with a code identifying the values of different attributes and for each study in the inventory a one-page description of these values.

PART I – THE MANUAL

In keeping with the idea of a simple and usable framework, the manual is intentionally very basic: a one-page introduction with the goals and context of the framework, followed by one page for each of the five attributes, i.e., detailing the basic concepts of focus, approach, data collection, data analysis and communication. Next, there is one page per data collection technique (e.g., sketching, photography, interview), divided in three parts according to how the technique can be used (Existing, Direct, Indirect) and including references to standard works on the topic. A similar set-up is used for data analysis: one page per method (e.g., content analysis, statistical analysis), with an indication of the applicability of the method (Open, Closed) and including references to standard works. This bundle will be added to an online guide

that was set up for our students as a collection of relevant, practical information they will need in their educational career (e.g., with information on plan conventions, on the formal requirements of a jury presentation, on how to refer correctly in papers etc.).

PART II – THE FILING CABINET

The "filing cabinet" consists of a coded inventory of existing, relevant research (e.g., journal papers, master theses, exhibitions, …). For example, in a simple excel file, each row could represent an existing study with a value for each of the five columns representing the five attributes (Focus – Approach – Collection – Analysis – Communication). By searching for a specific value for a given attribute (e.g., 'sketching' for data collection or 'Nara-grid' for data analysis) students could quickly find some relevant examples. Moreover, by simply sorting according to one or more of the attributes (e.g., showing first all examples in which an Acting approach is combined with a phenomenological analysis) and scrolling through the list, students can immediately be confronted with different approaches. Finally, accompanying the inventory, an online (virtual) catalog (currently a simple pdf-file) will collect for each study one page with some general context for that particular study, some basic information on the five aspects and a link to where the actual study can be found.

The two-part system is currently being introduced and explained to first-year students as a way to interpret existing research and as a supporting device to initiate and execute their own research. By also using this system in assignments (e.g., locating a study with particular combination of attributes), we hope to encourage students to recognize different aspects in research and also notice the opportunities of research in the context of the design process. An evaluation of the impact and effectiveness of the system will be performed at the end of the year.

Some final remarks

To reiterate: we have described a proposed minimal framework and implementation focused on actions as a didactical tool to integrate research as a separate skill in a design curriculum. To conclude, we would like to formulate some final remarks on the (potential) use of the system.

First, a note on the modularity and the accessibility of the system. The *modularity* implies that these five aspects can occur in (almost) any combination. Although it is obvious that some combinations occur more frequently than others, there are hardly any a priori constrictions: a descriptive approach can be used with any of three research focuses (P-D-U); sketching as a data collecting technique can be useful both in mapping (describing), but also in acting or creating (designing); a narratological analysis can be employed for the analysis of a group dynamic in a design studio, the scenographic routing through a museum or the representation of living scenarios in magazines through the decades… The *accessibility* of the system relates to the starting point of a research activity. Although the description of the five attributes is ordered as the traditional steps in the classic research cycle, in reality, the order in which the value of these five attributes is determined is not fixed. For example, the method of analysis can determine which data needs to be collected (e.g., a researcher who wishes to use the NARA-grid, will have to collect specific kinds of data) or a data collection technique (cfr. the "I want to do something with photography"-attitude) can affect the focus in research question… Both properties of the system enhance its flexibility and thus, hopefully, the usefulness for designers.

Second, although the (theoretical) framework makes clear distinctions between the different components, in practice this is not always feasible or even possible. In some cases the data collection and analysis methods or the analysis and communication methods are completely intertwined. For example: the visual essay is both a way to analyze a given set of images, but also a way to communicate this; sketching an interior is way to collect information from this space but can be simultaneously a way to analyze it. This is, however, not problematic for the intent of the system.

Finally, by putting the emphasis on the research actions and including designing as an approach, it is hoped that the perception of the artificially inflated distinction between research and design for our students effectively vanishes. As mentioned, in this approach we refrain from addressing the more philosophical discussion of the exact nature of research versus design: a designer-researcher who is experimenting with a particular architectural attribute (e.g., the colour palette or choice of material) is designing, but is also performing a research activity. Whether this experimentation deserves the label of actual *research* is in the present context less relevant. What is important, is that students learn to recognize that this "playing around" is indeed also a research activity and that they become aware of the potential (and limitation) of this activity in their design process. This is of course a hypothesis that needs further investigation. In addition, because of this 'bottom-up' approach we did not touch upon many concepts that traditionally occur in contributions on research skills: the traditional dichotomy of quantitative versus qualitative, epistemological frameworks, "designerly ways of knowing", etc. This does not mean we regard these as irrelevant or dismissed: these concepts can of course be integrated where appropriate. We have described in this paper the basic version of the system as it is presented to our first-year students; if successful, expanding and extending the system by embedding it in existing conceptual and theoretical framework can prove to be an interesting next step.

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Design Education for Social Sustainability

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Abstract: In a changing world how do we educate students for equitable global sustainability and embed design for social need in curricula? This paper explores pedagogic methods for people-centred design and considers the benefits this can provide for students, whilst preparing them for future careers in a globally challenging environment. Examples of user-focused design relating to health, wellbeing and education illustrate social and community issues driving design ideation, process and outcome. Inherent value gained through experiential learning is analysed alongside associated assessment issues. Researched case studies indicate that students engaging with people-centred projects and learning through leading acquire enhanced multi-faceted professional and personable skills. A correlation is then explored between education for social sustainability and students gaining 'softer' employability skills. Studies suggest they understand the interlocking complexities of design and social behaviour and are better prepared as future sustainable thinkers and innovators. The paper culminates in the development of an educational digital content resource, the 'People-Centred Project Platform', designed for the clustering and sharing of information relating to community methods of working and is relevant for any arts and design discipline.

Keywords: Social Sustainability, Participatory Design, Design Pedagogy.

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Design Education for Social Sustainability

How do we as educators prepare students for future design careers in a globally challenging environment? Within university curricula we need to ensure we are educating future designers, as interdisciplinary thinkers, leaders and problem solvers with knowledge to address social and environmental concerns. Teaching design for sustainability requires an understanding of societal needs and human behaviour as well as concern for environmental issues.

This paper explores a pedagogic approach to community centred and participatory design through the use of tools and methods adopted and developed by 3D Designers. The educational benefits to students are highlighted, and a causal link established between participatory project work and the development of 'softer' employability skills.

Whilst preparing students as future thinkers, innovators and leaders, the transformative learning that takes place is recognised through the enhancement of long-term, life and professional skills.

Design Now

Design as a discipline is evolving with less emphasis on producing things and more focus on creating socially responsible ideas and solutions driven by people-centred, participatory design. Globally we are facing a critical environmental situation and need to question the role of the designer within today's society. In a rapidly changing world we need design thinkers to engage with socio-environmental issues and provide longer-term solutions for products and systems that can enhance life and well-being for all. Barnwell (2011, p.184) states that "Today we need new visionaries to provide sustainable visions to aim for; we need to shift our focus from things to people –we need to realign our design orientation".

Manzini (2010, p. 11) states that design schools can be "active agents of sustainable change" and can "promote social innovation which is sensitive to cultural and social diversity". Participatory design requires developing specific research methods to engage people in a design process, and initially techniques borrowed from the social sciences provided a framework for gathering information to drive solutions from a user perspective. Design ethnography techniques have since evolved to become owned and developed by designers, and Sanders (2001, p. 6) refers to the "blurring of boundaries" between designers and social scientists, and that designers "need to learn how to become involved in the creation and construction of the new tools".

Bichard & Gheerawo (2011, p. 46) question how designers can also be ethnographers within the normally tight time constraints of a design brief. They state that, "many designers who have engaged in ethnography have also re-imagined it" and give the example of the IDEO[1] methods cards, created for "design teams to use in empathic research and human-centred design".

Designers now have an intrinsic role in the whole research and design process and create their own visual and participatory research tools, gathering information, interpreting research and developing outcomes. In participatory design the 'user' becomes the participant and co-designer, and is central to the design process. Lee (2011, p.21) defines a current shift in design from "designing *for* people" (a user-centred design approach) to "designing *with* people" (a co-design or participatory design approach). Thus a more integrated design ethnography process is evolving to inspire people-driven design solutions. Designers have the ability to interpret raw

information experienced firsthand with users, and identify nuances and the unexpected that can inspire ideas and innovation. Design methods drawing on ethnographic and social science research practice have become established within the design profession and major design companies such as IDEO recognize the value in using design ethnography and have lead commercial innovation in this area. Julier (2007, p. 6) states, “design processes involved now go beyond the object and into the systems that both contain it and provide the infrastructures through which it flows”.

We need to prepare students as future designers and leaders in this field and develop effective pedagogy in people-centred design within curricula. Enabling students to use an immersive experience within the everyday, seeing life through others eyes and creating design solutions to address the social needs of our time.

Pedagogic process model for participatory design

Pedagogic methods are used to embed user-centred and participatory design in the course curriculum. Students on the 3D/ Sustainable Product Design bachelors course at Falmouth University engage with projects involving different groups of people in the community. Methods of interactive designing with people underpin project work, often relating to health, wellbeing and education. Students are required to question the context surrounding their projects and the role and impact of their designs on people, society and the environment.

The eclectic nature of design utilises an ability to gather and synthesize information and to search for a seed of inspiration to spark ideation. Bichard & Gheerawo (2011, p. 54) refer to this as “the search is for creative insights” and that “designers relinquish their leadership position when working with users”.

Studio based teaching is intrinsic to our discipline and naturally creates a conducive environment for orchestrating collaborative idea generation. The additional step is to take research and ideation methods out of the studio and into the community to create firsthand design experiences outside the familiarity of the studio environment. This demands a different approach to a user-focused or client focused activity, it can be a dive into the unknown and the unpredictable, and requires engaging with people who don’t necessarily connect with a design language, often in challenging situations.

Students whilst studying engage with participatory design methods through community focused project work. This is introduced to second year students through staff-led group projects, which aim to develop research methods and equip students with knowledge and experience of designing with people. Initial workshops explore issues such as diversity and inclusivity to engender respect and acceptance of others and challenge preconceptions of people and society. Students focus on designing with people for people within the local community, using creative research methods they engage with people and look for design problems and creative solutions.

In the final year students run their own context driven self-directed projects and it is at this point that their individual interests develop and the extent that they engage with community methods of working is determined.

Pedagogic process

A pedagogic process toolkit was developed to enable research and process to be mapped within user-led and community based student projects. It assists collaborative working and identifies sections covering the whole project journey from approaching organizations to assessment. It acts as a self-directed project tool to assist students organising projects, and an advisory checklist for staff to oversee the process. There are

three main sections covering: Preparation, Process, Engagement and Assessment. Preparation at the start of the process can be staff and/or student led and Assessment at the end is primarily staff-led. The Process & Engagement section is predominantly student led and is divided into subsections: Introduction, Interaction & Invention, Outcomes and Evaluation.

Table 1. Pedagogic Process Toolkit

Preparation	**Process & Engagement**			**Assessment**
	Introduction	**Interaction & Invention**	**Outcomes**	**Evaluation**

Preparation	**Project pre-planning e.g.** Making connections Enabling a multiple working relationship between stakeholders Arranging preliminary meetings/ site visits Communicating with organisations Establishing project parameters, participants and time frame Establishing a critical framework associated with the subject Identifying appropriate research methods
Introduction	Engagement activities Building trust with user-groups Establishing project rules for social engagement Setting the scene & context
Interaction & Invention	Co-generation of ideas Iterative process developing and testing ideas with and for people
Outcomes	Actual: object/ system/ concept/ event/ recommendation Social: conclusion/ celebration/ giving something back
Evaluation	Student led evaluation Compile evaluation from all stakeholders: organisers, participants, students
Assessment	Establish work required for assessment Ensure learning outcomes are fulfilled Project outcome: object/ system/ concept/ visualisation Process journey: evidence, record, reflect

Two case studies illustrate how this process can be applied to a design project. The projects are examples of inclusive, social and community led projects, organized by final year students, they follow a collaborative methodology and working practice within the pedagogic process toolkit.

Case study 1 - BootUp Garden project

A group of disadvantaged school pupils participated in a co-design project organized and directed by a final year student. It involved liaising with stakeholders: activity garden staff, school staff and pupils. The pupils participated in co-design and idea generation activities over one term and created water collection and transportation solutions for the site. The project generated a recycled water container, which grew out of the co-design participatory process. However the most important outcome was the sense of community generated through shared participation and the social and educational benefits gained by the pupils. At a celebratory concluding event, all pupils were presented with a book that documented their journey and discovery and it was

this 'giving back' that was most meaningful and memorable. Key learning success factors were reflected in the confidence gained by the pupils, and the confidence gained by the student, learning through leading.

Table 2. Case Study 1, BootUp Garden project.

	feedback from stakeholders
Pupils	"loved it, it's better than school" "less restricting and more creative than school"
Garden Manager	**"**helped with team work and confidence building" "developing their social skills" "through the process of design, the children have learnt that they can turn their ideas into practice"
School Teacher	"The children have learnt team work, being creative, to take part in discussions, practical skills, making friends, problem solving and the ability to work independently" "The project has been a fantastic experience for the children who have learnt to be creative and voice their own opinions. They have gained confidence"
Student	"Being asked their opinions and working on a live brief has given the children a sense of responsibility and determination" "Empowering children through design, using design as a tool to build confidence. - Learning social skills through design" "I learnt so much - changed how I design - more valuable way of designing"

Case Study 2 – Memory Game

Using co-design methods this final year student worked with a group of dementia sufferers, their carers and a NHS Dementia care trainer in a 'Memory Café' venue. Trust was established over several weeks of visiting the centre, and the memory game was co-designed with the participants using cognitive stimulation activities. The final product was an interactive memory prompt, which created discussion and reminiscences amongst the group.

The student (designer) was leading the process as a more user-centred activity and the group, in the latter stages, became a focus group to refine and test the concept. The memory game was successful as a product with commercial possibilities. The success of the project was mainly due to the social interaction with the group and the student's role as facilitator of the process.

Table 3. Case Study 2, Memory Game project.

	feedback from stakeholders
Occupational therapist	"We've all enjoyed this and got a lot out of it, it's fantastic" "People in further stages would really benefit from this reminiscence too" "A good way to learn about other people. Sensitive issues were raised and discussed"
Health care assistant	"It's a great conversation maker"
Memory impaired clients	"We are getting more confident" "Recalling happy days" "Finding out things about people which you may not ask directly"
Student	"I gained a better understanding of how valuable user engagement can be during the development of concepts" "A rewarding experience of working with people in the 'real world".

Both case studies required sensitive introductions and building trust and respect within the groups. It was important to establish a good relationship with them over a period of time and also create an end (celebratory) point to the project. Although the pedagogic process was similar both outcomes were different in their quality, refinement and commercial potential. In both studies the Preparation, Process and Engagement, and Assessment stages were clearly defined. The product outcomes were exemplary when matched with context and community engagement. Feedback and evaluation, a crucial component, from all stakeholders was commendable as was the students' clear contextual understanding of their process and journey. In both cases the process journey and social interaction benefits were almost more important than the specific product outcomes.

Learning, Assessment and Pedagogy

Findings suggest that the project outcomes may not necessarily score highly on traditionally assessed design outcomes, such as product innovation and marketability. In many instances outcomes, often as a result of true collaboration, reached by collective consensus, can be diluted rather than driven by a designer's personal vision. However, what is apparent is the journey, the learning transition that students undergo experientially. Innovation is happening through process and engagement and not necessarily through project/ product outcomes.

Kolb's model of experiential learning' illustrates a cyclical process encompassing: 'Experiencing, Reflecting, Generalising and Applying' (Kolb 84, p. 42). If we apply Kolb's model to people-centred design projects, the cyclical nature of design process areas correlate with Kolb's definitions. His model includes convergent, abstract thinking and divergent, actual, experience. It provides a close correlation with a participatory design process methodology emphasizing the importance of journey and outcome. It also provides a checklist that can ensure all aspects of a design process are considered for assessment. The cyclical model is non-hierarchical and illustrates equality of process and outcome.

This then raises the question of the value (assessment) placed on the students' individual learning journey and the process of assessment. The benefits accrued by students need to be reflected in assessment by establishing clear guidelines on how and what is assessed, the criteria used and grading applied. Assessment must also allow for the unpredictable and the organic nature of community involvement in project

development and recognise the value of experience, good or bad (a negative experience can often lead to a meaningful educational transition). Assessment needs to allow for the complexity of learning and the connections made between multi-faceted gathering of eclectic knowledge, metacognition and experience. Assessment criteria should focus on assessing participatory process, social engagement and allow for a range of possible outcomes.

Learning Outcomes need to be specified to ensure distance travelled, individual growth and personal skills gained by the student are acknowledged. Learning Outcomes (UK) as defined by QAA (2010) are segregated into 'Subject specific' and 'Generic'. Subject specific qualified by discipline are tangible and (in design) visible, but generic can be intangible, subjective and more difficult to evidence. Socially interactive projects provide a mechanism for making generic skills meaningful**,** as the success (or not) of the project is dependent on the effectiveness of the student's generic skills, such as: Management and leadership, Preparation & organization, Working with people and Communication skills.

Pedagogy for Employability (Pegg et all. 2012, p. 30) refers to staff and students working together towards a common objective and that "students are active partners in the educational process" also "it is important that a learner is able to recognize the part that each activity in which they engage plays in helping them demonstrate the attributes expected". Knight states that it is "vital that they recognize what they have been learning" (Knight et al. 2003). Through reflective learning, recording project journey and development, students analyse and acknowledge what they have learnt. It is important that they learn through an iterative process of experiential and reflective learning and evidence this transition for assessment. For example process journey could be evidenced through reflective analysis of: journals, reports, sketchbooks and blogs.

Observations & feedback

Participatory and community driven projects enhance the students' learning experience by making them aware of issues around equality and diversity and the influence that they can have on social change and improvement. Through a holistically socially focused design education, students become flexible in their thinking, are open to ideas and gain respect for others' opinions. The educational benefits of community focused experiential learning encourage students to develop their ability to deal with complex social situations. They also experience the multi-faceted roles of the designer as facilitator, director and co-creator and their design ability is enhanced through designing with and for others.

Student feedback on their experience

All students expressed a positive experience when working on people-centred and community focused projects:

Table 3. Student comments.

"Changed my attitude to design"
"I value opinions and ideas"
"No one is exactly who you think they are"
"Collective thinking"
"Just talk to people to allow ideas to flow"
"Research never stops"
"Incredible experience"
"Work equally together"
"Seeing what they think through the eyes of the child"
"They reacted better if I asked them to help me help others"

A survey was undertaken with 22 students who had graduated over a three year period, 2009-12, to ascertain their perceived benefits of working on people-focused design. This included students who had worked on Dott Cornwall[2] projects whilst studying, where they greatly benefited from working alongside professional companies[3], gaining experience of using meaningful research methods and how these were applied to social design contexts. Thackera (2011, p.7) described Dott's methodology as, "start with existing grassroots activity and then create frameworks and platforms that enable these activities to grow and develop".

Graduates were asked to reflect on the people-centred projects they had worked on whilst studying at university and to comment on their personal and design experiences. They analysed how community interaction had influenced their projects' direction and outcomes. They were also asked to list the personal and professional skills they had learnt and developed and how their experience had influenced their current career choice and their future prospects and ambitions.

All graduates expressed the positive benefits of working with people and all stated that they gained increased confidence in themselves, their ability and ultimately confidence as a designer. They also found it had influenced their employment choice, how and where they were currently working and their ambitions for their future careers.

Table 4. Graduate comments

"I gained a great sense of community working with local people"
"All round experience and confidence"
"Learning how to approach people"
"a rewarding experience of working with people in the 'real world'
"I definitely gained confidence in both my personal and professional skills"
"I learnt a great deal of social skills"
"Improved my time management, telephone manner and design skills"
"Working with the user enhanced the quality, content and professionalism"
Employability context
"Working in a design communication role - I have always loved telling the stories behind my designs"
"applying worldwide for jobs focused on sustainable and social design"
"Creating informative and functional designs that resonate with the public service customer of the future"

'Softer' employability skills

A constant factor that kept emerging from feedback was confidence; all students stated that they gained self-confidence from working on community focused projects.

The sharp rise in university fees in England has increased universities' focus on the employability characteristics of graduates. Elliott (2010, p.106) refers to the benefits of students' participation in education for sustainable development (ESD) projects as "developing knowledge of the wider social and environmental implications that surround their future professions". Students working on user-centred and community based projects experience multi-faceted roles such as: designer, organiser, facilitator and communicator. Indirectly they develop enhanced professional and 'softer' employability skills. They gain confidence in working with people, are equipped to face challenges, adaptable to change and are proactive initiators of collaborative working, able to identify and solve problems and tackle real world situations.

Research into transformative learning of 3D Design graduates who worked on socially interactive projects indicates there is a strong correlation between acquiring enhanced long-term life skills as a student and improved employability prospects. There is a causal link between working with communities, learning by leading and gaining 'softer', yet complex, employability skills such as empathy and self-confidence.

Knight & Yorke (2003, p.29) describe the 'softer' concept of employability as "encompassing developments that ought to stand them (students) in good stead for a life time".

Key 'softer' life skills that are orchestrated, promoted and acquired through experiential learning on people-centred projects include: communication skills, powers of negotiation, empathy, people skills, social responsibility and confidence. Feedback confirms that students working on people-centred projects find it instils confidence in their ability to relate to people, work with other disciplines and indirectly enhances their employability skills.

In the CareerEdge model of employability (Dacre Pool and Sewell 2007), self-confidence and self-efficacy link to self-esteem & ultimately employability. This model is a useful holistic tool as it considers the whole spectrum of learning of the student and it illustrates a complexity of different factors contributing to employability. Confidence was the key characteristic that emerged from student feedback on people-centred projects. Confidence in self instils confidence in ability and ultimately employability. Confidence cannot be taught but can be nurtured in the curriculum and we need to recognize that 'softer' employability skills tend to be acquired over time, are just as important as professional subject skills but may take longer to develop.

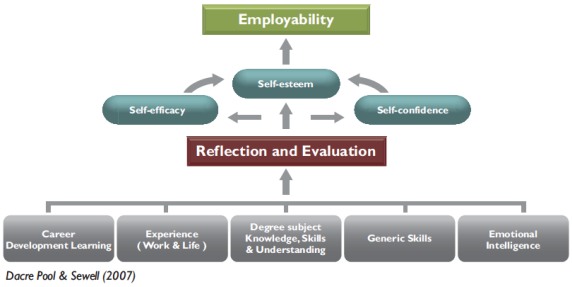

Figure 1. Dacre Pool & Sewell (2007)

People-Centred Project Platform

Building on pedagogic development with people-centred participative projects, it was recognized that students could be better prepared for working within communities and the interlocking complexities of linking design and social behaviour. It was also identified that many students across different subjects in Art, Design, Media and Performance work in uncontrolled project environments external to the University and share many similar issues. This led to the development of an educational web based resource, the People-Centred Project Platform. It provides a digital platform for the clustering and sharing of information relating to working with people and community focused methods of working. It is a shared learning and teaching resource accessible for all arts disciplines; a package of advice, tools, methods and training to cover different scenarios associated with external project working. It also provides guidance for protocols and regulatory frameworks for students to work confidently and safely within the community and share good practice across disciplines through an on-line project forum.

This collection of resources enhances pedagogy and technology enhanced learning. It encourages flexibility of learning, facilitates the sharing of knowledge and ideas, and allows for networking and community building between disciplines. The resources can be selected and incorporated into modules to aid and supplement subject delivery. It consists of six content sections: Methods, Social, Connecting, Legal, Paradigms, Shared.

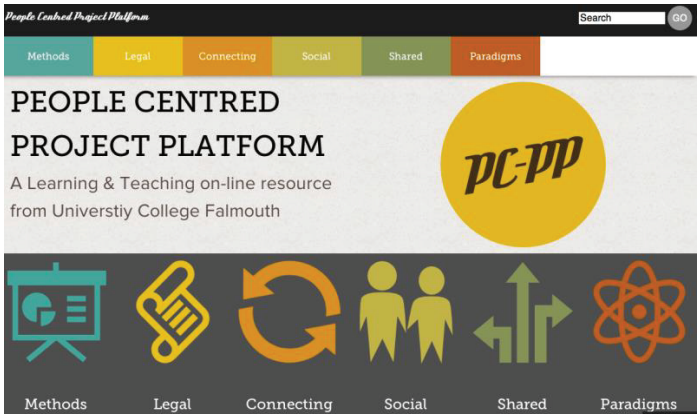

Figure 2. People Centred Project Platform.

Table 5. People Centred Project Platform, content sections.

People centred project platform					
Methods	**social**	**connecting**	**legal**	**paradigms**	**shared**

Methods	Examples of social science and design ethnography research methods. Techniques of working with and engaging people to find out what they think, do, feel, like and wish for.
Social	Guidelines for working with people, groups and communities. Advice for running workshops and forums and promoting cultural and social awareness.
Connecting	Advice for approaching people and organisations. Communication methods Establish a critical framework.
Legal	Legislative advice Regulatory frameworks and responsibilities.
Paradigms	Links to key examples Exemplars of external companies and organisations.
Shared	A forum space for sharing ideas and exhibiting project work.

The cross-disciplinary nature of the collection of resources is appropriate for any course where students engage with community-focused projects and work with people outside of the university environment.

Conclusions

Research indicates that there is a causal relationship between students engaging with community-based, people-centred projects whilst at university and gaining 'softer', yet implicitly important, long-term, life and employability skills. We need to acknowledge the transformative learning that takes place, possibly over a longer time frame, and allow flexibility in our assessment processes and design of learning

outcomes to recognize this journey. It could be argued that the same students would succeed in employability terms without a social engagement experience and there is also an inherent link with personality traits and an ability to engage with people. However, the corollary of research has indicated that nurturing people skills through working on social innovation projects increases empathy and self-confidence. This is directly linked to gaining professional confidence and ability, and correlates with enhanced employability skills. These socially orientated skills are not only applicable to designers, they can be applied to students across a spectrum of courses and provide a common theme for linking interdisciplinary projects and practice.

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Low-tech skills in high-tech solutions Era: the cognitive benefits of basic craft techniques in formal design education

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Abstract: *The formal design education in the 21st century is confronted with an expanding list of challenges: knowledge availability on the Internet; handicraft vs. computer skills; amateurism; specialist vs. multidisciplinary curriculums; national vs. international agendas, etc. In a multifaceted design education where everything is accessible and the disciplines' borders are blurred, there is a rising necessity for structured and intelligent design process, to reflect the need for smart and sustainable design solutions in the complex high-tech Era. Equipped with computers and internet resources, students are allowed instant access to infinite repositories of visual material and ready-for-digital-recycling creative solutions. This may accelerate the research and the development stages in design projects, often resulting in omission of important cognitive processes, hence the weakening of decision making ability and decline in original thinking.This paper aims to underline the significance of the employment of basic handicraft techniques in comprehending the design process, beneficial not only for developing spatial understanding and enriching tactile experiences for the Net Generation, but also for enabling critical thinking, problem solving and decision making on the road to intelligent, relevant design solutions in professional design education.The analysis is made through a series of empirical studies including: observation of trends; tailored workshops with constrained design tasks; semi-structured interviews with students.*

Keywords: Design education, Design process, Design thinking, Problem solving, Decision making, Basic craft techniques, Practical skills.

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Introduction

"To cut is to think"
Germano Celant 1997

Celant's thought is a perfect starting point for discussing the creative mechanisms of art, design and education from the beginning of the 20th century till the present day. It is the revolutionary approach of Cubists and Constructivists that have introduced a new way of creating sense by individual constructs, thus constructing reality rather than imitating it. The Cubists have bravely fragmented the existing images and objects into pieces and have constructed new structural relationships. "The first modern conceptions of design, photography, graphic art, fashion and cinema spring, in a practical as well as linguistic sense, are from Cubism and its cuttings" (Celant 1997, 21). It is not a coincidence that the Constructivist's theory of learning was developed in the same period of history, promoting the principles of *experiential learning* through *exploration, thinking and reflection*, favouring democracy and interaction in the process.The act of *making* is the act of *knowing*; such approach leads to innovative outcomes and originality, the ultimate goals of the learning process. As John Dewey (1910, 122), one of the leading names of Constructivism argues: "The acquisition of definiteness and of coherency (or constancy) of meanings is derived primarily from *practical activities*". The interaction between thinking and doing is a crucial mechanism for our ability to design, apart from the fundamental skills vital to our survival and wellbeing. As we do things, we experience, learn, conceptualise and use our knowledge to produce meaning, sensible actions and products for living. "An experience has pattern and structure, because it not just doing and going in alteration, but consists of them in a relationship" (Dewey 1934, 45-46). A designer of the modern era comfortably fits into this idea of a maker = thinker, being some sort of Leonardo da Vinci, a master of the multidisciplinary realms. This is someone who is capable of making connections, constructions, concepts.

A century after the naissance of Constructivism, times are considerably different. In the last two decades of the digitalized and internet-powered world we are witnessing the rapid diminishment of vertical hierarchies, and a rise of the World Wide Web of Interactivity. An incredible amount of information, goods and number of people are in movement or interaction. We utilize wireless communications, satellite navigation, touch screens, robotics, nanotechnology. The World is becoming increasingly complex, with a new technology and new media to embrace in everyday lives. We live at the same time in the physical as well as the virtual world. A 21st century designer, working in the global complex environments must possess a broader set of skills: artistic, thinking, development, communication, computer, business skills, etc. More and more, the designer turns into a strategist, an artist or a manager who "focuses on self-entrepreneurship and on deconstructing hierarchical power, through the galaxy of projects". (Borja de Mozota 2011). When being responsible for managing elaborate design projects, designers need to use well structured design methodologies and processes. They need to solve systematic problems and make important decisions. At the bottom line, "the design skillset is broadly definable as range of both intellectual and practical skills" (Design Commission 2011, 8). Design education, as expected, must follow the trends and the needs of contemporary design practice and prepare young designers for the responsible role they are supposed to undertake. This paper investigates the role of practical skills in development of design thinking abilities. More

precisely, it aims to underline the significance of basic handicraft techniques' employment in comprehending the design process, important not only for developing spatial understanding and enriching tactile experiences for the Net Generation (Tapscott 1998, 1-3), but also beneficial for all cognitive processes that lead to intelligent, relevant design thinking in professional design education. The research was conducted within the Faculty of Art and Design, European University – R. of Macedonia and involved 2 workshops and 3 selected design methodologies.

Formal Design Education

As a field of academic inquiry, design established itself with the first colleges of design education in the 19th century, such as Royal College of Art (1837 -) and Central School of Art & Design (1854 -) in London, UK. Bauhaus school (1919 - 33) in Germany has had an important influence, spreading the ideas of Constructivism and Modernism. Expanding as the World developed in the past two centuries, schools of design are now all around the Globe. Design as a discipline has evolved from traditionally perceived *product-oriented* to *process-oriented* activity, bringing it closer to communication and management practices. Today we witness "convergence of design and management" (Borja de Mozota 2003).

But even now in the 21st century, the nature and purpose of design is not so well understood by many people. The variety of ideas about design comes from the abstract character of the discipline (or "non-discipline") itself as it has not only one field of inquiry, but it serves rather as integrator of other disciplines (i.e. technology, arts, management, etc.). It is "a field without its own subject" (Design Commission 2011, 25). Considerable academic debate is still going on whether design belongs more to "arts", "technology" or "sciences" i.e. should educated designers be "artists" or "engineers". The curriculums at design colleges and universities are generally envisioned to teach students a variety of skills: visual skills, artistic skills, creative thinking, computer literacy, business skills, etc. There are specialist and interdisciplinary pathways, both with pros and cons for the actual context. It is the designers themselves whose preferences will lean towards *specialist* or *globalist* discourse in education and practice.

Recent doctoral programs in design indicate that the discipline is becoming more competitive than before, and that the field of education and practice is widening towards other academic fields of inquiry.

Design Education in the R. of Macedonia

Fine Arts and Crafts have long tradition in the country, where industrial production is stagnating in the Post-communist period. Nevertheless, the Western influences and the global business and marketing trends, the rise of creative industries (film, software, etc.) have brought along the need for contemporary design practices in the society. Therefore, design is slowly emerging from the Traditional and Applied Arts (Vrencoska 2008, 136). But the infrastructural system of the discipline is still "under construction".

> In order to overcome the problems of social recognition and providing sufficient level of professional practice, there is a strong need for solid infrastructure: higher education, active design associations, centers and councils supported by the Governments; museums and galleries to promote design; design conferences and awards, specialized media and design theory (Vrencoska 2008, 141).

The university level of design education in the Republic of Macedonia was established only in 2006, with the first Faculty of Art and Design as a private initiative at the European University – R. of Macedonia. The framework of the program is based on the Applied arts' practice combined with contemporary design methodology. There are four main pillars in the program: Artistry, Design/Development, Theory and Software. Some of the courses taught, such as Design Methodology, were introduced on the country's academic scene for the first time. Three modules – Graphic Design, Fashion Design and Interior Design are offered as elective subjects.

The students at the Faculty of Art and Design come from different backgrounds with various levels of skillsets. Not all enrolled students have well developed artistic articulation and skills through the primary and secondary education, so their creative talents often remain underdeveloped by the time they reach university. Creative subjects are underestimated and not considered as potential fields for professional career choice. Additionally, there is a lower level of interest for traditional crafts in younger generation, comparing to the generation of their parents and grandparents when Do-it-Yourself concepts were part of everyday life. Unlike today, sewing, tailoring, knitting, embroidery, woodcarving, construction, painting, etc. were traditionally handed over within the family circle and via informal education. Back in our present time, most of the students are typical representatives of the Net Generation, advanced with the latest models of personal computers and mobile devices, exploiting social networks and a whole variety of digital media. They become masters of the virtual space but have no idea how to stitch a button. Thus, lack of physical experience in practical activities with real problem-solving leads to weaker understanding of reality and concrete problems. It is often "appropriated" with a lack of pragmatic skills (cognitive and practical) to solve these problems.

Employing Design Methodology in Formal Design Education

Before presenting the case studies, I want to give an overview of the design methodologies applied over six years of formal design education at the European University – R. of Macedonia. Design process is the basis, with variables for its implementation in different design fields. Since the Faculty have committed to teach design as a problem-solving activity, we are interested in producing designers with solid cognitive and practical skills, capable of creative and innovative approaches in design. The program supports them to become designers with a broader understanding of design's principles and mechanisms, although they partly specialize in their chosen field (graphics, fashion, interior). Therefore, we aim for a balanced design skillset, in which students would harmonize their interest and abilities for low-tech and high-tech skills. It is often quite difficult to define the border between "low-tech" and "high-tech" in a world where technology rapidly progresses. But in the context of contemporary design education, we would prefer to qualify "low-tech" as "before personal computers" and "high-tech" as "after personal computers". Observing that students heavily rely on digital technology and internet during their studies, we started to pay more attention to the level of their practical skills. The focus shifted to observations on how low-tech and high-tech skills influence comprehension of design process and design methods that are part of it.

Design Process

In real practice, design process is a structured activity of problem-solving, which relies on the interactive relationship between the involved parties (i.e. a client who is in quest for solution and the designer/s who can conceptualise and produce solutions). "Design processes have evolved from tried and tested ways of problem-solving and are continually refined by the designer or design team applying them to 'real' client projects" (Best 2006, 112). Creativity as a thinking activity is essential to the design process in the quest for better and smarter design solutions. Decisions are important part of the process, which helps accomplishing or managing the process of problem-quest-idea-solution-final product. "Actively guiding decisions will, at times, include the need to be both *assertive* and *empathetic*, and to be able to *say no* if required" (Best 2006, 80).

Design process varies from designer to designer, from organization to organization. UK Design Council (2005) summarizes the steps of the design process in four categories:

DISCOVER, DEFINE, DEVELOP, DELIVER.

The structure of the process that is taught to our students within the Design Methodology course is based on this model, and is divided in the following structural steps:

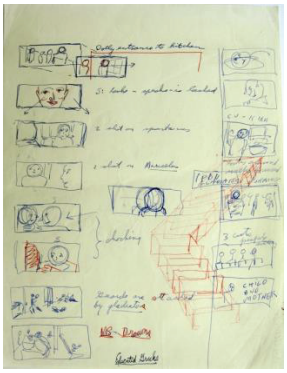
- Identification of the possibilities for design
- Definition of the problem/challenge
- Defining the design task, criteria for success, summarized in brief
- Secondary research - field and literature
- Target group – visual and written description
- Primary research (surveys and interviews)
- Development of ideas and creative solutions
- Choice of relevant solution / design concept
- Visualization & Presentation of the concept
- Models and prototypes
- Testing & Evaluation of proposed concept
- Realization, production
- Implementation of design/Supervision of implementation
- Evaluation of success

Design processes consist of "a series of methods that are put together to suit the nature of each design project or question" (Best 2006, 112). I have included a variety of design methods and creative techniques in the course program (such as mood boards, mind mapping, brainstorming, design sketch with annotations, prototyping, etc.) to form the process accordingly. But then, in formal design education, the design process is often simulated, modified, shortened or stretched, and to some extent unrealistic. Since there's an absence of real market situation with a real client and project budgets / time / resources constraints, the process is leaded more into the realm of developing and applying creativity rather than managing a more complex design project. Another issue is the absence of real teamwork, as many of the projects in the first cycle of studies (undergraduate level) are executed and assessed as individual activities. In comparison, Diploma projects are usually the first major opportunity for a student to employ a coherent and more comprehensive design process, due to several factors:

more time for undertaking the project, a real problem involved (in most of the cases), human factor (contact with companies/institutions, research with the target group, etc.).

Several learning outcomes: developing cognitive abilities in design thinking as creative problem-solving; strengthening decision-making abilities; learning various creative and visual techniques to develop and present thinking/ideas; communication and presentation skills, among others, are expected once the course is completed. With the diploma projects, students are expected to gain better project management skills and wider research capacity, on top of the basic design skillset.

While mentoring students during their journey through the design process, it is important to foster responsibility and some sense of management for their own creative resources and phases. Csikszentmihalyi (1997) has described the creative process as comprising five steps: preparation, incubation, insight, evaluation and elaboration. The stage of incubation and birth of ideas are the most fragile and delicate part in the process, often disturbed, pressured and over influenced by external factors. When the brain delivers the awaited ideas it is significant to ensure enough time, space and isolated environment for these important cognitive mechanisms. "If in doubt we must experiment until we discover the best timing for work and rest, for thought and action, for being alone and for being with people" (Csikszentmihalyi 1997, 7). The students are encouraged to approach the creative process thoroughly, acknowledging all the steps needed for productive outcomes. Selected design methods and creative techniques are used to conceptualize gathered data and to prevent "creative blockage". It is important to pursue trial-and-error; exploring the benefits of both physical (i.e. handicraft) and virtual (i.e. digital) experiences; individual and teamwork efficiency. For the purpose of this research, several design methods and tasks/projects were selected to give evidence of different learning experiences through involvement of handicraft techniques such as cutting and collaging paper (i.e. mood boards), freehand drawing/writing (i.e. mind mapping), folding paper, waving, moulding (i.e. model making) and their cognitive benefits for the practitioner. The focus in the following analysis is put on examples where physical experience and low-technology have been encouraged and used or not considered / dismissed in the *crucial stages of the creative process*, vs. virtual experiences and digital resources. Crucial creative stages of the design process are: research, visualization of gathered data, development of ideas and solutions (i.e. Figure 1, 2), visualization of ideas and design concepts, models and prototyping. The case studies are selected from the experiences in undergraduate design studies, where the educational journey through a coherent design process begins.



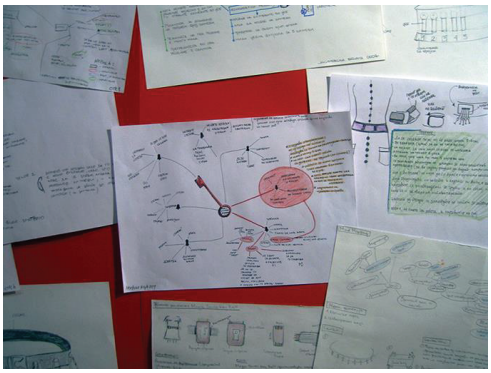


Figure 1.Developmental cognitive sketch for "Spartacus" movie, Stanley Kubrick, 1957. Source: Stanley Kubrick Archives, UAL London, UK. Figure 2. Students' cognitive mapping for development of design concepts. Source: "Design Methodology" archive, Faculty of Art & Design.

Researching the Low-tech approaches in Design Methodology: Educational experiences

Case Study No. 1 Handicraft workshop for unlocking the creative potential

Having in mind our intention to educate the students in both practical and intellectual skills and foster their interplay, we organized a 1-day Waving and Knitting workshop in the first year of studies in 2007 (see Table 1). The workshop came as a surprise to most of the students, since they didn't expect such an activity during their formal design education.

Table 1. Description of Case Study No. 1: Waving and Knitting Workshop

Workshop	**Waving and Knitting Workshop**
Objectives	-To introduce design students to traditional craft techniques of waving and knitting -Exploring the potential of various materials used in design -Offering uncommon practical and tactile experience -Raising awareness for traditional cultural heritage and inspiring the use of traditional techniques in contemporary design
Design Task	No specific design task was assigned. The students were encouraged to enjoy the experiential process of learning the techniques and producing some basic elements of wave and knit structures.
Participants	42 students from the 1st year at the Faculty of Art and Design (male and female)
Facility	Classroom
Equipment and Material	Wooden looms 30 x 40 cm, needles, wool & cotton threads, plastic, fabrics
Supervision	3 professors and 3 assistants
Time Frame	1-day workshop (6 hours in total)

Results	-All students tried and learned the two techniques offered at the workshop; Got familiar with the basic principles of textile construction through interlacing fibres; -Male students were particularly interested and encouraged in learning the techniques, as they have never tried them before. The interest was even more evident in male students who were known as “computer wizards”; -Female students who were familiar with the techniques to some extent felt proud and voluntarily helped the others; -Although the work was predominantly individual, there was a spirit of playfulness, sharing, teamwork and assistance; -Acceptance of traditional techniques as potential for creative exploration.
Evaluation of the learning outcomes	The workshop helped to unlock students’ creative potential. They gained basic understanding of what “construction” and “technique” mean for design. The activity offered great fun and liberated them from the stereotypes for handcraft techniques as “old fashioned”, “outdated”, “granny’s staff”, “female staff” etc. It was a great opportunity to gain some new practical skills, as well as *patience* and *discipline* for work.

Figure 3 - 8.Students of design learn waving and knitting techniques in workshop.

Source: © Gordana Vrencoska, Faculty of Art & Design.

When Low-tech meets High-tech in Design Process

> "Craft is an extraordinary thing of wonder; encompassing skill, creativity, artistry and emotion with thought, process, practicality and function. It is one of the purest forms of expression."
> Tricia Guild OBE
> (In Craft Matters 2011)

Around two years after the start of the undergraduate program, we have noticed that students rely much on data and ready design solutions gathered through internet. After given a certain design task, the students would "jump"over the phase of researching the aspects of the problem directly to exploration of the existing solutions for the problem. Consequently, there was a visible decline in quality of research & development stages in the process, resulting in regression of original thinking.

The issue was discussed among the team of professors and we agreed that some action is needed. Inspired by a Hi-tech / Low-tech debate during my studies at Central Saint Martins' College of Art & Design in 2005, I have proposed the following activities: an experimental workshop for the students and a lecture/discussion on the topic. The planned activities were included on the agenda of the large international project titled "Chain Reaction", and took part at the European University along with several other workshops and lectures in September 2008.

Lecture: Lotech_hitech@designeducation.com: Cognition, Computers, Confusion?

I have focused the lecture on studio practices in design education, tackling the issues related to use of new technologies in design classrooms and labs. The democratic availability of information and its high-tech processing in educational facilities influences research and development stages in design projects, often resulting in omission of important cognitive processes. Does computer technology facilitate or inhibit creative thinking? How pure information-processing systems (computers) can stimulate human-like processing of information (cognition) while designing?

These questions initiated discussion in which students and teachers openly talked the stages of design processes where new technology should be temporarily dismissed.

CASE STUDY NO. 2 DESIGN WORKSHOP LOTECH_HITECH@DESIGNLAB.COM

The aim of the lotech_hitech experimental workshop was to show how low-tech and high-tech approaches in methodology influence the cognitive process in creative problem solving. Two groups of students worked on the same design task (see Table 2) in equal time frame, one implementing low-tech hands-on methods and craft techniques, while the other group was allowed to use only technical equipment (i.e. computers, digital camera, etc.) (see Table 3, Figures 9 - 17).

Table 2. Description of Design Task, Case Study No. 2

Design Workshop	**Designing outdoor Trash bin for the younger generation**
Design Problem	The insufficient number of trash bins on frequent locations and the low level of ecological awareness in youth often result in garbage scattered in urban environments, especially in the capital city, Skopje. Most affected places are the city parks, school courtyards and bus/train stations. There is a growing need for new trash bins, which will help raise awareness to a higher level of hygiene and aesthetics in our urban environments.
Design Task	To design a new trash bin that will motivate young people for keeping their environment clean, by applying innovative approach. The trash bin should communicate interactively with the young users and is intended for use in frequent places.
Criteria for Success	Innovative solution; Feasible for production; Application of modern and durable materials; Simple maintenance; Attractive and outstanding design; Possibility for communication with users.
Target Group	Teenagers and young people, aged 14 – 22. Most members of this age group are attending high school or college. They are in so called rebellious years when they oppose their parents, spend their time going out or communicate intensively via social networks.
Insight	Field research indicates that there are insufficient numbers of trash bins. The ones in use have quite unpractical designs for waste disposal and are visually inappropriate / unattractive for the target group.
Expected Outcome	Developing and visualizing design solutions for the problem.

Table 3. Overview of Objective, Process & Outcome for Case Study No. 2

Process & Outcome	**Low-tech group**	**Hi-tech group**
Objective	The aim of the lotech_hitech experimental workshop was to show how low-tech and high-tech approaches in methodology influence the cognitive process in creative problem solving.	
Design Task	Designing outdoor Trash bin for the younger generation	
Designated Process for development of solution	-Problem analysis and brainstorming on possible solutions -Choosing the most relevant creative solution -Analysis of the solution applying Criteria for Success -Visualization of concept -Presentation of concept	
Time Frame	3 hours in total: -15 minutes for briefing -2 hours' work on development of solution -15 minutes preparation for presentation -30 minutes for presentation of both groups and conclusion	
	Low-tech group	**Hi-tech group**

Facility	Art Studio	Computer Lab
Equipment	Pen, paper, carton, scissors, paints, brushes, nylon bags, glue, celotape, and whatever else is available at the Art studio.	Computers with internet connection, tablets, mobile phones, digital camera. Use of pen and paper or other low-tech equipment is not allowed.
Participants	Team of 5 students (male and female, 2nd and 3rd year)	Team of 5 students (male and female, 2nd and 3rd year)
Supervision and Monitoring	4 professors and 1 teaching assistant Observation of process and semi-structured interviews	3 professors and 1 teaching assistant Observation of process and semi-structured interviews
2h. Process	40 min. brainstorming, 5 min. sketching, 60 min. crafting, 15 min. preparation of presentation	50 min. brainstorming, 20 min. internet research, 30 min. digital visualisation, 30 minutes preparation of presentation
Presentation	Oral presentation and physical demonstration	Power-point presentation with LCD projector, oral explanation
Results	6 creative ideas, 1 chosen for proposed design solution. Concept based on "Recycling and Rewarding"; the trash bin has a built-in electronic system, which allows users to manage personal account with login and password. Amount of money is transferred to the account according to the electronically measured waste disposal. Built-in micro camera for security purposes.	Several creative ideas, 1 chosen for proposed design solution. Concept based on regular trash bin made of aluminium, with the lid in a shape of a human head. The bin has an "EMO" personality, for identification with the target group. The lid is opened by digital sensor.
Evaluation of process (students)	Satisfied with the result, but missed computer and internet for research and preparation of presentation.	Satisfied with the result, but missed pen and paper for more efficient development of ideas.
Evaluation of outcome (supervisors)	Although they missed high tech resources, the group successfully managed the creative process and delivered an innovative solution which complied with the task given and criteria for success.	The group made research on the internet but missed pen and paper to document and map the creative development of ideas and delivered a solution that is more visually attractive than essentially innovative.

Conclusion: both groups managed to accomplish the process in the short time given for the task (3 hours in total). There were no signs of panic or confusion; the students didn't ask for assistance from the supervisors during the brainstorming and visualization of ideas. A general opinion was concluded at the end, that the best way is to utilize both ways of working during the process, but to wisely manage when and for what purpose to use low-tech and high-tech resources. The supervisors have evaluated Low tech group's process and outcome as more successful. Their proposed design concept "Recycling and Rewarding" is considered feasible and assessed as highly innovative for the present environmental situation.

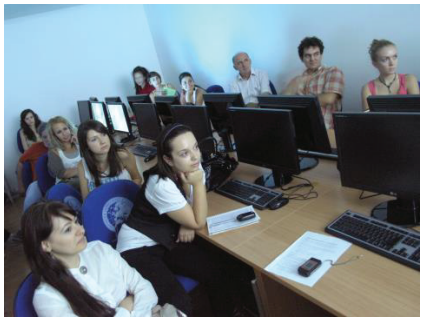


Figure 9.Working facility for the High-tech group. Figure 10.Working facility for the Low-tech group.

Figure 11.Work-in-progress: High-tech group. Figure 12, 13.Work-in-progress: Low-tech group.

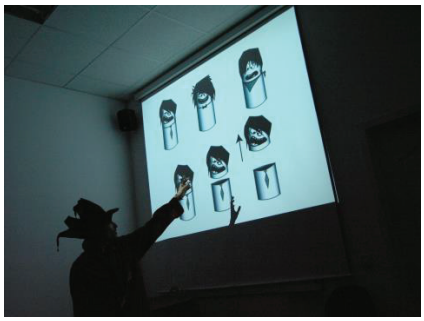


Figure 14. Presentation of the design solution: High-tech group. Figure 15. Presentation of the design solution: Low-tech group.

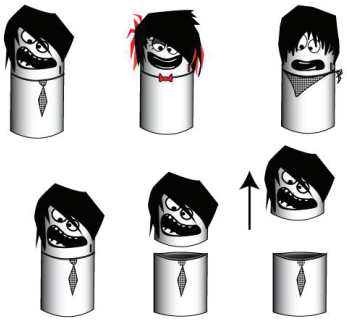


Figure 16.Design solution: High-tech group. *Figure 17. Design solution: Low-tech group.*

CASE STUDY NO. 3 MOOD BOARD AS A DESIGN METHOD (ONGOING 2006–2013)

Mood board is involved from the 1st year of studies, taught as design method within "Design Methodology" course. It is recommended as a tool for visualization of insight; visual presentation of inspiration; definition of styles, forms and colours in a project; visualization of target group lifestyles, etc. The students continue to use it during their studies for a variety of projects. It is also part of the methodology for the diploma project. Cutting and collaging techniques are used for the method.

Overview of the learning outcomes: The Mood board enables quick visualization and variable combination of elements; it liberates the students from the pressure of drawing in the initial stages of design process; it enhances the feeling of playfulness and the notion of "I can't go wrong with this", "work in progress"; it serves as a visual guide through the next steps of the design process.

After the students practice the method by hand, they are encouraged to use computers as well. Observing the process, the outcome and the usage of physical and digital mood boards, we can detect some differences. Although both categories serve the same purpose, the handcrafted mood boards take a longer time to produce, involve the designer more into the "storytelling", offer an "imaginative journey", appear more artistic (students explore forms by cutting and pay attention to the art composition), and what is most important, they can be continuously present on the working table while the design project is being developed. Digital mood boards which are done by the students often look pretty much as if they were done just for the sake of it; ready images are downloaded from the internet and pasted onto a white background. Due to the faster process they would use less time to develop the "story". Digital mood boards are rarely printed and once they are done, remain stored for most of the time in the digital project folder.

Figure 18, 19, 20. Handcrafted Mood board collages, themed as "City of Words". Source: "Design Methodology" Archive.

Figure 21.Handcrafted Mood board collage, summarization of research on "Black & White Kitsch". Source: "Design Methodology" archive.

Figure 22.Handcrafted Mood board collage, visualization of target group lifestyle. Source: "Design Methodology" archive.

Figure 23, 24. Digital Mood board collages, "Agency for urban culture" Visual identity design project. Source: "Visual Communications" archive.

CASE STUDY NO. 4 MIND MAPPING AS A DESIGN METHOD (ONGOING 2006–2013)

Mind map (Buzan and Buzan 1993) is one of the creative techniques that is taught and encouraged as a design method suitable for individual development of design projects. Students present design problems with important aspects on a map, adding crucial words and drawings out of the gathered research, going step by step to the desired design solution. Mind mapping is an excellent tool for organization of material,

development of ideas and problem solving. With the mind maps students learn the so called “visual thinking” or “radiant thinking”.

The maps are usually used in one of the crucial stages of the process, when students are supposed to make sense of the research data and continue solving the problem with their own creative solutions. It is observed that the map is a “breaking point” between research and development or a “point of connection”, “synthesis” between the outside world and the inner world of the designer. It’s a crucial cognitive tool and appears to be a great support, especially with more complex or systematic design projects.

Within the Design Methodology course, mind maps are produced by hand which allows students more time for incubation, artistic freedom to express themselves, and avoidance of mental blockage. Students also use mind maps in other courses, handcrafted or digitally crafted. Observation shows that students feel more confident when they firstly create the map by hand. The digital versions are mostly designed for presentation purposes, especially for important projects (i.e. Diploma projects), but are not necessarily a primary tool for the visual thinking process.

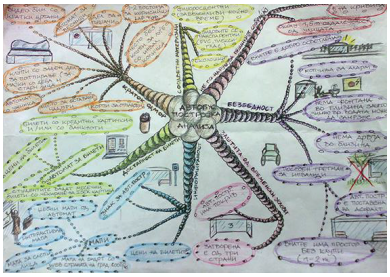
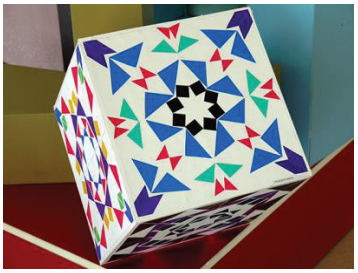


Figure 25.Student’s mind map for presentation of gathered research and development of ideas, handmade. Source: “Design Methodology” archive.

Figure 26. Student’s mind map for presentation of gathered research and development of ideas, digitally made. Source: “Visual Communications” archive.

CASE STUDY NO. 5: THE “TANGRAM” PROJECT (ONGOING 2007–2013)



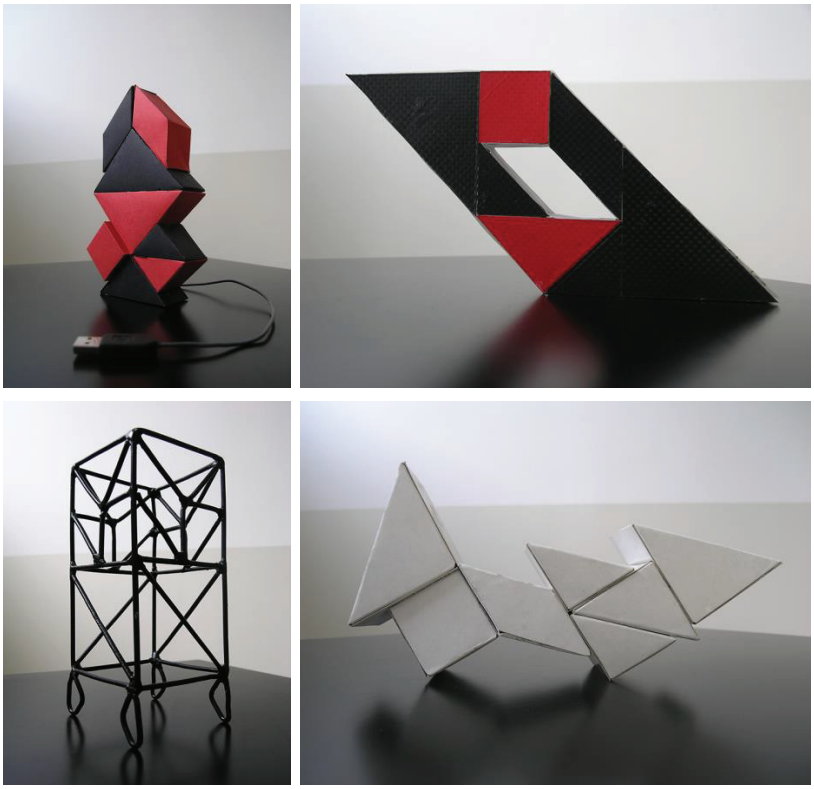


Figure 27. Tangram wooden kit, used as reference for the "Tangram" project

Figure 28 - 33. 2D and 3D solutions from the "Tangram" project. Source: Photo © Gordana Vrencoska, Faculty of Art & Design.

The "Tangram" project is a regular design task in "Design Basics" course. Its objective is to allow exploration and use of geometrical shapes in 2D and 3D design. It is based on the popular Chinese puzzle Tangram, which consists of 7 geometrical shapes. This logic game enables creation of specific shapes made of all 7 parts of the Tangram. In the original game the seven shapes are not supposed to overlap, and the same rule is used in the students' projects as well. There are 4 main tasks: 1) To form recognizable figures out of two-dimensional design; 2) Two-dimensional design to form abstract motives in symmetry, asymmetry, repetition and rotational symmetry; 3, 4) Three-dimensional design as progressions from a flat Tangram shape to a designed object (chair, lamp).

Handicraft techniques used: cutting, collaging, folding and moulding. Paper, plastic, metal or clay are usually used as materials for the models.

Overview of the learning outcomes: completion of the project results in development of spatial logic and understanding of dimensionality, composition, transformation, progression and construction; use of design principles; working with constraints; understanding of geometric form and its application in design; developing sense for tactile relationships with material and objects, and ability for prototyping.

Discussion

We can now discuss the emerging insights of the previously reported case studies. The presented workshops and design methods show some valuable experiences of the undergraduate design students from the Faculty of Art and Design in Skopje. Different aspects of employing basic craft techniques and their influence on cognition are presented and compared to high-tech, or virtual experiences in design processes. It is well known that in the 21st century we have a sheer choice of craft techniques for facilitating design processes – research, development and production stages. Just because the students are all literate in computer software does not mean that as teachers we should dismiss handicraft techniques from their creative journeys. We are supposed to allow students experiment with the unknown and to surprise themselves with unexpected creative ideas or results. As with the Case Study No. 1, learning knitting and waving may become a totally new experience for male students, especially if they are very proficient in software and dependant on digital media. Second, the workshop was an "eye opener" for all the students regarding the importance of practical skills in design. The tactile sensation which is enabled with the use of handicraft techniques is also important, as students become familiar with different materials and their presence in the physical world.

At this point it is important to underline the specific role of the designed / crafted object coming out as a product of the cognitive process. A tangible object enhances the experience of designing and remains a point of reference for future ventures; comparing to a digital file that may not be regularly visible, we can exhibit crafted objects in our studios and classrooms. They may serve as catalysts for other creative processes/projects, to their creators or to other students. "Objects have stories attached to them; they have personal narratives. In contrast, it is the rare simulation or virtual experience that could ever have the personal meaning of even the simplest keepsake or souvenir."(Eisenberg and Eisenberg 1998, 15).

Relying only on over-the-top high-technology in the design process does not necessarily mean that we will come up with highly innovative ideas. As with the case study No. 2, we were able to get evidence that even poor tech resources can facilitate creative and innovative thinking. Handmade Mood boards, Mind maps and crafted 2D or 3D models (Case Studies No. 3, 4 and 5) are reliable methods for unlocking creativity, developing original thinking and allowing imagination to surge into applicable design concepts.

To indicate the various benefits of basic craft techniques for design students, a summary table of all techniques presented in the research is made (Table 6).

Table 6. Benefits of basic craft techniques for design students

Handicraft technique	**Practical benefits**	**Cognitive benefits**
Hand Drawing and Writing	Communication skills Artistic skills	Visible (visual) thinking Intuitive process Imaginative journey Concentration
Folding Paper (Origami)	Construction skills Preciseness	Transformation Progression Spatial logic Understanding dimensionality
Cutting & Collaging paper	Form Composition	Spatial skills Imaginative journey Experimental attitude Playfulness
Waving & Knitting	Construction skills Preciseness Accuracy	Discipline Realistic approach Progression Design principles
Moulding	Construction skills Sculpting Exploring form Texture	Spatial logic Transformation Understanding dimensionality Experimental attitude Playfulness
Overall cognitive benefits	• Self-discipline, Self-esteem • Step by step approach, Logical thinking • Managing time, managing a process, managing constraints • Establishing relationships, Teamwork, Interactivity • Applied imagination, Freedom of creative expression • Decision making, Problem solving	

Conclusion

The world is becoming increasingly complex, with more interaction and problems to solve in everyday live. Design, as a tool, process and product is becoming essential for creatively solving these problems. The problem-solving capability of designers is depending on well-developed intellectual and creative skills, essentially synthetized in the practical skills. "This has been called '**intelligent making**,' encapsulating the multifaceted and joined-up learning processes relevant to the digital age" (Craft Council 2011). We have a variety of handicraft techniques and high-technology instruments to facilitate our design process on the road to relevant and intelligent design solutions. Involvement of basic craft techniques in formal design education in 21st century remains significant part of the journey, for they are an excellent learning, thinking and experimental opportunity. Handicraft skills gained and practiced during studies are a great advantage for developing *constructive*, *realistic* and *innovative* approach to problem solving in design ventures.

"Literature from the past two decades demonstrates that craft practice is no longer exclusively focused on the making of objects, but also on the development of knowledge-based services" (Craft Council 2011, 14). More and more, the skills and learned principles of basic craft techniques form a solid platform for highly smart solutions and systems needed for the High-tech solutions' Era.

At the end, several recommendations may be given for the design students. Better results in designing are shown when:

- They learn how to solve problems in the physical world, first;
- The brain comes first, the hands are second, and the tech-tools are third in the process of creativity;
- In other words, learn how to wisely balance available technical resources during the design process, maximize use of both low-tech and high-tech;
- Use "pen and paper" during the creative thinking process;
- Get comfortable with the trial-error approach; "No effort is underestimated";
- Use their own practical skills, not depending on other people for visualisation and presentation of ideas

This is one of the possible ways for going from university education to successful design practice. "**Intelligent practitioner**" would describe a designer - thinker and decision maker who possesses practical skills and relevant knowledge to face real problems and situations. If we revisit the opening thought "To cut is to think" by Germano Celant, and describe the 21st century designer, we would say that this is "a professional who knows how to use scissors and a computer keyboard to "cut", and how to use the brain to draw a line and say "go" or "no".

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Developing Design Thinking Expertise in Higher Education

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AUT University

Abstract: Design Thinking describes a human-centred methodology for innovation, which has evolved from the study of the unique ways in which designers 'think', and 'practice'. There is growing evidence of the increased uptake of Design Thinking in design, business and other disciplines, and there is an emerging body of research. There is a need to develop sound University curricula that are founded in relevant theory and research findings, however, there appears to be a relatively small amount of rigorous research on the learning and teaching of Design Thinking. This paper presents the initial stages of a PhD research project that explores how Design Thinking can be best developed, delivered and evaluated in higher education to both product design and business students. The evaluation focuses on the students' learning and teaching experiences, and the impact of the curriculum on the development of their Design Thinking expertise. The research uses Action Research, Design, and embedded Case Studies. A number of key theories inform the curriculum including Design Thinking, Constructivism, Experiential Learning, Bloom's Learning Domains and Constructive Alignment. The paper presents initial research findings from the first iteration of the curriculum.

Keywords: Design Thinking, Curriculum Development, Learning and Teaching

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Introduction

The overall aim of this research project is to explore how Design Thinking expertise can be best introduced, developed, nurtured and enhanced within both Product Design and Business higher education programmes. Specifically, a Design Thinking curriculum is being developed, evaluated and refined through a number of iterations. For the purpose of this research, a curriculum is defined as a learning and teaching programme for the introduction and development of Design Thinking expertise. The research specifically aims to: (a) evaluate the impact of the curriculum on students' learning and teaching experience, and their development of Design Thinking attributes and capabilities; (b) identify factors that influence the impact of the curriculum on students' learning experiences and achievements; and (c) assess the use of action research as a methodology for both improving teaching practice and developing personal learning and teaching theory in relation to design thinking.

Currently, there is limited research on the learning and teaching of Design Thinking. Consequently, this research will make a significant contribution to related scholarship and offer significant contribution to developing a deeper understanding of:

- The knowledge, cognitive capabilities, thinking styles attitudes and values, methodologies and methods associated with design thinking expertise;
- The perspectives of students, teachers and business professionals concerning design thinking;
- The features of a curriculum and resources that can support students' learning of design thinking expertise;
- How design thinking can be best taught, nurtured and enhanced in higher education and professional learning contexts; and
- The methodologies and methods that can be used to design and evaluate Design Thinking curriculum and resources.

Design Thinking

Design Thinking is founded on the notion that many designers 'think' and 'practice' in particular and unique ways in the creation of products, graphics, artefacts, environments, buildings, systems and services, and that this way of 'thinking' can be studied, harnessed and improved. Design Thinking can be conceived as a 'human-centred methodology' (framework) that supports and drives effective innovation (Bauer and Eagen 2008). The usefulness of Design Thinking in tackling complex or 'wicked problems', as opposed to well defined problems is important (Cross 2001; Buchanan 1992). "Wicked problems are complex that they cannot be analysed and fully understood in order to be solved afterwards by rationalistic scientific processes, but should instead be reframed and addressed through an iterative processes by the designers involved" (Poulsen and Thogersen 2011).

Design Thinking is a useful methodology for exploring complex and complicated problems, and it is now being taken up and utilised by a range of disciplines and professions outside of design to drive innovation (Bauer and Eagen 2008; Kolb 1984; Martin 2009; Leavy 2010). These disciplines include architecture and engineering; information and technology; business and management; and education. Design Thinking has also had increasing uptake in areas such as sustainability and social innovation. Much of the rise in the recognition, study and application of Design

Thinking can be attributed to specific businesses and organisations such as interdisciplinary design consultancy IDEO, who have developed key Design Thinking models and practices; academic institutions such as the 'd' school at Stanford University and the Chicago Institute of Design, which have developed undergraduate and postgraduate learning and teaching programmes and workshops informed by Design Thinking. In addition, Toronto's Rotman School of Management has been instrumental in promoting Design Thinking management education.

Conceptualisations of Design Thinking

A number of researchers offer conceptualisations of the cognitive processes that are manifest in Design Thinking. For example, Bauer and Eagen (2008) propose that Design Thinkers use a generative process of 'imagining' to drive the idea creation process. Imagining relies on analytical, associative thinking and day dreaming (Bauer and Eagen 2008). Cross (2011) describes the designer's ability to move between the concrete and abstract modes thinking modes as central to Design Thinking. The literature review has revealed that a wide range of thinking capabilities and styles have been associated with Design Thinking. These include: constructive (concrete) thinking; analytical (critical) thinking; abstract thinking; divergent/convergent thinking; synthetic thinking; abductive reasoning; intuition; reflection, visualization; heuristical thinking, aspirational thinking, synaptical thinking and hypothetical thinking.

Cross (2008) identifies various forms of intelligence that may be drawn on in Design Thinking. They include: Linguist; Logical Mathematical; Spatial; Musical; Bodily-Kinaesthetic; and Personal. Goldschmidt and Badke-Schaub (2008) present a model of cognitive processes including Search/Generation/Mental Imagery/Evaluation Assessment/Structuring Learning as well as Visual Thinking and Design Reasoning. They advocate that design researchers work with psychologists to investigate these cognitive processes. Owen (2007) represents Design Thinking as knowledge building situated between analytic 'finding' and synthetic 'making' modes of cognition (see fig 1). Cross (2008) also argues that more work on understanding the cognitive aspects of Design Thinking will empower design educators in formulating their aims, objectives and methods

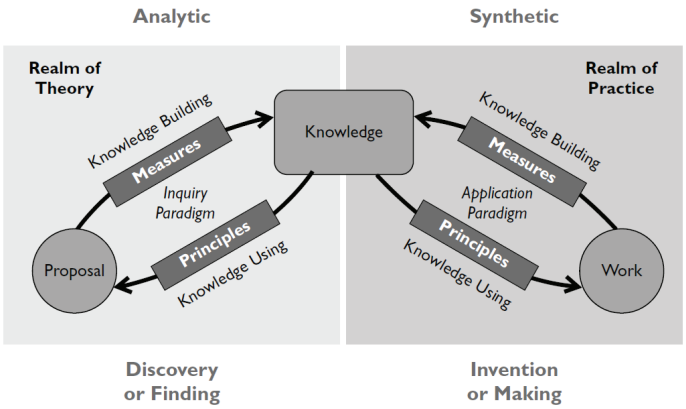

Figure 1 *Design Thinking as knowledge building. Source Owen, 2007.*

Dunne and Martin (2006) describe Design Thinking as the reverse of scientific thinking: where as the scientist analyses facts to discover patterns, the designer invents new patterns and concepts to address facts and possibilities: "Design Thinking includes inductive, deductive and abductive reasoning" (Dunne and Martin 2006, 517). Brown (2008a) states that Design Thinkers not only rely on analytical processes (those that produce either/or choices) but also exhibit the ability to see and grasp all of the key and sometimes-contradictory aspects of a problem and synthesise new solutions that go beyond and dramatically improve on existing alternatives. In this sense Design Thinking is a Creative Thinking process.

Various researchers propose that many designers have a different outlook or worldview that is underpinned by particular values and attitudes. For example, Lockwood (2010) refers to Design Thinkers applying a designer's sensibility and methods to problem solving, no matter whatever the problem is, and Brown (2008) states that designers have an ability to imagine the human world from multiple perspectives, for example those of colleagues, clients, end users, and customers (both current and prospective). Values and attitudes identified in the literature on design thinking include optimism, empathy, embracing of the radical; sensitivity, a questioning attitude, sustained curiosity, playfulness, tolerance for ambiguity, systemic vision, personal courage, asymmetrical thinking, sustained curiosity; ability to maintain sight of the big picture, and tolerance of uncertainly.

In contrast to the many publications that paint a sometimes 'idealistic' picture of Design Thinking's contribution to design, innovation and to other professions such as business, Badke-Schaub, Roozenburge, and Cardoso (2008) take a more critical view and state that many of the claims regarding Design Thinking are not supported by empirical evidence. Carr, Halliday, King, Liedtka, and Lockwood (2010) examined the influence of Design Thinking on business and found that many managers found the term Design Thinking confusing, and that there was much disagreement of its value as an innovation tool. Newman (2011), claims that Design Thinking's time has not come, and that many companies that conceptually invested in Design Thinking have not yet seen the results on innovation that it promised.

The implementation of the design thinking capabilities and attributes previously identified is associated with varied methodologies and methods or process models. It is important to note that Design Thinking is frequently emphasised as a collaborative process. For example, Brown (2011) observes that the increasing complexity of products, services, and experiences has replaced the myth of the lone creative genius with the reality of the enthusiastic interdisciplinary collaborator. The best Design Thinkers do not just work alongside other disciplines; many of them have significant experience in more than one discipline (Brown, 2011).

Design Thinking Education

In parallel with the uptake of Design Thinking across a range of disciplines, there has also been an increase in the learning and teaching of Design Thinking in universities and institutions of higher learning. However there is a relatively small amount of research published on the learning and teaching aspects of Design Thinking. Much of this literature expresses a range of views about learning teaching and assessment approaches and practices that facilitate learning of Design Thinking capabilities.

For example, Dunne and Martin (2006) contend that the teaching of Design Thinking has the potential to positively influence business and management education,

specifically MBA programmes. They argue that management has many parallels in design, and that while applying design approaches to management is relatively new, and with a drive for innovation in businesses, there are many opportunities to do this. In response to this emergent opportunity, business schools need rise to the challenge and develop new courses in Design Thinking (Dunne and Martin 2006). "Under a design-thinking paradigm, students would be encouraged to think broadly about problems, develop a deep understanding of users, and recognize the value in the contributions of others" (Dunne and Martin 2006, 512). They argue that this will be achieved through 'epistemological pluralism', which would involve teaching the 'standard' models currently taught in business schools, in addition to a Design Thinking approach.

A number of engineering schools have developed approaches to teaching Design Thinking. For example, the d.school at Stanford University, one of the leading multi-disciplinary engineering and design schools, is well known internationally for developing and incorporating Design Thinking in its programmes. Plattner et al. (2011) describes the key philosophy and approaches used in design courses at the Stanford's School of Engineering. They identify that the teaching of interdisciplinary collaboration is fundamental to this approach. "Design thinking students learn in interdisciplinary teams how to tackle a given design problem by exploring it's (sic) problem space with a hands on approach" (Plattner, Meinel, and Leifer 2011, 14).

Design Thinking Curriculum Development

A small number of authors have extended the literature to discuss the development of Design Thinking curricula in higher education. Melles and colleagues (2008, 2011) describe the development of a university based Design Thinking Unit, which delivers a course in Design Thinking which is underpinned by a Design Thinking 'mindset' model developed by the Stanford d.school (Emapthy/Define/Ideate/Prototype/Test) (Anonymous 2010). The authors provide some reference to the deeper pedagogical underpinnings of the course, such as epistemological position and learning and teaching approaches, or Design Thinking capability development. In addition, they provide useful reflections on the results and lessons learnt to date, specifically concerning the difficulties in teaching an inaugural course on Design Thinking.

Eagen, Aspevig, Cukier, Bauer, and Ngwenyama (2011) state that in response to a demand for innovation, business programmes are emerging which embrace multi-epistemic modes of Design Thinking. They explore the pedagogical models used to teach design thinking in business programmes and identify multiple ways of knowing including (capabilities), cognition, emotion, sensation and intuition as central to Design Thinking. Skills such as imagination, interrogation and play are identified as playing a key role in dealing with undefined, incomplete, 'wicked problems'. Eagen et al provides in-depth discussion of the role, and pedagogical implications of: Intuition, Empathy, and Action Learning. However, while there is in-depth discussion of the pedagogical shifts needed in moving to teaching Design Thinking in business schools, there is very little discussion of the practical implications of this, and/or examples of how and where this has happened.

Beckman and Barry (2007; 2008) describe the development of a postgraduate business course in Design Thinking and cross-disciplinary management. In discussing the underlying approach to teaching the course, the researchers identify significant parallels between Owen's (2007) view of the field of Design Thinking, and Kolb's (1984)

Experiential Learning Theory. Owen outlines how Design thinking is different from other types of thinking, and provides a framework based on a map of four fields in relation to context and process from symbolic (abstract) to real (concrete) and from analytic to synthetic (see figure 2).

The literature review indicates that:

- Design Thinking is emerging as a 'discipline' area, and the body of research is growing;
- Given the uptake of Design Thinking across many disciplines and professions, there is a need to develop sound curricula that are founded in relevant theory and research findings;
- While there is emerging research into the learning and teaching of Design Thinking (descriptions, examples and case studies), it is largely anecdotal and reflection rather than research-based, and there is general lack of rigorous evaluation of curricula;

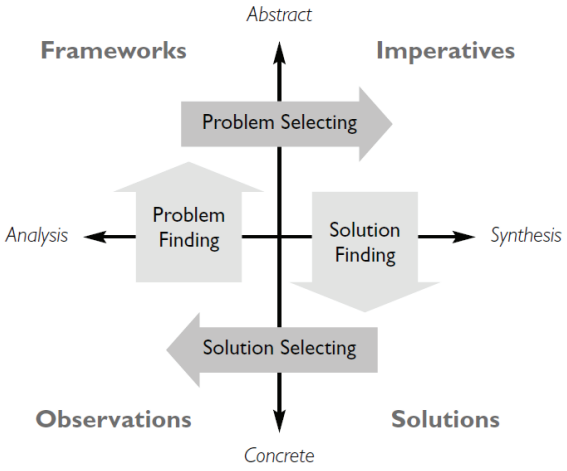

Figure 2 *Adaption of Kolb's (1984) Experiential Learning Theory model mapped against a Design Thinking process. Source: Barry and Beckman 2008.*

In light of this summary, there is a strong case for a research project in which:

- Priority is given to exploring how Design Thinking expertise can be effectively introduced, developed, evaluated and enhanced in higher education contexts;
- The development of a Design Thinking curriculum is underpinned by a clear and coherent conception of design thinking as well as recognised learning and teaching constructs, models and theories (see next section); and
- Rigorous research is used for the development, evaluation and fine-tuning of a design thinking curriculum and associated resources.

Research Design

The PhD research is underpinned by a paradigm position of *Critical Realism* (Healy and Perry 2000). Within the Critical Realism position, the epistemological position is *Relativist*. The research uses an *Action Research* methodology that incorporates both *Design* and Co-*Design* methods. It also uses an embedded *Case-Study* design and involves the use of *Multiple Methods* for the gathering and analysis of both *qualitative* and *quantitative* data.

Action Research, defined as "systemic inquiry that is collective, collaborative, self-reflective, critical and undertaken by participants in the inquiry" (McCutcheon and Jung 1990, 148) was selected as the overarching methodology specifically because of it cyclic and Iterative approach to research i.e. the Design Thinking curriculum is developed through a number of design iterations. According to Barab and Squire (2004,) a Design-Based research approach, as opposed to more traditional Hypothesis-Based research approach, uses design processes to iteratively develop new theories, artefacts, and practices and is particularly useful for research in educational contexts. In essence, the design process itself becomes a research process. This approach is compatible with Action Research. In particular, Co-Design, sometimes called Participatory Research (Bryman and Bell 2007), is used as a key design strategy. Co-Design/Participatory Research involves participants as active collaborators in the research and design process.

In addition, the use of case studies aligns specifically with a concern to capture rich and deep insights into the experiences and the learning of students, accompanied by explanation for tendencies, trends and impact factors. In this instance the explanations link curriculum implementation the curriculum's effects and impacts (Yin 2003). Multiple case studies also enables the researcher to "explore differences within, and between cases" (Baxter and Jack 2008, 548). In this project, the multiple case studies are embedded as they include individual students and groups of students.

Learning and Teaching Theory

It is essential that the development of the Design Thinking curriculum be situated within appropriate learning and teaching theories and constructs. The following theories have been utilised:

A. Constructivism/Constructionism. The constructivist and constructionist approaches to learning and teaching emphasises student-centred, or student-directed learning. Internationally, constructivism has been a key part of educational discourse for more than twenty years (Conole and Alveizou 2010);

B. Experiential Learning. Experiential Learning Theory (ELT) emphasizes and values learning through 'reflection on doing', which is can be contrasted with rote or didactic learning. “Knowledge results from the combination of grasping and transforming experience" (Kolb 1984, 41). The ELT model portrays a cyclic models of four related modes of grasping experience: concrete, analysis, abstract and synthesis (Kolb, Boyatzis, and Mainemelis 2000);

C. Learning Domain Taxonomies: Bloom's (1965) taxonomy of learning objectives in the cognitive, affective and psychomotor domains provides an appropriate framework for identification of relevant learning and outcomes. A modification of this taxonomy must also be taken into account Dettmer, (2006). Dettmer (2006) adds ideation and creativity to the cognitive domain and internalization, wonder, and risk taking to the

affective domain. These changes are closely correlated to the key principles of Design Thinking; and

D. Constructive Alignment: Constructive Alignment (Biggs 1996) has its roots both in constructivism and curriculum theory and emphasizes a necessary connection between a constructivist understanding of the nature of learning, and an 'aligned' design for an outcomes-based teaching education. It is the aligning of desirable learning outcomes, and learning activities with assessment (Jones 2006). Constructive Alignment can also be perceived as a systemic theory that regards the total teaching context as a whole, as a system (Brabrand 2007).

Data Gathering

Data is obtained from the following participant groups:

Researcher-Designer: Includes the researcher's ongoing personal reflections, thoughts, experiences, observations, and records of interactions (both tacit and explicit); and

Students: The student participants are drawn from two distinct groups: (a) approximately 50 first year Product Design students undertaking a paper titled Product Design Studio II in the three year, Bachelors of Design programme; and (b) approximately 100 first year business students, undertaking a paper titled Design Thinking in a Bachelor of Business programme.

All students enrolled in the two papers (above) are invited to participate in a 'pre', and 'post' Design Thinking curriculum survey and complete a portfolio of Design Thinking practical work and a stratified sampling case frame was developed to identify a purposive sample of students to participate in key informant interviews. In addition all students participating in the research were also invited to participate in creative co-design sessions in which they help co-design improvements to the Design Thinking curriculum (based on initial findings of the research) and their own experiences.

The qualitative data is analyzed using both inductive and deductive methods. It is anticipated that a variety of forms of inductive analyses will be appropriate (e.g. constant comparison, content analysis, domain analysis, taxonomic analysis, componential analysis, retroductive analysis). The quantitative data is analyzed using simple Descriptive Statistics to describe the basic features of the data in a study and uncover patterns or general tendencies in a data set ("Descriptive statistics" 2004). Ethical approval for this research was gained from the University Ethics Committee.

First Case Study (Iteration One)

Informed by the researchers previous experience of teaching Design and Design Thinking, the findings of the literature review, a visit to the d.school at Stanford university to observe a Design Thinking 'Boot Camp' for executives in action, and a review of the core learning and teaching theories, the first iteration of the Design Thinking curriculum was developed and taught to 25 first year product design students.

A key approach to the curriculum development was to interrogate the existing Stanford University d.school 'Bootcamp' workshop model (a model widely used in professional situations) and strategically evolve it into a four-week, 9 hours per week, studio model suitable to a university product design programme. The curriculum was structured into 12 sessions. The aim of the curriculum, in this instance with product design students who already have some familiarity with design processes, was to

introduce a formal Design Thinking model (methodology), as well as Design Thinking principles, methods and tools, and to develop students Design Thinking expertise.

The curriculum development process involved conceptualising and designing a detailed four-week teaching plan including a six-stage Design Thinking process model (See figure 3), learning goals, structured session plans, presentations, learning activities, project brief, assessment criteria and deliverables. Stages 2, 3, 4 and 5 of the Design Thinking process model correspond to Kolb's (1984) Experiential Learning model and the work of Barry and Beckman (2008) on how a cyclic processes of analytic/abstract/synthetic/concrete thinking relate to learning and the Design Thinking process. Specific consideration was also given to the development of an overall learning and teaching environment that reflected constructivist principles. This included providing a variety of learning activities from structured to semi-structured, through to independent and self-directed, and to allow for as much student tutor interaction and discussion as possible.

A detailed Design Thinking Methods resource was also developed to accompany the curriculum. The resource is structured around the Design Thinking model and presents a summary of each of the key methods within each stage. Within each method an introduction provides an overview, followed up by more detailed information on using the method and examples/case studies with links to relevant videos are also included.

Integral to the curriculum development was the identification and development of key learning goals and an assessment framework. The learning goals, based on key conceptualisations of Design Thinking expertise, and align with Blooms (1965) domains of learning. The learning goals were then developed into assessment rubrics, and a self-reflection tool for students (see figure 4). Constructive Alignment was utilised as a key theory to maintain alignment between the learning goals, learning and teaching process and the assessment framework (Biggs 1996).

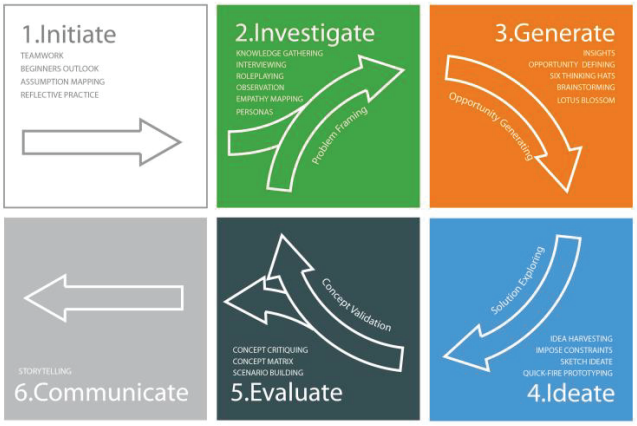

Figure 3 *Model of the Design Thinking process developed for the curriculum.*

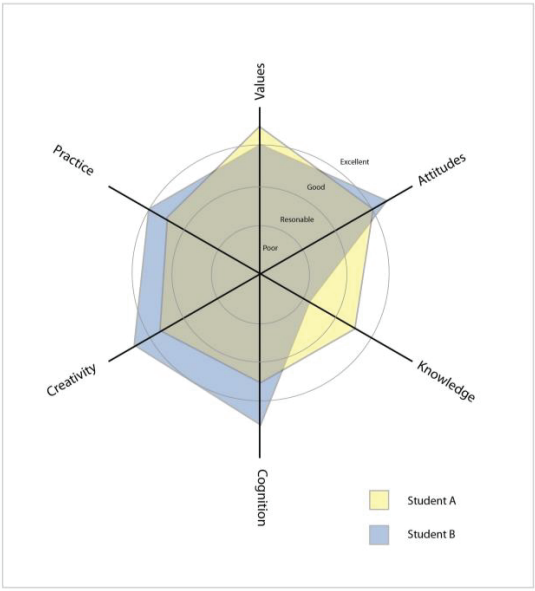

Figure 4 *Example of a spider diagram to help student's self-assess their Design Thinking expertise.*

A project brief, reflecting an appropriate, relatively undefined, but user-centred design problem, was then developed. In this instance the brief asked students to collaborate in groups of three to undertake in-depth research, analysis and the design of one or more innovative 'design interventions' that clearly improve and enhance the experience of ferry patrons at the downtown Auckland ferry terminal. The emphasis here is on the design interventions that enhance user experience, rather than just products.

Following a detailed briefing the researcher, the curriculum was delivered by two design lecturers. Each of the 12 sessions consisted of a tightly scripted structure usually starting with a key multimedia presentation, followed by a structured and semi-structured learning activities linked to the project. In addition student groups were asked to develop a portfolio documenting the Design Thinking process and following the key steps in the Design Thinking process model. Students were also asked to individually self-reflect after each session via a journal (in this case via an online blog) on their personal learning development using the learning goals framework.

Initial Analysis

At the time of writing the first iteration of the Design Thinking curriculum has been delivered, and the students have completed both the pre and post curriculum surveys. Within the next few weeks key informant interviews with a random sample of the participants will be completed, and portfolios and blogs will be reviewed. A co-design session with students will be undertaken to explore ideas for improvement to the next iteration. The researcher has also completed a detailed reflection of the curriculum development process, including informal and ongoing discussions with the teaching

staff. An initial review of the survey data has been completed by the researcher and indicates that:

- The majority of participants had a reasonably high i.e. adequate/good range personal rating of their design thinking expertise pre the commencement of the project;
- Student's personal ratings of their design thinking expertise increased to the good/excellent range post the curriculum;
- 92% of students rated the overall learning and teaching approach was either good or excellent;
- 88% of students rated the curriculum structure (i.e. each session having a clear workshop style and approach based on the d.school 'Bootcamp' model) as good to excellent;

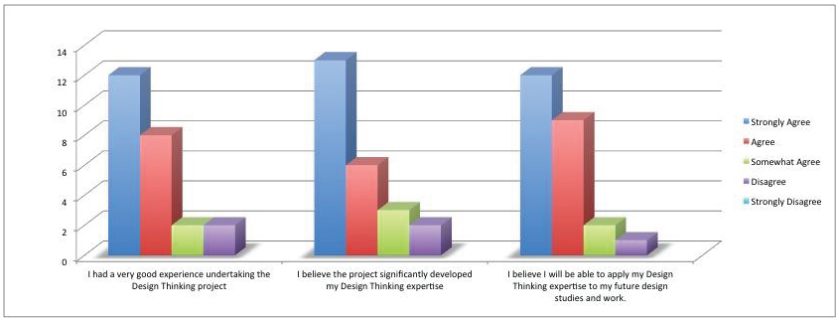

Figure 5 *Graph showing students ratings of their experiences of the Design Thinking curriculum, and their perceptions of the impact that it had on their learning.*

- Students identified key aspects of the curriculum as particularly useful including the presentation content, videos and resources as very helpful/extremely helpful to their learning;
- 79% of students of students agreed or strongly agreed that they had very good experience undertaking the curriculum (project);
- 88% of students considered the curriculum significantly contributed to the development of their Design Thinking expertise; and
- This positive feedback regarding overall students experience and the perceived value of the curriculum seemed to validate the overall learning and teaching approach.

Arising from the researcher's more general reflections on this opening phase of the research were insights into research that requires the collaboration of teacher colleagues. The briefing of colleagues who taught the curriculum needed to encompass their knowledge of the goals and theoretical underpinnings of the research as well as the curriculum, and take into account their initial differing conceptualizations of Design Thinking. Their involvement also meant that some aspects of the curriculum and pedagogy were more tightly structured and scripted for the first iteration than would have been the case if the researcher had been the teacher. Ethics considerations did not allow for this. However, the action research methodology along with a commitment to co-creation of curriculum meant that a more flexible approach might

be introduced for succeeding iterations. Certainly, this collaborative process became a strong 'provocation' and helpful 'mechanism' for dialogue around learning, teaching and curriculum development issues.

Conclusions

This paper has presented preliminary findings from the initial stages of a PhD research project that uses action research to evaluate the impact of a Design Thinking curriculum on students' learning and teaching experience and their development of Design Thinking expertise; identify the factors that influence the impact of the curriculum on students' learning experiences and achievements; and to assess the use of Action Research as a methodology for both improving curriculum development and teaching practice.

Although this is the very early stage of the analysis of the first iteration of the Design Thinking curriculum, some emergent issues and opportunities have been identified. It is clear from the initial feedback however that the overall approach using an evolution of the d.school 'Bootcamp' model seems to provide students with a sound learning and teaching experience and that students perceive a positive impact of their Design Thinking expertise. Further research including in-depth participant interviews, a review of student portfolios and self-reflection will be used to more deeply identify, explore and analyse the key mechanisms within in the curriculum that impact Design Thinking expertise development. In addition a co-design session with student participants will be used to explore innovative ideas and improvements to be incorporated in the development of the second iteration of the Design Thinking curriculum. This iteration will then be taught to, and evaluated by, first year business students in semester 1, 2013. The on-going evaluation of the usefulness of this Action Research approach to curriculum development will also continue.

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Assessment

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Mind the Gap: an evaluation of joint development practice between FE and HE tutors within art and design

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Abstract: *An English art and design college was the setting for this project which aimed to improve the transition of Access students into design Higher Education (HE). The Access course is made up of non-traditional, mature students who may have no previous formal qualifications. They come from diverse backgrounds, ethnicities and nationalities; often overcoming barriers to education in order to fulfil their ambitions to study on a design degree. Previous research had discovered that Access students were susceptible to dropping out during the first year of their degrees. In order to improve the critical thinking and resilience of Access students staff from both sectors worked together to develop the pedagogy of studio critiques. This project was based on two theoretical principles. The first was assessment for learning where formative assessment can be a very effective teaching strategy. The second was joint practice development (JPD) which is an approach to course improvement through cross-sector collaborative activities. The research used a case study methodology to identify and evaluate JPD activities across the two sectors that were both effective and sustainable. This project is situated within the changing context of Further Education (FE) where technical-managerial models potentially conflict with democratic and professional values.*

Keywords: Research informed designed education - Design education informing research, Assessment

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Introduction

The *Learning and Skills Improvement Service* (LSIS), a sector-owned body which develops excellent and sustainable FE provision, awarded the art and design college a grant which enabled a range of cross-sector activities to occur. The motivation was to improve the experience of Access students when they progressed from Further Education (FE) to Higher Education (HE). Previous research had indicated that this could be done by building resilience and confidence in students in order to prepare them to cope with the demands of HE. It was found that although Access students performed well at HE they were vulnerable to dropping out, (Broadhead and Garland 2012). There were many possible reasons for this including a loss of confidence due to age and cultural differences between ex-Access students and the rest of the HE cohort. These perceived differences influenced the students' self-belief and their critical thinking when participating in critiques and assessments. In order to continue and develop this line of research it was decided to explore and to improve the Access delivery of studio critiques, as this would improve student confidence and critical rigour. During recent years the HE provision at the college had been expanded, at the same time the delivery of FE and HE courses had been polarised onto two separate sites, so as well as wanting to develop critical rigour it was also thought to be a good idea to initiate a dialogue with HE tutors to improve the pedagogical experience of transition. This formed the reason for undertaking activities such as Access staff observing a variety of studio critiques that occurred in art and design HE programmes. In particular the practices of BA Art and Design Interdisciplinary, BA Fine Art and BA Printed Textiles and Surface Pattern were observed and discussed. In February 2011 the Quality Assurance Agency for Higher Education (QAA) identified the use of structured group critiques for studio work as a feature of good practice within the college's HE provision, (QAA 2011). The critique can be a dynamic process where student work is selected, discussed and evaluated. Often the studio critique can be seen as an end in its own right, however, it can also be a teaching strategy that:

> …favours process over product, the means over the end, and arguably a belief in a necessary fluidity between the artist, the creative act and the possibilities of a final product. (Buster and Crawford 2000, p.ix).

This is an area where shared understandings between FE and HE staff about the nature of the critique would be beneficial to students. Access students were also able to talk to HE students about their work. This was very valuable to the Access to HE course, both staff and students, because previously a research project had recommended a dialogue with HE tutors to ensure the Access to HE course kept up to date with changes in HE, (Broadhead and Garland 2012). The research had also pointed out that critical rigour was seen by students as an area that could be developed on the Access course; so concentrating on the studio critique would be a means of exploring this issue in more depth. This would help the course best prepare Access students for HE study as well as ensure they applied to the best course for them.

Context

In England Access provision lies within the remit of FE rather than HE. During the last twenty years the FE sector has increasingly been subjected to a high rate of change driven by political agendas. This has been enforced by the various bodies that audit, validate and inspect FE providers. In the late 1990s this form of managerialism and its

effects were identified in the art school context (Brighton in Hetherington 1994, p.34). Biesta (2007) has shown how a technical-managerial approach to quality assurance has replaced a professional and democratic form of accountability. The implications of this are that tutors and senior managers respond to ideologies where market values dominate educational practices and structures (Coffield and Williamson 2011, p.10). Similar changes happened in HE but this sector retained a relatively greater degree of professional autonomy (Deem 1998, p.48). Biesta has argued that educators should take responsibility for their practices rather than continually responding to the agendas of others (regulators, government departments, funding bodies). They should not be afraid to make professional judgements based on wisdom and experience. The wider political context has contributed to the growing division between the FE and HE sectors in the art college where this project was undertaken.

The college has two main campuses. It runs a range of specialist and general art and design FE courses at one site that is mostly self-contained and separate from the other site where a range of specialist degree and foundation degrees are taught. The majority of tutors work mainly on one site, perhaps meeting all together a couple of times a year during staff development weeks or briefing days.

The college delivers the Access to HE Diploma (art and design) as a full time day course and in a part-time mode on an evening. It is aimed at mature students who have not been in conventional education for at least a year. What constitutes a mature student has become increasingly vague, students can be as young as nineteen, but may find the pace of an Access course more suitable to their needs than a Pre-BA Foundation course or A levels, which are seen as the more traditional route to degrees in art and design (Hudson 2009, p.25). However, there is usually a wide range of students whose ages range from nineteen to over seventy. Often these students have had a diverse set of experiences and come from a variety of backgrounds. The aim of the Access to HE Diploma is to prepare students for a degree or foundation degree in art and design. Not only is this done by accreditation at level three but also by the preparation of a portfolio of work which is used at interviews as part of the application process.

The students are taught the knowledge and skills necessary to succeed on their higher level course; these skills include visual studies, drawing, responding to set and self-directed briefs, technical skills in specialist workshops like photography, ceramics or printmaking, contextual studies, academic skills of researching, presenting and essay writing.

The full-time and part-time Access provision is successful in getting people onto the higher education course of their choice. Students progress to a range of design degrees (including some highly competitive courses) both locally and nationally, (*Further Education: student achievements and career routes* 2011, pp.28-33). About ten to eighteen students a year progress internally. Students who are successful in achieving a place generally take up that place up in the following September.

The underpinning theoretical context

The main theoretical framework for this study was based on joint practice development (JPD), a concept that critiques the cascade model of staff development.

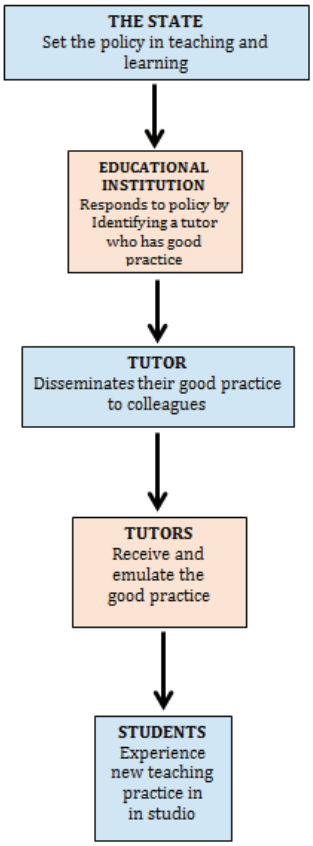

Figure 1. *Diagram showing the cascade model of staff development*

The JPD argument says that good practice cannot be easily passed on from one group of practitioners to another for two main reasons. Firstly cascading good practice can be seen to be divisive because it promotes the idea that one group of people has good practice and another does not thus creating an unequal and perhaps resentful working relationship, (Fielding et al 2005). Secondly, the context in which practice is performed is not deeply considered; what is good practice in one area may not be suitable in another. It could be argued that all practices need to be modified to fit a new context. Rather than passing or cascading practices to colleagues a more sustainable process would be to develop relationships and trust between groups of professionals where ideas can be explored together over time, (Fielding et al 2005). Other aspects that need consideration are; teacher and institutional identity in practice transfer; learner engagement; and an understanding of the time needed to successfully engage with JPD, (Fielding et al 2005). Coffield and Williamson (2011, p.72) propose that JPD could be seen as a move towards the ideal of democratic-professionalism which proposes co-operation between teachers and other partners in education as an alternative way forward to the market model of education.

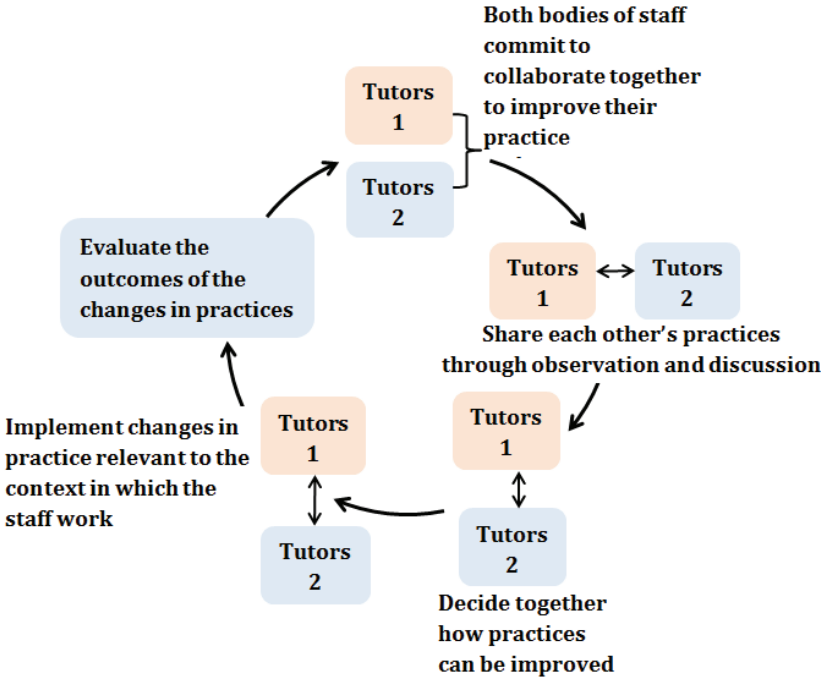

Figure 2. *Diagram showing the joint practice development (JPD) process*

As the project developed it was seen that one key issue was the studio critique and the way it could be used as a formative assessment tool. This was because it addressed both the need to develop critical rigor and student confidence when presenting their work. The importance of students' active participation in formative assessment has been highlighted by Shirley Clarke:

> The dominance of a constructive pupil dialogic talk in the classroom is a key identifier of a formative assessment culture in which pupils are actively involved in thinking; effective pupil talk paying a central role in the philosophy of citizenship, personalisation and lifelong learning. (Clarke 2008, p.35)

Clarke was working within the different contexts of primary and secondary education. However, student engagement would also be central to good design practice at FE and HE level as it promotes meaningful student reflection on their own work and that of their peers. Dylan Williams has talked extensively about the role assessment has in the learning process:

> Assessment for learning is any assessment for which the first priority in its design and practice is to serve the purpose of promoting pupils' learning. It thus differs from assessment designed primarily to serve the purpose of accountability or ranking. (Dylan 2009, p.8)

This also describes the nature of the studio critique whereby students critically reflect on their own work and that of their peers. Critical thinking can then be

promoted in a way that is not necessarily driven or led by the tutor or the tutors' assessment agenda.

The values and identities of different groups of practitioners are also important concepts to consider when reflecting on cross-sector partnerships. An insight into other professionals' positions within an institution brings to light differences in what is seen as important within the education process. This exposure to other points of view through observation and discussion will influence teacher identities through the stories and communications professionals tell each other. Expressions of cultural values, norms, and structures are also passed on through narratives in discussion:- (Rex, Murnen, Hobbs, and McEachen, 2002 in Beijaard et al 2004, p.123). The exchange of ideas with other design educators will lead to a deeper understanding of the issues students face when they progress from FE to HE with particular reference to the studio critique.

Methodology

The research was based on a case study approach. Bassey (1999) argued that this approach was very suitable for research in educational settings due to the complex nature of the context and interactions of people within that context. He stressed the importance of constructing a case study method that is underpinned by trustworthiness and respect of the person. The outcomes of case study research can be described as 'fuzzy' generalisations' in that rather than seeking to find an absolute truth or law, the research aims to say this happens within this context and it could happen within another one. In other words, claims refer to what is possible, likely or unlikely (Bassey 1999, p.12). The constructing of a detailed and rich description of the context is important, (Bassey 1999, p.88) as is providing a coherent and chronological narrative account, (Bassey 1999, p.33).

In this case a complex set of issues had been identified in previous research that needed analysis within a well-defined context, that of the art college (Broadhead and Garland 2012). It examined what for students and tutors are everyday activities within the particular environment of the studio. There may be no generalisations made on the basis of these findings that could be reliably applied to a different context. However, it did describe in depth what happened to this particular set of students at this particular time and in this particular institution. In terms of practitioner-led research the results were important to aid the improvement of Access student transition between sectors. The idea of *trustworthiness* was seen as a more appropriate notion than validity or reliability as this was a qualitative study (Shenton 2004, p. 63). Trustworthiness was assured by looking at the studio critique from a range of points of view (that of students, Access tutors and HE tutors) and recording the activities in detail.

Case Study

The activities described in this case study took place in the academic year 2011-2012. The Access course leaders made an appeal for HE tutors who wanted to take part in cross-sector activities during a staff development presentation addressed to the whole college. From this call for partners, three HE courses expressed an interest: - BA Interdisciplinary Art and Design, Visual Communications, and Printed Textiles and Surface Pattern. In practice it was difficult to arrange activities within the research time frame with Visual Communications. Further links with the first year Fine Art tutor were established and a meeting arranged with an Access tutor to discuss their studio critique

practices which had been previously observed. A timetable of shadowing was then drawn up. Three Access tutors were selected to shadow and observe HE activities. Two of the research team were part-time and would usually have had less opportunity to network with colleagues in HE than course leaders and full time tutors. This project enabled them to work together with HE staff to develop their own practice and feedback observations to the Access team. The Access tutors were responsible for arranging a time when they could shadow a HE studio critique session. They then made notes about what they had seen and discussed their findings with both their HE and FE colleagues.

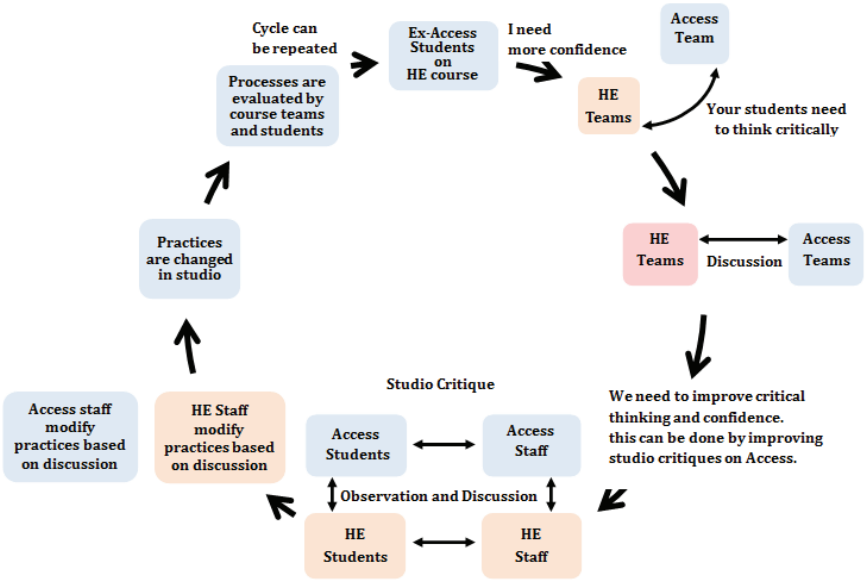

Figure 3. *Diagram showing Access and HE teams taking part in JPD process*

Two examples of teaching practice that was observed were a cross-year studio critique and another one which focused on one piece of work. They were delivered by the BA (Hons) Art & Design Interdisciplinary Course in order to promote a 'sense of ownership'. This was managed by three HE tutors and observed by two Access tutors who made reflective notes that were then shared with the rest of the Access team.

The first studio critique was part of an 'Open Studio' week where all students from the three year groups arranged current work within their individual work spaces.

Students were split into 4 groups. Each group has mix of first, second and third years. All students prepared to present work, but tutors (unknown to the students) had selected in advance one person per year per group to actually present to the rest of the group.

The Access tutor observed staff discussions before studio critiques. There was a strong focus on planning which questions to ask. There were similar questions for each student, but differentiation through the expectation of different qualities of answers depending on year group.

The style of studio critique varied throughout the academic year. This particular one was to build on an 'Open Studio' event and encourage communication between year groups. There was no formal feedback given, but students were encouraged to reflect on their critique experience over the Christmas break. The staff were looking for evaluative comments on student's own practice that weren't initiated by staff. The presentations were not linked to a particular brief but were concerned with process, rules of practice, tools of practice and links to other practitioners. It was noted that there were very strong links to critical studies.

During the studio critiques students were reminded about the weekly discussion forum that would start in the new term. Students were encouraged to put questions/themes onto the notice board, which would be the basis of a vote on the most popular topic to start off the next term's work.

The Access tutor described how the group moved around the studio to different workspaces. All students were engaged with standing and looking at work, maybe this was less intimidating for the student leading the studio critique? Most students were very quiet during the process and interestingly, most questions and comments came from past Access students.

During the studio critiques students presented and talked about just a few key pieces. Several times the HE tutors encouraged students to stop and reflect on work so far. Staff were keen for students to develop an idea more deeply rather than explore lots of ideas more superficially.

The second structured studio critique was introduced by an HE tutor who presented a group of first year students with a mystery object. The group was asked to identify what it was and who made it. Two students were able to deduce that the object was a coat hanger designed by Antony Gormley, this initiated a discussion about the relationship between art and design. The Access tutor noted that this was a way of the HE tutor contributing something to the session and engaging the interest of the group. Students had been asked to select one piece of work and to think carefully how to present it. Within groups of about 6 students the work was discussed by everyone except the creator of the work. Only at the end of the process did the student say what intentions were behind the work. The Access tutor thought that the process led to focussed discussions that were not bogged down in superficial detail. The HE course leader and the Access tutor had the opportunity to share their observations after the session about studio critiques and student confidence.

A group of students from the Access course also observed the studio critique. They had opportunities to talk to HE students about what it was like on the HE course. Access students found this helped them to feel confident that they were ready to go onto higher education and to discover if this was the right course for them. HE students and recent graduates later brought their portfolios into the Access studio and discussed their own progress, which was also well received by the Access group. The impact the activities had on the Access student's progression onto their degrees was reported at a later workshop in January 2013. Enough time had elapsed for the students to experience the first term of their degree. They presented their evaluations at an event called: *Research, scholarship and pedagogy: Working with students to develop undergraduate research in Art & Design*. This was facilitated by the Higher Education Academy (HEA) in England. They said their confidence in giving and receiving feedback had improved and they had enjoyed their participation in the JPD process. This meant they felt well prepared for succeeding on their new course.

Discussion

After this process the Access team discussed how some of the ideas learned from the shadowing exercise could be applied to the curriculum. Access tutors did share some values with HE staff, for example the belief that studio critiques were crucial in the development of design students' practice. It was also seen there were a variety of formats that could deal with different focuses. Some critiques focus on media/materials processes whereas others focus on concept development and/or design methodologies. There were also occasions where the synergies of process, concept and realisation were considered. The insights gleaned from the discussions of the observations were added to the Access tutors' repertoire of critique strategies. These ideas needed to be considered within the context of Access provision, as not everything successfully done on an HE course would be appropriate for FE. The team drew up a range of ideas to be considered in planning the next round of critiques. These were:

- Focussing on the student's own practice rather than assessment criteria. By making a studio critique more about a student's own working methods than the physical outcomes, students are encouraged to reflect on their own practice. This could help them in preparing for degree course applications, interviews, and writing their own briefs. Students could become more aware of who they are as artists/designers/craftspeople.
- Consideration of the timing of studio critiques by timetabling them before breaks when students could be given reflective questions raised from the studio discussions to work on in sketchbook during the holidays.
- Developing a discussion forum:- it would be difficult to allocate an hour a week for an in-depth discussion, but it would be a positive use of *Moodle* (the college's virtual learning environment) and maybe a way of uniting first and second year Access students. If this engaged students it could become almost self-running.
- Introduction of more cross-year studio critiques to boost the confidence of second year students who would be talking about their work in interviews.
- Structuring studio critiques so that the student's peers comment on the work before the student talks about it. The danger of focusing on one student presenting their own work was identified in the staff guide of *Critiquing the Crit,* (Orr, Blythman and Blair 2008, p.8). When everyone is actively engaged in the critique process the students' tendency to rely on descriptive narration, when presenting their own work, can be avoided.
- Selection and presentation of work is a really important part of the HE critique, this is different in FE practice where 'work in progress' is generally viewed. This fits in with Buster and Crawford, (2007, p.ix) where they stress the selection of work by students. This means that the students are being more independent in making critical evaluations about their work.

The JPD process can benefit those students wanting to do a design degree. The changes in the studio practices of the Access course enabled students to become more confident in giving and receiving critical feedback about their work. But also the students were exposed to collaborative a model of improving practice which could be emulated when they were called upon to work in design teams on their future degrees.

The practices that were evaluated in this project are of benefit to staff and students in both sectors. It could be expected that these cross-sector activities should come within the normal remit of curriculum planning. However, the heavy bureaucratic demands on both tutors and students that are part of the audit culture make it difficult logistically to give the time needed for collaboration (Chaney in Hetherington 1994). This demonstrates the tensions referred to by Gert Biesta between the technical-managerial model and the democratic and professional need of accountability. It is important to go beyond simply responding to the demands of managerialism to fully meet the educational needs of students. JPD is a time-consuming strategy that has outcomes which may not be immediately apparent. Therefore it is less useful to a market model which demands easily measurable outputs (O'Neill 2002, p.54). Within this project staff needed to use their imagination and professional judgement to see beyond prescribed performance indicators and decide for themselves the value of JPD. Tutors now need to take responsibility for sustaining this practice despite competing demands on their time.

Conclusion

The process worked best when there was already a good relationship between the two courses, through previous contact and good communication about student transition from FE to HE. The amount of time for developing such a relationship cannot be underestimated. Fielding et al. (2005, p.35) discussed how an understanding of the time is needed for in depth collaborative professional learning to take place. Both parties should be committed to the project and value the outcomes. Although the outcomes of the JPD process are owned by the course teams because of the time and personal investment made by the participants, it would not normally have occurred without external funding, as it opened up new spaces for relationship building and trust. It may be difficult to sustain this level of cross-sector collaboration.

The Access tutors have put some of the ideas into practice. They have begun to experiment with the shift of focus in the studio critique from the object/image/work to the creative process. The participation of different year groups in the studio critique was also used as a way of boosting confidence when talking in front of people other than their peers. One of the most effective formats was to get all students except the creator to initially critique the work, this increased student engagement and saved valuable studio time. The ideas gleaned from the shadowing experiences were useful because Access staff could imagine how they could be used within their own particular practice. The role of imagination as part of participation within a professional community is discussed by Etienne Wenger (1999, p.217) where he says imagination allows us to adopt perspectives across boundaries and time. If tutors could not imagine how new practice would fit within their particular context then it is unlikely they would be motivated to try out new possibilities.

This is an important point to make as it is what differentiates JPD process from the cascade model of improvement and pedagogical development. Practices are selected and edited to best fit a particular situation rather than adopted in an uncritical way.

The course partnership that was very successful was with the Art and Design Interdisciplinary course because the FE and HE staff some common ground. This partnership was seen as successful because the both partners openly shared their practices with each other and set aside plenty of time for in depth discussion about the issues raised from the JPD activities. The Access course had over previous years sent

many students to this degree programme who had then flourished on it. This was similar to the point:

> Long-term, prior, relationships were seen by many participants to be enabling. Many examples arose where practice transfer was seen to have been successful because it drew on existing relationships…(Fielding et al 2005, p.8)

The art and design degree staff used more open, wide-ranging briefs. The Access staff were familiar with working in this way rather than focusing on specialised assignments about, for example, fashion or interior design. This was a shared approach to pedagogy that made working together more straightforward.

The shift in focus away from the products the students produced to the processes of creativity demonstrated a difference of values between FE and HE staff. Access staff valued the production of a portfolio of artefacts that would allow entry to a degree course. When doing studio critiques Access staff had focused on how well the work produced had met the brief. However, the HE staff were more interested in helping students become confident reflective practitioners who could work professionally after their course. This meant that the studio critique was not necessarily tied to the criteria stated in the brief but could be about the students creative methodologies that were employed and how effective they had been. This difference is not a bad thing but is useful to consider when Access students progress onto their HE course. There could be ways in which both objects and processes are considered in an Access critique so encouraging critical self-reflection in the students and thus preparing them for degree courses.

Through the commitment and tenacity of the project's participants there have been some small but significant changes in pedagogical practices in studio critiques. It is challenging but important to find the time and resources to continue to develop cross-sector practices to enhance students' experiences of progression from FE to HE. At the time of writing this paper it is too soon to say if dropout rates of ex-Access students would be improved by the changes in studio critiques on the Access course. However, the students who participated felt they had improved their confidence in giving and receiving critical feedback. This research has shown that JPD is an approach worthy of more consideration as a tool for educational improvement and a means of developing democratic professionalism.

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Constitutive and regulating modes of learning in creative design education

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Abstract: *The main aim of this research to analyse the learning process in order to recognize the characteristics currently associated with creating and/or creative students profiles. This paper focuses not much on the psychology of individuals as on the learning process as an intersubjective network of social relations. The theoretical framework considers holistic judgement and arithmetic assessment as evaluation modes and the relevance of fiction within the learning process. With these referents we have developed a polarized parametric system as a framework for mapping learning practices and teaching strategies. On one side we consider the actions related to the constitution of new spheres of creativity. On the other, we discuss regulation sets that allow the creation of design projects. This analytical tool is a guide for actively involved observation, we have tested the theoretical model and the parametric system within a series of project oriented courses in the Design Degree. As a result, the learning process in design happens to be a mode of learning rather than a learning style. We developed a communicating vessels model explaining unfeasible contradictions in the assignment of marks as the result of an experience based device to adapt assessment to both learners and design diversity.*

Keywords: assessment, modes of learning, design creativity.

Introduction

Over the last few years, the aim of a clearer, criterion-based judgement has turned the assessment of design projects into a summative process. A set of requirements for the final result are collected and submitted previously to the students. One by one, these requirements are used to scrutinize the student's portfolio in order to identify the relevant qualities of the work, to reference these qualities in a marking scheme, and, finally, to count the marks to obtain the awarded grade. Richard Kimbell has raised

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a central question about this process questioning whether: " this added-up collection of parts is the same thing as 'capability'" (Kimbell 2009, p. 5)

It often happens that the arithmetic assessment doesn't match a teacher's judgement despite the accepted accuracy of the listed criteria. Usually, when this occurs, we are more likely to adjust the numbers than to doubt our holistic approach to the student's project. Rightly so, we are not just ticking small boxes in order to avoid the big black box of the holistic assessment process. But to doubt this form of atomised assessment does not mean that we have to trust blindly our intuition and make direct comparisons without general criteria. Rather than avoiding the black box of holistic judgements, or relying confidently on it, perhaps we ought try and open it up to understand and to describe how it works. This is a necessary condition not only in order to identify the strengths and weaknesses of the different procedures used in assessing students' capabilities, but also to explain why holistic judgement and arithmetic assessment are complementary.

Considered as a meta-device, the process of assessing design projects conforms the measurability of the different devices that constitute the design project –scenario scripts and requirements documentation, sets of formal solutions, usability tests, viability accounts, etc–. As a meta-device, the evaluative action builds models based on design theories. Design theories are prescriptive in character rather than a descriptive, when assembled into evaluative models. But usually design theories are not much explicit, so teachers and designers are not always aware of the tacit theories that are at the core of the assessment devices. Holistic judgements are based directly on design folk theories, as general ideas about what we mean when we talk of design, knowledge based on experience and routines, acquired habits without a theoretical formulation but with deep professional roots. The arithmetic assessment is based only on partial and circumstantial instantiations of design folk theories. This is what we mean when we propose to open up the black box of evaluation.

The fundamental values of the assessment cannot only be derived from the features and mechanisms within learning theories. They have to be sough within the wider framework of creative design. In this sense, this paper considers the difficulties observed when assessing design projects as a point of departure to explore the relationship between ideas and practices of creativity in design, as well as between the design project and the learning process. To put in another way, this paper could be seen as an essay about reverse assessing, opening the black box of holistic judgements, identifying strengths and weaknesses of different procedures in assessing, explaining the complementarity of judgement and assessment, identifying tacit theories at the core of assessment devices and exploring the relation between ideas and practices of creativity.

Initially our essay on reverse assessing starts with a detailed description about how the procedure of evaluation works. We identify the problems of evaluating a design project, as we learn about how students and instructors think, behave and produce meaning, through mutual interaction. In a second level of analysis we have considered points of controversial assessment, three of which are discussed in this paper. The identification of malfunctions and/or contradictions during assessment helps to deploy features that are usually hidden and silent in the evaluation process, as matters of concern (Latour 2005, p. 115). Mapping such matters of concern has been our way of opening up the black box not only of design project evaluation but also of the narrative images about design authorship and project driven creativity. In words of Hyden White, narrative and narration might well be considered a solution to a problem of general

human concern, of how to translate knowing into telling. Rightly so, in our research we use narrative images as a solution to fashioning human experience into a form assimilable to structures of meaning, as we do so in design teaching (White 2003, p.117).

This paper is built around a dialogue between two different experiences, on the one hand, quantitative research into cultural transmission trough multimodal media, and on the other, the ethnographic description of creative processes in post-studio art and design. The result is a multifaceted research project conducted over 7 months, from March to September 2012, at Eina (Barcelona) where we both teach. Seeking an in depth analysis rather than a broad overview, our main focus was on a limited number of student graphic design projects. We followed 28 projects and were directly involved in the development and evaluation of students' work, and. The research compare students' presentations with the verbal evaluations of the jury and the grades assigned later. Finally we also conducted some interviews with teachers and students from other graphic design project oriented courses, in which we were not directly engaged. The interviews made it possible to obtain personal points of view to contrast our direct experience with other educational and learning practices.

Carrying out participant observation within our own teaching has supposed a systematic self-reflection about our role as academic instructors as well as restructuring of previous ideas regarding design learning and design processes. This has involved a reflection about the kind of research envisaged and the conceptual challenges it implied. It also triggered questions about the way current results are presented. In our research we used narrative images as analogies in order to facilitate new ways of thinking or interpreting design learning and projecting. Narrative images empower conceptual systems to perform explanations in different contexts. With these images we sought to try out ways of combining creativity and authorship in a framework that incorporated psychological and individual based notions of learning styles and creativity. Notions of learning style, that were considered, and partially transcended, to be reconsidered as a network of social relations. Thus, design learning and design process will be redefined as a set of integrative modes.

Learning styles and creativity

There are many characteristics currently associated with creating and/or creative persons in different artistic fields. In this report we take into account both the manifestation of a person's potential and its social recognition, in order to identify the differences between creating and creative persons, as De la Torre (2000) does:

- The creating person: shows creativity in valuable achievements
- The creative person: creative potential not fully exploited

The differences in personality traits among learners are typically associated with different learning profiles or learning styles (Leahy et al. 2009) in the design learning process. The problem is whilst there is a lot of literature concerning the psychology of individuals during the learning process, there's not much research about the learning process as an intersubjective network of social relations.

We consider the learning process as an intersubjective network of design, particularly within project oriented courses, which is the focus our research. Learning strategies, in project-oriented courses, commonly involve different activities with the aim of introducing tensions between theoretical knowledge and the common world of

experience. Susana Barco de Surghi (1988) identifies these tensions as an opportunity for generating an open attitude to creation within the learning state of affairs.

Design teachers stage the tensions between real world scenarios reproduced in projects, using methods such as viability, analysis of previous examples, case comparison, etc. The learning context always implies multivariable agents, subjects and different levels of reality –and fiction– as learning is no longer reliant solely on individuals, so much as on an intersubjective network of multiple nodes and relations.

On one hand we consider the actions related to the constitution of new spheres of creativity. On the other, we discuss regulation sets that propitiate the creation of design projects.

Talking about ugliness or dealing with it: form and content in design judgements

Different sorts and degrees of discordance between atomised and holistic approaches to assessment have been observed during our research. The first situation that we are going to consider is a clear example of dissension between the arithmetical results of the criteria based assessment on the one hand, and the judgment of a teacher –and experienced professional designer– on the other, when directly comparing the results without employing sets of abstract criteria. After the midterm evaluation of the Editorial Design course, the students, then in their 3rd year of a 4 year degree course, were asked to design the layout and pilot issue of a magazine on a subject of their choice. The magazine project was conceived as the final project to evaluate the key and transferable skills. Two different ways of being good or poor were at play when comparing the grades resulting from the use of an assessment chart –with a closed list of criteria– when ranking the learners in relation to each other.

The most blatant divergence appeared when the arithmetical assessment assigned a poor 45/100 to one of the projects that was rated most highly –by C.A.– according to the holistic judgement. The divergence was explained as being due to “technical faults”; the misalignment of the text boxes to the main grid, or the misuse of the Adobe Indesign tools to define layout styles. Despite the relevance of the acquisition of these skills as being principal objectives within the course, the capability of the learner was not question and the faults were considered to be part of her learning profile, after some doubts the grade was revised upwards. Talking afterwards separately to both the teacher and the student, the traits of this profile were clearly defined and coincided. During the informal interviews, the perception of the magazine shifted from being solely test evidence, flagging up the results of the course programme, to become a sort of vivid self-portrait of its author, able to encapsulate personal attitudes, interests and, even, hopes and fears.

Although we didn’t use any kind of indicator tool during the interview, the way the teacher expressed her opinions about the learner, and the way learner described herself, were a clear example of an heuristic approach to non-systematic but normative exposition of the facets of student diversity. Afterwards, reviewing the notes taken during the two interviews and confronting them with an outline, such as the one offered by Richard M. Felder and Rebecca Brent (2005), regarding learning style preferences, orientations to studying, and levels of intellectual development, we obtained a definite characterization of the coincidence between the instructor’s intuitions about the learner and the learner’s self-opinion. An accurate learner profile is defined –extravert rather than introvert, intuitor rather than sensor, feeler rather than

thinker, sequential, active, visual– even though the analysis is based not on the actual person but on her virtual projection in the work. What we were in reality talking about was about a mode of learning rather than a learning style.

But the correction of the arithmetical grade is not easy to explain as merely an accommodation of the assessment system in recognition of the different learner profiles. But is an acceptance of idiosyncrasy sufficient to relativize the evaluation system? When asked directly, the teacher invoked the comparison between projects as of way defending her decision to upgrade the student. She showed C.A.'s project alongside a project authored by G.P., a fellow student on the same course who had achieved a grade of 85/100. Both students had chosen ugliness as the subject of their magazine. Despite the excellent realization, the appropriate use of typography and the rigorously composed layout, G.P.'s final result was clearly "a lot duller" than C.A.'s project. While turning quickly the pages of C.A.'s pilot magazine, the teacher was reassured in her decision:"It's a good piece of art direction, full of mistakes, but she has done a good job!"

Looking back on the opinions of the students about their respective projects. C.A. expressed her admiration for G.P.'s focus on details and admitted that her own work would be better with a similar attention to detail, but she concluded that this was quite beyond her, that she would never achieve this. In turn, G.P. observed that in his magazine ugliness was a circumstantial subject: 'In fact, my layout would suit anything, beauty too, but C.A.'s magazine has absorbed ugliness not as an external factor but as intrinsic to the design."

The collective author: sources of agency in the design project

The detailed analysis of this micro-situation is useful as a way of framing both the learning process and design creativity as the results of the relationship between the author, the project and the state of affairs.

1. Student / designer profile. Skills, attitudes, orientations, intellectual interests, etc. The differentiating factors between C.A. and G.P. If we consider the design process in light of a hunting analogy, some designers will have the profile of patient, methodical trappers of small preys, and others that of adventurous and imaginative hunter in search of a white whale.

2. Project qualities. Just like the experienced animal that knows the habits of the hunter, the project triggers a certain metamorphosis in the author, causing the author to assume each individual disguise. In this sense what we consider to be *project immersion* is the process of transformation that makes it possible to transcend acquired habits and personal limitations. The sense of anticipation, inherent in all design projects is the engine that moves this dynamic mimesis.

3. State of affairs. The professional or educational conditions are the scenario where learning-creative activity takes place. This scenario is also dynamic, as its shapes and changes producing a second kind of immersion, an adaptive one. Adaptation to the state of affairs results from the author dealing with technological constraints, brief conditions, instructors and fellow students comments, assessment charts, syllabus, course programmes, etc. The contextual vortex assures the confrontation of design with reality. To continue with the hunter analogy, here, the personal profile of the author camouflages itself in order to blur into the backdrop of the forest.

Both the project and contextual vertices can be considered as fictional devices involved in reshaping the author's profile, combining different mimetic unities (Schaeffer 2010) generated at either the project-anticipation vortex or at the vortex of context-adaptation. Applied to our case, G.P. has overplayed an adaptive role and attained a high grade but with an average outcome. C.A., on the other side, has adopted a creative role and failed to adapt to the constraints of the learning context but vibrates beautifully with ugliness.

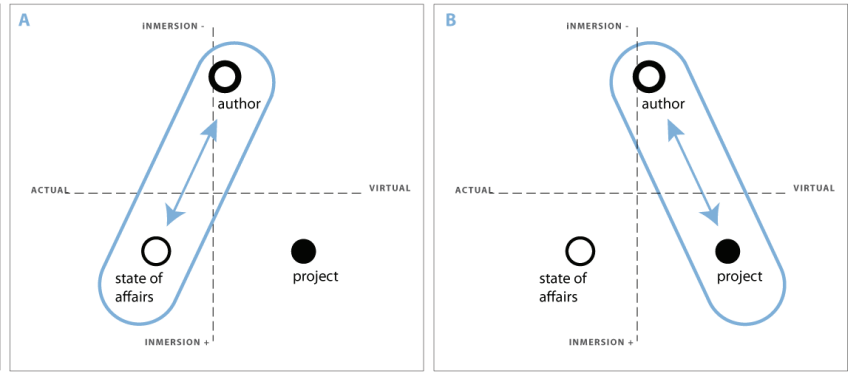

Figure 1. Two forms of author immersion: adaptative (A) and anticipative (B).

We use "mode" to define the different positions that the author's profile assumes as a result of the immersions: the balance between the project-anticipative vortex and the contextual-adaptative one. So, with "mode" we indicate a particular way to think about design as an anticipative, world-making activity while, at the same time, confronting a particular design state of affairs –either a professional or a learning one–. If the contextual immersion is dominant, the author's profile will turn on a regulative mode. On the opposite pole, if the main immersion is on the project vortex, the mode will become constitutive. Any system of evaluation creates a contextual constraint but, at the same time, needs to accommodate the different modes at play. This is coherent with the remark made by Shana Agid that "design practice methods include tools and aptitudes for working with unstable problems and imagined futures in which the object of study and inquiry is, nevertheless, real" (Agid 2012, p. 1).

Looking for a way to measure the incidence of the three sources of agency in the construction of the author's voice, we found that the front page of the degree project are all identical in contents –name, title and object– but differed in their hierarchy of their typographical display. Some students graphically highlighted their name, others the title of the project, and a third group the object –degree project and name of the institution–. We used these hierarchies to group the projects with the grades attained.

Table 1. Results of agency distribution on the state of affairs-project-author interaction. Curs de retitulació. Eina, july 2012.

	Students	**Average mark attained**	**Highest grade**
Author's name	12 %	83/100	85/100
Project title	60 %	73,6 /100	100/100
Object	28 %	82 /100	100/100

As shown in Table 1, the 60% of the students highlighted the title of the project, so the project was the most common agent in the construction of the author's voice.

Despite the tool was able to measure the relevance of each agency, we observed the average marks attained in the project agented cases weren't obtaining the highest grades. There wasn't any cause-effect relation between sources of agency, highest relative and highest absolute grades. To have a project agency in the construction of the learner's voice doesn't grant a high grade, as C.A. case suggested. Then, what reasons makes a project-author-context get the highest grade in an assessment?

Getting the same grade for different reasons: constitutive and regulating elements in assessment

As the preceding research revealed, some projects got the highest grades despite being in different categories. The reasons for why these cases got the maximum grades differ, even though the criteria employed in the assessment were the same. Given this situation we decided to explore the differences between two agents of the triadic mode as a dynamic variable –projects and students– with the third one as an static variable –the state of affairs–.

We considered two cases of final degree projects, designed during the 4th year, where both projects –by I.C. and B.M.– came from the same context achieved the highest grades. However, if the jury had maintained the same criteria when assessing I.C.'s project and B.M.'s project, the latter wouldn't have received an A. It would have undoubtedly been treated as a poor project. Equally if B.M.'s project had been assessed using a different set of criteria I.C. would not have received the deserved grade.

I.C.'s project was a constitutive project. The learner developed it from an established index, but it soon evolved into a piece of fictionalized history, while remaining the basis for a new family rum label. I.C.'s project started with a free interpretation of the last point on the initial established index: creating the conversations he thought people would have around a rum cocktail, mixed with his rum label. The learner developed a constitutive project by way of a free interpretation of the index constituting a new sphere of action, far from the fictions of the rest of the group. At the end IC established a new and detailed index for his project. He adapted the criteria from the initial index to fit it partially in the arithmetic schemes of assessment. Even though the project was a real model of the creativity learning, the jury commented that some parts of the project viability lacked credibility.

The second is a regulating project where the learner –B.M.– redesigned the idea of newspaper adapting the reading experience to a digital device. Initially she followed

the given index to the letter. When she had explored all the graphic aspects of the project; typography, rhythm, composition and infography she started to work on new tasks in order to fulfil the index. At the end B.M. obtained a lot of data about the usability and semantic viability and ended up having to create and regulate new sub-sections of the initial index. B.M. developed the perfect project for a summative assessment. The jury explained that even though the project was perfect it was "lacking in soul".

As a final consideration we identify the project of B.M. as an agent that allows her learner profile to adapt to the specific constraints of the index. In the second case we identify I.C.'s project as an agent that allows the learner to anticipate a new sphere of summary development.

Taking all this into consideration the main arguments are:

- 1. The project has an agency on the design learning process.
- 2. Getting an A doesn't mean getting the highest value according to constitutive and regulating modes.
- 3. It's feasible that projects with a "little lack in soul" obtain the highest grade.
- 4. Points 2 and 3 can't be done or explained solely with an arithmetic assessment.

Communicating vessels

Let's say an evaluating system –judgement or assessment– is ultimately a communicating vessels model. Let's say the homogeneous fluid it contains is the maximum amount of points a project can get –e.g. 10 l.–. During the evaluation process, the liquid settles and it balances out a grade.

In design project evaluation we've considered two main containers for this evaluative substance, the constitutive and the regulating. Each teacher establishes the shape and volume of the containers according to the course objectives, so the liquid grade will be distributed according to the program requirements. Looking through the mirror of this analogy we could incorporate an arithmetic explanation of how the teacher uses the vessels as an accumulative collection of shots when applying criteria-based assessment. When adding-up the liquids a new level will be established within the two connecting vessels. When adding-up 10 ml of liquids, the project gets an A grade –see figure 2–.

But as we observed previously, sometimes the fluid doesn't seem to achieve the same level in all parts of the system. Getting an A doesn't mean reaching the highest value with constitutive and regulating containers. Getting an A means the fluid is balanced out and it reaches the maximum in one or both containers. And there's a way to do it even it's not possible to increase the liquid amount in only one container, even though the total amount of liquid added may not be the maximum amount.

A holistic judgement could gently overturn the system, inclining ever so slightly the vessels in order to allow the project to achieve the maximum level in a regulating or constitutive way. This is known as "The Mean Lean" –see figure 2–.

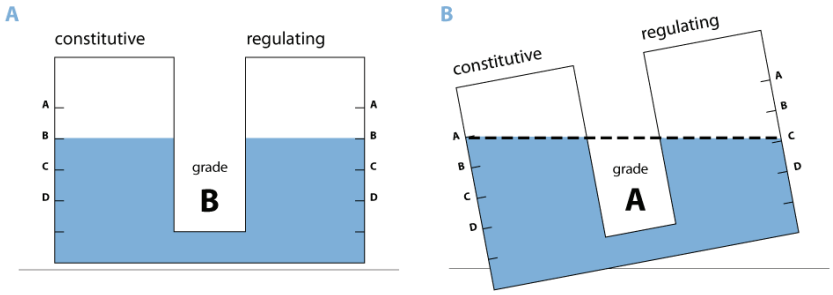

Figure 2. Communicating vessels. The project gets a B grade (A). After "The Mean Lean" the project gets an A grade (B).

How do teachers mean The Mean Lean? The communicating vessels theory is useful to escape a scenario of arbitrary uses of evaluative criteria, or a relativist one, in which each learner has to be assessed depending on their singularity. The way to attain a grade might seem different but they are the result of the application of the same logic: the search for an equilibrium between the opposing poles within a parametric system. But if the charted criteria of the arithmetic assessment is not enough to explain the logic of the communicating vessels, what are the hidden criteria at work? The presentation of a third case will help to explain this.

Plots and outcomes: design project on stage

The project authored by C.V. was intellectually ambitious. Based on connectionist theories it proposed redesigning the infography of the metropolitan public transportation of Barcelona. The redesign started with a broad research into cognitive sciences. The aim of C.V. was to redefine radically the representation of the metro map as a system of transfer lines, instead of a system of metro lines. The main goal was not to increase the usability but to redefine the basis of infographic conventions with a more accurate understanding of mind procedures, as a new point of departure. The development of this idea led the project to a system of graphic representations devoid of metro lines, with serious applicability problems. On the one hand it rejected the graphic resources traditionally used in mapping public transportation. On the other, the project wasn't tested and the results were questionable as they lacked state of affairs immersion. The C.V. case was a typical project on a constitutive mode of learning. During the assessment, one of the jury' members criticized a collection of final communication pieces –designed for smartphones and the metro guide– that seemed to hark back to a more conventional tune. She asked for general conclusions and a reflection on the sense of the project.

In this case we have an assessment situation where the arithmetical grade remained unmodified. The C.V. degree project was clearly a constitutive one and immersion on anticipation was dominant over contextual adaptation. But something happened at the end of the presentation, the interest remained undiminished during the first part, and no objections were made about the lack of viability of the result. The student was playing out her role, a strange mixture between designer and neuroscientist, and the audience was trapped by her fiction. But with the realist final

applications, the illusion abruptly vanished. Perhaps this vanishing moment is the key to explain what drives the overturning mechanism of communicating vessels.

Kirsten Hastrup in a series of challenging papers on the role played by imagination in social action, has discussed illusion as the key "to understanding how society is realised in the actions of people engaged in a gradual fulfillment of what they see as the current and relevant drama" (Hastrup 2007, p. 27 and 2004, p. 223). Hastrup identifies illusion with the theatrical notion of the ˝suspense of form˝ that means not so much the uncertainty about outcome as the process of getting there. When confronted with a project in the constitutive mode, we are under the enchantment of this suspense of form. The illusion of wholeness moves us to complete the story –in drama–, or to imagine a new context where the project might have viability or even sense –in design–, or to tick the small boxes that remained empty in the evaluation chart –in holistic judgement–. The fault of C.V. was to break the engagement of her audience when she returned to the prescriptive nowadays state of affairs, without realizing that, actually, she was designing outwith the state of affairs. So, in holistic judgment the "holism" is not simply about the complete understanding of the actual project, but also includes imagining the world made thinkable by it.

If illusion of wholeness explains the reception of constitutive projects, and, particularly, how the anticipative character of design is assumed, what happens on the opposite side of the parametric model, when creative action is on a regulating mode? As the result of an adaptive immersion, what makes a regulative project gripping is the organization of the events in a suspense of plot, our illusion now is not about the outcome –because we know that it will be close to our actual world– but the representation of action. This reminds Aristotle's notion of plot as the inner soul of the play: "(...) plot, like an animal's soul provides a play with its essential identity, function and purpose" (Rorty 1992). Let us not forget, "lacking in soul" was how a member of the jury defined the regulating project authored by B.M. The emplotment of regulating projects, as in theatre, achieves "its realistic effect not by *copying*, but by making the audience vicariously experience real actions as intelligible" (Hastrup 2007, p. 27) . The adaptation to the context is not an imitation but an emplotment of design experience that serves to condense, to display, and to make noticeable and manageable the sets of conventions that are replicated and interpreted in the project. In this case, the overturning mechanism of holistic evaluation acts in response, not to the imagination of new worlds, but the recognition of new layers deep inside the present world.

Conclusions

The aim of this research was to clarify the effects of different educational settings on design practices. At the end of this research, we are able to explain two educational modes of learning in project oriented courses in design, the constitutive and the regulating mode.

We also can explain the differences between a holistic judgement and arithmetic assessment as a complementary evaluation processes, using the communication vessels model. The influence of summative assessment leads the students to a misuse of constitutive and regulating modes because assessment criteria introduces frames for each device, so the learners conceive the project as a mere addition of parts lacking the sense of wholeness. The influence of holistic assessment should lead the learning processes to a conscience/self-reflectivity about the appropriate mode of projecting in any given situation or imagined scenario.

To identify the tacit theories of design that are at the core of the assessment devices has been proved plausible. It should use the study of controversies in evaluation as a way to reveal subjacent criteria based on professional folk theories. Once upon this point, the research should focus on cognitive sciences as a way to explain why the use of ranking methods seems a natural process to assess, and if there's any relationship between the use of comparison methods and the natural process used to "evaluate the world", comparing what we perceive with what we know.

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Aligning assessment, feedback and action planning for international students

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Abstract: *What language should feature in assessment criteria for international students? How do students reflect on assessment feedback to allow the creation of effective action plans for future learning? Have universities adjusted their assessment methods sufficiently to match the increased demand for studying abroad? What can art and design contribute to these issues? These are some of the questions this paper seeks to address by reporting on recent pedagogic research at the School of the Arts, Loughborough University, in the United Kingdom. Language use is at the heart of this, and yet, it has been overlooked as an essential tool that links assessment, feedback, and action planning for international students. The paper reveals existing and new data that builds on research since 2009, aimed at improving students' assessment literacy.*

Keywords: Assessment criteria, Feedback, Action planning, Internationalisation.

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Introduction

This paper reports on two dimensions of pedagogic research in art and design assessment practice at a research-led university in the United Kingdom. First, we consider recent pedagogic research that extends the use of keyword assessment strategies in the UK to collaborative work in Holland. Second, the paper reports on a project to help students reflect on their assessment feedback through action planning. These issues are contextualised against the historical and recent understanding of internationalisation.

Early findings suggest that certain keywords are more easily located than others on a mark scale from 0-100%, whereas some are ambiguous to students who know English as a second language. This responds in part to recent concerns about how criteria is used to judge work in fields that are immersed in art and design higher education assessment practices, such as graphic design (van der Waarde 2009: 11). Regarding students' ability to reflect on feedback, problems are identified relating to difficulties associated with undertaking pedagogic research with students that encourage them to be active rather than passive in their response to feedback. This will be contextualised as part of a wider student centred assessment, feedback and action planning cycle.

I report on-going pedagogic research into aspects of the undergraduate assessment cycle, such as the link between reflection and action-planning which is little understood by students (Parkin *et al*, 2012: 969) who find difficulty learning from feedback (Orsmond *et al*, 2013: 241). The research is contextualised against a 're-internationalisation' agenda that has emerged since the early 1990s in the United Kingdom, driven by economic growth. The extension of existing research tests previously held assumptions about keyword use in the application of assessment criteria with an international audience. New data reported here raises important questions about how to relate verbal descriptors to class and grade indicators in assessment practice. Furthermore, different approaches to assessment level indicators at a national and international level are noted to highlight the variation between Universities. This is supplemented by the design of tools that intend to encourage students to reflect on assessment feedback and develop a response to it in the form of an action plan. Internationalisation is also outlined with the intention to encourage an inclusive approach to assessment processes that focuses on what students do rather than what teachers do or what students are. The paper begins with by reviewing recent work on developing and testing a keyword strategy for assessment criteria that supports written criteria statements to help guide tutors and tutees towards a collective understanding about levels of achievement. This has been undertaken in the UK and The Netherlands, bringing an international dimension to what began as an internal process to review assessment criteria. The discussion moves on by reporting on new work about student reflection on feedback through action planning tools.

This is contextualised against the development of internationalisation, emphasising the need for language use to be more carefully considered and explained as an enabler to learning for international students.

INTERNATIONALISATION IN HIGHER EDUCATION

It seems obvious to state that Internationalisation and Higher Education have been directly linked through the development of research between scholars throughout the history of universities. However, more recently the alignment of academic standards for research and teaching is cited as an increasingly important factor (IMHE 1999, p. 19) as universities see internationalisation as 'the concept and the process of integrating an

international dimension into the teaching, research and service functions' through 'quality assessment and assurance' matters (IMHE 1999, p. 3). 'Globalisation' is therefore an influential factor in the present-day understanding of internationalisation, the incentives being ' commercial advantage, knowledge and language acquisition, enhancing the curriculum with international content, and many others' (Altbach & Knight, 2007: 290).

Internationalisation in this present-day sense is said to have been a priority in Europe since the early 1990s and the contrast between the historical and contemporary emphasis leads to what has been called 're-internationalisation' (Teichler, 2004: 6–9). That said, a distinction has also been made regarding 'cooperative internationalisation' or the 'commercial internationalisation' (Beelen and de Wit, 2012: 1) acknowledging increased competition.

Over the previous two decades, the economic dimension to the latter has become more vivid in countries such as the UK because funding for university education has shifted from the public to private sector through gradual increases in tuition fees compensating a stagnation and more recent reduction of government funding. A consequence of this has been to seek out more international students willing to pay tuition fees higher than has been typical for UK based students of the past. With this change has come the need to reflect on how curriculum is suited to the overseas students. This must also include assessment and feedback processes because these differ significantly between institutions in the UK and beyond. Despite the reinterpretation of internationalisation in the guise of economic development over a period of two decades, little appears to have been published on issues that link internationalisation to assessment criteria and art and design.

Furthermore, it has been suggested that attempts to internationalise the curriculum are resisted and further complicated by suggestions that mythologised 'bohemian, liberal and open minded' academics who teach art and design react with 'reticence and resistance' to the idea of internationalisation (Barham, 2011). It is therefore clear to see how international issues may be overlooked in the development of assessment criteria, providing written feedback, and encouraging students to reflect on their feedback and instigate actions plans.

An assessment process that has language at the core must therefore consider not only the fluency and transference of language between learning outcomes, assessment methods, assessment criteria, and written feedback, but also action planning, and the in/ability of international students to interpret meaning associated with important words and phrases at the core of assessment practice. If this is problematic, supporting international students requires an inclusive approach to 'cross-cultural teaching' with a focus on 'what students do', over 'what teachers do' and 'what students are'. This is what Biggs describes as 'teaching as educating' rather than 'teaching as accommodation' or 'teaching as assimilation' in ways that avoid stereotypes (2003, pp. 120–139).

Testing keywords internationally for assessment

Pass and fail is a rudimentary way to determine the outcome of assessment. More specific is to establish a class or grade that indicates a level of achievement that may also support verbal descriptors. Nomenclature such as 'good', 'very good', 'excellent' and 'outstanding' distinguish 'levels of competence' (Davies 2012, p. 2) and an extended correlation between class, verbal descriptor and literal grade establishes the

relationship between different ways of indicating achievement levels to students. One interpretation of that number, letter and word based marking systems, is shown in Table 1.

Table 1. Comparison of class, verbal description & literal grade indicator.
Source: Brown 1997, p. 75

Class	Verbal description	Literal Grade
1	excellent	A+
		A
2:1	very good	A–
		B+
2:2	good	B
		B–
		C+
3	moderate	C
		C–
P	marginal	D+
	pass	D
		D–
F	fail	E

Recently at Loughborough University School of the Arts this has been supplemented by adding to the list verbal descriptions, or keywords, to align with ten equal percentage divisions between 0–100%. This has been done to encourage more consistency between marking tutors (Harland and Sawdon 2011) in their use of language when providing feedback to students. For example, two students who receive the same percentage grade should also expect a similar verbal indicator, but this has not always been the case. This introduced additional words to differentiate further the bands typically aligned with the first class (70% plus) and fail (below 40%) bracket typically used in UK assessment matrices, after surveying assessment criteria from nine universities. See Table 2. The words were sourced to support the writing and presentation in student handbooks of guidance for the application of assessment criteria across four assessment criteria headings commonly used in the UK: knowledge and understanding, subject-specific cognitive skills, subject-specific practical skills, and key/transferable skills. A working group of academic staff agreed these verbal descriptors based on the usefulness for marking both written (e.g. essay) and practical (e.g. artefact) outputs by students. As part of the process, consultation with staff and students took place in the form of a small focus group and the findings supported the ordering of word recommendations against a hierarchy of numerical grading as seen below.

Table 2. A hierarchy of key terms representing ten percent divisions. Source: Harland and Sawdon 2012

90–100	Outstanding
80–89	Excellent
70–79	Rigorous
60–69	Very Good
50–59	Good
40–49	Satisfactory
30–39	Marginal
20–29	Insubstantial
10–19	Insufficient
0–9	Deficient

These were adopted after reviewing research data established specifically for discussion and debate regarding how other institutions typically place words to match a percentage grade indicator. The data contained familiar and specific meaning words (e.g. excellent) and those more casual and unfamiliar in an academic context (e.g. sound). See Table 3.

Table 3. Assessment criteria keyword analysis from nine higher education establishments. Source: Harland and Sawdon 2012, p. 74

	A	B	C	D	E	F	G	H	I	
	Extensive	Extensive	Outstandingly	A Outstanding	Outstanding	Significant	Outstanding	Unfamiliar conceptual	High order	
	In-depth	Deep	high quality	High quality	Original	Original	Exceptionally high	territories	Appropriate	
90–100	Coherent	Excellent		Originality	Complex	Transcend	standard	Unified	Developed capacity	90–100
	Detailed	Inventive	Originality	Excellent	Rigorous	Transform	Trivial defects	Discernment	Very high standard	
	Theoretical	Ambitious		technical	New insights			Technical/craft		
	Intellectual	Exceptional		competence	Publishable	Flair	Excellent	Persuasive	Rigorous	
80–89		Highly flexible		& Innovation	Extensive	Thorough	Very minor defects	Compelling	High quality	80–89
					Effective			Responsibility		
								Well informed		
								Wide ranging		
	Comprehensive		Exceptional	A Excellent	Confident	Challenging	Very good	Accurate	Originality	
	Coherent		Distinguished	Exceptional	Appropriate	Exceptional	Few minor defects	Extensive		
70–79	Wide ranging		Authoritative	Distinguished	Organised	Evaluative		Risk taking		70–79
	Specialist techniques		Methodological	Very good quality	Structured			Selective		
	Systematic		Critical, Skilled					Organised		
	Thorough	Sound	Very good		Very good	Coherent	Very good	Reflective	Above average	
	In-depth	Very good	Greater insight	B Greater insight	Analytical	Familiarity	– minor defects	Professional	Synthesis	
60–69	Advanced	High level	Good quality	& originality	Critical	Evaluation	Generally very good	Accurate	Sound	60–69
	Critical	Inventive	Sound	Good quality		Clarity	Notable defects	Checking		
	Creative	Strong	Ordering					Testing		
		Quite flexible	Appropriate					Finishing		
	Sound	Sound	Insight	C Sound quality	Satisfactory	Satisfactory	Good creditable	Good judgement	Average	
	Focused	Satisfactory	Satisfactory				Generally sound	Reflection	Clear	
50–59		Good	Relevance				Number of			50–59
		Thorough	Standard				shortcomings	Adequate		
		Competent	Accurate					References		
			Satisfactory					Familiar ideas		
	Adequate	Acceptable	Reasonable	D Satisfactory	Adequate	Some knowledge	Fair standard	Awareness	Limited	
		Competent	Competent		Limited	Limited	Shortcomings	Collaborative	Adequate	
40–49		Moderate	Familiarity			Reiteration	Satisfactory	Independent		40–49
		Sometimes flexible	Derivative	Standard		Descriptive	On borderline			
			Misinterpreted	F Fail	Incomplete		Unsatisfactory	Insufficient	Inadequate	
	Limited	Limited	Misdirected		Deficient		Significant	Rudimentary	Very limited	
	Unfocused	Partial	Misunderstood		Inadequate		Shortcomings	Limited knowledge	Poor	
30–39		Basic	Poor			Compensated pass		Little judgement		30–39
	Inadequate	Unconvincing				Weaknesses		Lack clarity		
	Little or no coherence	Limited flexibility						Sporadic		
			Little engagement	Clear fail	Misunderstanding	Confused	Very poor	Little evidence		
		Insufficient	Irrelevencies		Lacks coherence		Exceedingly poor	Poor judgement		
20–29		Unacceptable	Minimal evidence					Very limited		20–29
		Too narrow				Inadequate		Ineffective		
		Poor								
		Inflexible	Poor quality	Very poor fail				No awareness		
			Minimal effort							
			Little relevance							
10–19						Incomplete				10–19
			Virtually nothing			Inaccurate				
			of relevance, depth							
			or merit			Incomplete				
0–9						Fragmentary				0–9
						Zero response				

A focus group with students and staff at Loughborough University contributed to establishing the keyword ranking for the ten levels of achievement. Participants were presented with randomly assembled words selected by the academic working group, and asked to organise these in rank order from 1 (low) to 10 (high). See Figure 1. The outcome of the exercise, whilst with a small number of participants, provided quick

feedback to the working group with their established order. This qualitative scaling of achievement has since been published in student handbooks as part of a revised set of assessment criteria statements. For further reading, a detailed discussion has been reported in the journal *Art, Design and Communication in Higher Education* (Harland and Sawdon 2011).

Figure 1. Random keywords for assessment ranking. Source: Harland and Sawdon 2012, p. 79

The ten key terms have since been further tested approximately 45 undergraduate and postgraduate students and five academic staff at the St Joost Academy of Art in Breda, The Netherlands, during a workshop session in February 2012. A similar approach was taken as the focus group exercise in the UK, but with a smaller sample size. The results from the Dutch event presented a variable data set from an audience who did not speak English as their first language, and some of whom where from outside The Netherlands (the exact breakdown is not known but it is assumed the majority were Dutch).

Close inspection of the St Joost results revealed tolerance levels required for keywords beyond the limited nomenclature of excellent, very good, good, moderate, marginal, pass, and fail mentioned earlier, for an international audience is likely to be complex. This difficulty is further emphasised by anecdotal feedback during the exercise at St Joost, when some students revealed that certain words do not migrate that well between assessment cultures. For example, one Russian student confessed that words such as 'outstanding' may be difficult for Russian speakers as it suggests the work being assessed stood physically (not intellectually) apart from the rest of the assignments, and therefore may not be assessed. Also, Dutch academics debated if the idea of 'rigorous' had a Dutch equivalent and it seemed there was not a direct

translation. This clearly suggests potential problems associated with a keyword approach to assessment criteria for international staff and students.

As previously mentioned, the same exercise was undertaken at a workshop at the GLAD 2012 Conference at Kingston University, in the UK, but to a smaller audience. Eleven academic staff produced data, shown also in Table 1, revealing variation on the relative position of keywords. Most were ranked within 10% of the predetermined position, some occasionally up to 20%. The most consistently misplaced examples were 'insubstantial' and 'insufficient, the former being matched on only 4 from 11 responses.

Reading the data generated by staff and students at St Joost Academy of Art reveals that building a hierarchy of words in an international context with less than a 20% tolerance in the alignment with a predetermined grade band is difficult. Occasionally there was as much as 70% difference in the hierarchical placement of words within the set. In fact, the degree of accuracy is very low regarding the ability to rank words and match them to the recommendations made by the Loughborough working group. A lack of fluency in English is the probable explanation for this, as one can assume some words (e.g. excellent) are generally understood by most with a basic understanding of English. The reliability of 'blind' ranking keywords is shown in Table 4, and the degree of accuracy varies between the least reliable score of 30% for the word 'rigorous' and the most reliable score of 74% for the word 'satisfactory'. The reliability for matching keywords to a predetermined rank casts doubt on the relationship between keywords and the achievement levels they represent, especially for international students who will have a limited initial understanding about the application of assessment criteria.

Table 4. Reliability of 'blind' ranking of keywords to a predetermined order.

10	Outstanding	60%	
9	Excellent		58%
8	Rigorous	30%	
7	Very good	40%	
6	Good	62%	
5	Satisfactory	74%	
4	Marginal		64%
3	Insubstantial	46%	
2	Insufficient	58%	
1	Deficient		62%

The data samples generated at St Joost and GLAD 2012 are relatively small samples and lack reliability to generalise in more meaningful ways. However, the data provided the kind of quick feedback often associated with focus group research, and quick responses to aide the further development of the research. The inherent value of the data suggests that adopting a keyword strategy may have significant implications for an international audience because of cultural issues relating to language and understanding, and the subsequent development of their knowledge. The implication for this becomes more significant if staff replicate keywords of this kind in their feedback because this is likely to require the student to cross reference keyword based written assessment criteria with written feedback in order to develop an action plan that seeks to address weaknesses in their approach to assignments. Action planning is discussed further on in this paper. Before then it is worth exploring the variety of

assessment practice experienced by the international student before they travel from a predominantly non-English speaking environment to one fluent in English. This discussion requires only a partial view to illustrate the potential differences and the following provides a brief overview of assessment practice in a limited number of countries based on work by Paul Collins (2004).

International approaches to assessment practice: a brief overview

With the increasing migration of students between countries, the potential for misunderstanding assessment practice where language use is critical clearly possesses the potential for much confusion for the student. This is exacerbated by the complexity of assessment practice within the UK and internationally. Collins (2004) identifies five approaches to indicating achievement levels, comprising:

a) pass or fail (commonly used in competency based testing)
b) letter grades (e.g. A,B,C,D, etc. with and without plus and minus variations)
c) numerical grades (e.g. 1 excellent, 2 very good etc.)
d) numerical scores (e.g. an achieved score out of a predetermined whole – 12 out of 20)
e) percentage point marks
(Collins 2004, p. 24)

In the UK, assessment conventions are said to be split into what is referred to as 'full range percentage marks, grade based marks and what one might call hybrid grade percentage systems' (Collins 2004, p. 27). The pass threshold is generally set at 40% for undergraduate and 50% for postgraduate studies. Collins uses examples of 'assessment reporting' from a review of thirteen institutions:

percentage points Birmingham, Wales (Bangor), Reading, Liverpool, Oxford Brookes, Westminster, Cambridge;

grade based Middlesex, Derby, Wolverhampton, Aberdeen;

hybrid approach The Open University, Loughborough.

Beyond the UK, most European practice is apparently grade based, but in Germany the predominant system is numerical between 1 (high) and 5 (low) with the highest score and fail respectively at either end of a continuum, with an accompanying three sub grades for each number for greater accuracy. Hungary, Sweden and Switzerland do similar but in the reverse rank order of 1 (low) to 5 (high). Further afield, the United States of America (USA) seemingly favours letter grades, even though it sets the pass threshold at 60% by comparison with the UK. Specifically, Collins reports that York University in the USA employs a ten-grade letter scale with descriptors (2004, p. 30). In between the UK and USA, Canada and Australia are said to employ systems that use 50% as a pass threshold, but inconsistency is illustrated by Collins between The University of Calgary, The Royal Melbourne Institute of Technology, The University of Technology Sydney, University of New South Wales and the University of South Australia.

Based on his review of these systems, and more, Collins attempts to summarise the arguments for and against what he calls 'fine grain percentage' and 'broad grade' assessment. His comparison is reproduced here in Table 5. One can only speculate here which of these might appeal to the international student in art and design, but it seems that the simpler distinction of quality, lack of subtlety, and likelihood of better written feedback associated with grade based marking, might be favoured against the simpler to understand, quantitatively favoured imprecision he suggests is characteristic of percentage point marking systems.

Table 5. Comparison of percentage point & letter grade marking. Source: Collins 2004, pp. 40–42

Percentage based marking

For	Against
• it is simple to understand • it provides for precision assessment and especially so for quantitatively based work and for multiple choice or short question tests (where marks are added together towards a larger whole • it is easy to rank order cohorts of students • it can easily be used to calculate module and cohort etc. … averages and standard deviation	• risk of imprecision • possibly longer timescales needed to mark • greater chance of a disjunction between the percentage mark given and the written narrative • greater chance of errors in adding and dividing etc. in bringing percentage marks together • greater chance of second marker giving a different percentage score

Grade based marking

For	Against
• simple distinctions of quality • less chance of an error or doubts within a classification band (and consequently less worries and anxiety) • less chance of assessment benchmark subtly or even dramatically changing when marking a large number of scripts • Quicker marking times • A greater chance of a sampler/double marker/external examiner agreeing with the first marker • less chance of student challenge or appeal • providing a broader and stronger (defensible and constructive) platform for extensive narrative feedback	• an apparent lack of confidence in a lecturer to mark precisely • a loss of fine grain differentiation (little is black or white …) • that it might be divisive and demotivating amongst students who perceive themselves (and who may be are) at the top, as compared to the bottom of the grade

This comparison provides a useful framework for further research beyond the scope of this paper. Research may be undertaken into the desirability for universal verbal descriptors that equate different marking systems to keyword achievement levels over an agreed scale of achievement. Ten levels seem to offer scope for a more refined use of language than the seven listed above in Table 1, but in Brown's (1997, p. 75) list of class, verbal descriptor and literal grade there is inherent problems because these each indicate a different number of possibilities. For class, there are 6 options, verbal descriptors list 7 possibilities, and there are 13 letter grades!

Two ten percentage and grade division systems are presented below, comparing the earlier listed verbal descriptors proposed by Harland and Sawdon (2011) with those cited by Collins from York University in the USA. See Table 6. It is interesting to note that on these two ten division systems, only the word 'excellent' aligns, and words such as 'very good', 'good' and 'satisfactory' are misaligned slightly in the percentage system compared to the letter grade system, and whereas the former attempts to provide clear indicators for content (or lack of) in the use of 'deficient', 'insufficient' and 'insubstantial' below what would be considered a 'marginal' level of achievement, the letter based system indicates three pass levels of as 'marginally passing', 'barely passing' and 'passing'. 'Satisfactory' and 'fairly competent' are equal in the rank order and could be construed as representing similar levels of achievement.

Table 6. Keyword comparison of percentage and letter grade systems.

Verbal descriptor by percentage Source: Harland and Sawdon 2012		Verbal descriptor by letter grade Source: Collins 2004	
90–100	Outstanding	A+	Exceptional
80–89	Excellent	A	Excellent
70–79	Rigorous	B+	Very good
60–69	Very Good	B	Good
50–59	Good	C+	Competent
40–49	Satisfactory	C	Fairly Competent
30–39	Marginal	D+	Passing
20–29	Insubstantial	D	Barely Passing
10–19	Insufficient	E	Marginally Passing
0–9	Deficient	F	Failing

Systems used by institutions and assessors are likely to have been determined by historical factors, inheritance and perhaps unwillingness to change the status quo. The variety of systems used internationally suggests that student migration has not been a major consideration. But there is a more fundamental issue that has been neglected in the literature on assessment regarding what students do with feedback. It is unclear what assessment means to students beyond an indicator of progress. What do students do once they receive their mark? How do they interpret feedback? Assessment and feedback is known to be an under-researched topic (Cramp 2011, Rae and Cochrane 2008). However, interest is growing (Pitts 2005) and although research into feedback dates back to the late 1970s (Pokorny and Pickford 2010) virtually none has been undertaken for first-year undergraduates (Cramp 2011: 114). Regarding assessment and feedback, there appears to be an absence of reporting about how practical tools for action planning are developed by academics for use by students. This paper

attempts to fill this gap and takes a holistic approach by linking concerns to internationalization.

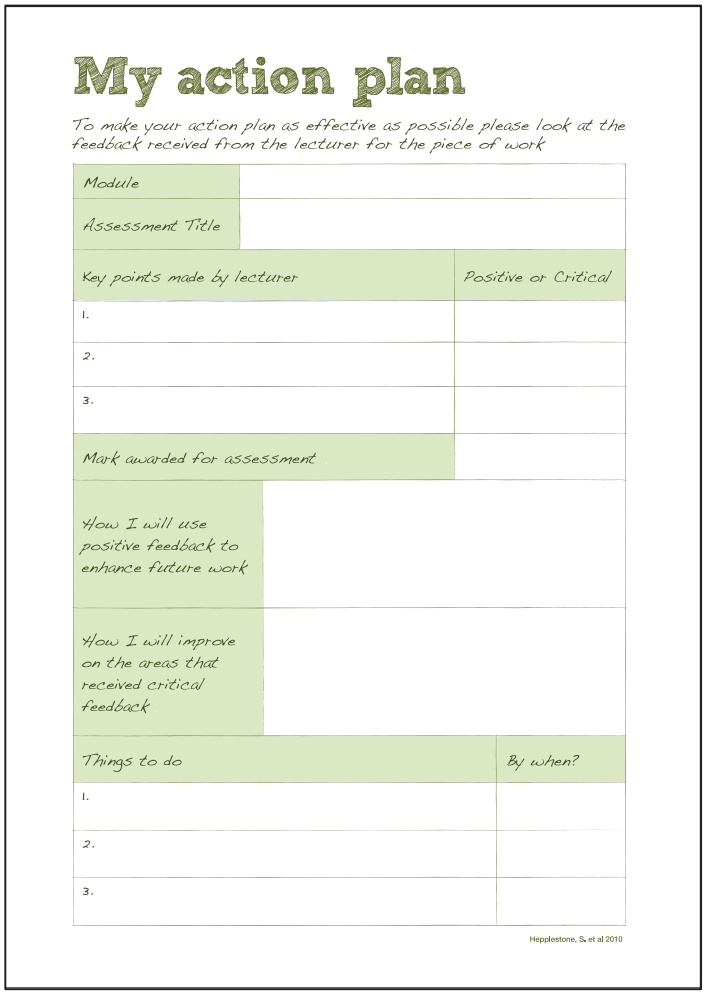
The following reports on a recent attempt to support students' response to feedback though action planning as part of a pedagogic research project: 'Feedback: facilitating reflection to promote learning.' This work was initiated by Caroline Smith at the Loughborough University Teaching Centre in conjunction with Emma Dresser at the Loughborough University Student Union, in collaboration with the author of this paper. The project benefitted from a Loughborough University Teaching Innovation Award with the intention to produce learning materials to help students make the most of their assessment feedback. The materials developed by the project can be viewed at www.lufbra.net/voice/feedback/further/.

Facilitating reflection to promote learning

Receiving feedback is also a central skill of assessment. There is a range or reactions to feedback. At one end is passive, uncritical acceptance of advice. At the other is uncritical aggressive rejection of feedback. […] A more mature response is to accept the feedback graciously and then consider it in light of one's own values and experience. (Brown, 1997: 5)

Recently in the UK student satisfaction surveys such as the National Student Survey (NSS) reveal a dissatisfaction about assessment and feedback and academics have been slow to respond to a need for useful, timely feedback. Even though staff aspire to produce useful feedback, there is a mistrust about how much notice is taken by students who overlook the opportunity to apply critical feedback to the next part of their learning. Yet, pedagogic researchers advocate that feedback should not be an afterthought or burden, but part of a process (Gibbs G., Simpson C., 2004) within which students are active participants in a process they are part of, rather than passive recipients (Nicol and Macfarlane-Dick 2006) in a process done to them. Studies have a tendency to focus on how students use written feedback rather than how they make use of self-reflection (Glover C., Brown E., 2006 and Weaver M., 2006). Successive NSS results indicate that feedback is inadequate, leading to the National Union of Students (NUS) establishing guiding principles in 2009 that include the use of 'self-assessment' as a strong motivator for learning.

This project at Loughborough University drew on some of this available feedback literature and has piloted the use of a "Loughborough Students' Union feedback resource" with first-year undergraduate students in the School of the Arts commencing their studies in autumn 2011 (see http://www.lufbra.net/voice/feedback/action/). In order to support the requirement to accommodate different styles of student learning, a feedback resource was provided to students as hard copy and electronic versions and the acceptability of these formats has been investigated. The feedback resource contained an action plan (see Figure 2) which students where asked to complete in order to promote engagement with the feedback they receive, supporting their learning from experience and promoting the concept of self-assessment of work.



My action plan

To make your action plan as effective as possible please look at the feedback received from the lecturer for the piece of work

Module	
Assessment Title	

Key points made by lecturer	Positive or Critical
1.	
2.	
3.	
Mark awarded for assessment	

How I will use positive feedback to enhance future work	
How I will improve on the areas that received critical feedback	

Things to do	By when?
1.	
2.	
3.	

Hepplestone, S. et al 2010

Figure 2. Action Plan tool for undergraduate students.
Source: http://www.lufbra.net/voice/feedback/action/

The intention was to guide a group of tutees in the use of an action-planning tool and address the following:

- Further introduce students in art and design to the use of assessment tools to enhance student learning;
- Assess the ability of students to undertake self-assessment;
- Compare how action planning might work alongside written feedback provided in advance of one-to-one summative tutorial feedback.

The project aims were to:

- Investigate the acceptability of a feedback resource amongst a sample of the student population.

- Gather student opinion on the feedback resource (ease of use, clarity, usefulness).
  - To compare the format of the hard copy and electronic resource (ease of use, clarity, usefulness).
  - To make recommendations relating to a University wide feedback resource dependent on these findings.
  - To gather staff and student opinion on the use of 'guided reflection' using the feedback resource action-planning tool.

The project fitted into an existing pattern of formative and summative assessment on a semester long studio module that occupied approximately 85% of the syllabus. This included a mid-semester academic tutorial for which students are required to write self-evaluation statements against four assessment criteria headings previously mentioned. Students also make a final assessment presentation to two other students and a marking tutor, before receiving an individual feedback tutorial to discuss written summative remarks by the marking tutor that align with the intended learning outcomes. Usually, students see their summative feedback for the first time at the feedback tutorial, but this was adjusted for the purpose of this exercise and students were sent their summative assessment feedback in advance allowing for them to consider what actions they may take as a result of the feedback.

INITIAL ANALYSIS OF STUDENT RESPONSE TO THE RESOURCE

The response to requests for student participation proved at first a stumbling block but provided some indication of how similar initiatives might be undertaken in future. However, further encouragement and subsequent reaction by more students suggests the exercise is worth reporting here. The initial intention had been to create focus group discussion from a cohort of 48 first year Graphic Communication students having distributed the resource at the beginning of their studies, but the response to requests for participation were disappointing. Only one student volunteered their time to participate in a focus group and they did not recall receiving the learning resource during induction but did recall the online version. They found the process of receiving a mark and written feedback before a tutorial feedback meeting really useful as it allowed them to prepare for the meeting using the action planning sheet in the learning resource, rather than ‘making things up on the spot.’ The student expressed that more people would look through the resource if it was given out by lectures and were told it would help them with doing their coursework now and in the future. Upon looking at the resource during the focus group, the student found it easy to use but explained the main difference was made by the session with the tutor. In response to this initial disappointing student involvement, a further email sent to cohort members to complete a survey about the resource resulted in a total of 28 people starting the survey and 23 completing the survey. Of those, 80% read the resource and found it easy to use

Implications for international agendas

Much of what is reported here demonstrates a reflexive approach to assessment and feedback pedagogy in art and design at Loughborough University School of the Arts. The discussion about adopting a keyword strategy for use in the application of assessment criteria, is linked to the project on promoting a reflexive approach to feedback by students in that the interpretation of language is at the core of both initiatives, and central to the provision of tools that intend to enhance student learning. This has exposed some difficulties associated with the use of a keyword strategy

especially for international students. A lack of understanding certain keywords as they may be used by marking tutors might disadvantage overseas students and prohibit them from participating in the formulation of action plans. Clearly, a disjointed approach to student assessment, feedback and action planning may be further complicated by the needs of international students.

Conclusion

In what may appear to some as a disjointed range of ideas discussed above, a holistic approach to a cycle that aligns assessment, written feedback and action planning has been the intention. The 'student perspective', often missing in the literature on assessment feedback discourse (Rae and Cochrane, 2008: 218), has been considered in terms of the opportunity for them to reflect and record responses to written feedback by introducing an action-planning tool. This encourages students to act on feedback for 'feed-forward' (Duncan, 2007, cited by Rae and Cochrane, 2008: 226) into subsequent modules.

Assessing student work using verbal descriptors to supplement class or grade indicators is likely to be problematic for international students unless keywords are utilised that carry meaning for all students, not just native English speakers. Some words, such as rigorous, have been shown to be problematic internationally. Other words are unstable regarding their position in a predetermined hierarchy and relationship to a class or grade. This is not helped by the variety of approaches to the scales used to mark student work in the UK and abroad. Overcoming this requires an inclusive approach to teaching, emphasising what the student does over the actions of a teacher and background of the student. Failure to achieve this limits the ability of students to reflect on their assessment feedback and develop action plans for future learning. The Higher Education sector in the UK has a significant responsibility to invest in assessment processes that equate with the growth of internationalisation since the early 1990s and the influx of students who make considerable commitment to move from their home to benefit from a long established culture of higher education. This paper has used new and existing data to highlight inconsistencies, make comparisons, identify weaknesses and identify research questions that may ultimately help international students understand the link between assessment criteria, written feedback and their reflection for action planning. Further questions such as: How should a marking scale be divided? What keywords, or verbal descriptors, reflect this division and appeal to international students? Should better correlation exist between percentage figure, verbal descriptor and letter grade systems? These may help the cross-cultural transition required for successful international student learning.

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A Preliminary Study on Time Management in Undergraduate Industrial Design Students

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Abstract: *Time management is one of the most important factors affecting the learning process and outcome. The purpose of this study aims to explore the time management behaviors and attitudes of undergraduate industrial design students. The study applied a time management questionnaire to 646 students, ranging from sophomores to seniors, from seven universities in Taiwan. The findings are summarized as follows: 1) Most students recognize the importance and effectiveness of time management. 2) Most students are dissatisfied with the time management and methods used. 3) Female students have better planning and control of time than male students. 4) Degree of time management increases along with school year increment, however the ratio of completing tasks on time declines accordingly.*

Keywords: Design, time management, education.

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Introduction

Due to recent changes in the market environment, Taiwanese corporations are facing transformation from basic industrial and Original Equipment Manufacturing (OEM) based models to high-tech industries. Therefore, these companies are progressing to establish branding in which design plays a highly important role. For this reason, many colleges and universities establish design-related departments to commit to training and incubation of professional designers. The development of design professionalism not only includes learning from knowledge-based courses but also from many technical and practical courses that require hands-on operations (Hou 2006). Therefore, students become quite disoriented when it comes to managing learning time due to the necessary level of engagement in the course, assignments, leisure, and sleep activities, as well as facing considerable pressure (Yang, You, and Lin 2003). Design learning differs from general learning in that long-term thinking, training and development are required from the design process, and only through continuous development and integral thinking students will be able to propose innovative solutions (Wong and Siu 2012). Hence, time management becomes an issue meriting further discussion in terms of design learning. The purpose of this study aims to discuss the time management behaviours and attitudes of undergraduate industrial design students.

Literature Review

Time management

Time management comprises many issues, and the definition given by Wikipedia (Wikipedia 2012) is described below:

> "Time management is the act or process of planning and exercising conscious control over the amount of time spent on specific activities, especially to increase effectiveness, efficiency or productivity."

Time management involves action, planning, efficiency and effectiveness. For a project to succeed, time management is one of the most important factors (Ibbs and Kwak 2000). A good time management approach will improve project quality. From the perspective of education, students with good time management will experience better learning effects (Britton and Tesser 1991).

Time management allows users to manage and plan according to their knowledge, whereas good time management can effectively process things in the right order. Users can utilize schedules or task lists to confirm things that need to be done and to gradually complete goals. Time management can also be regarded as self-disciplined behavior to use time more effectively and to speed up completion time (Ceng and Shih 1994).

Time management is particularly important for students who are engaged in many daily activities, including classes, assignments, clubs, breaks, and meals. Students will inevitably encounter conflicts between various activities in their daily routines. In particular, students are frequently faced with the dilemma of assignments or tests – whether they should execute tasks according to priority of order or importance. Time management enables students to deal properly with all kinds of complicated situations (Dille and Söderlund 2011).

Time management of design students

Time management is related to student learning. In general, students with better time management will achieve higher academic performance (Claessens et al. 2007). The professional curriculum of the design major covers fields in engineering, aesthetics and business (Cheung 2012) while emphasizing "learning by doing" (Schön 1987). For this reason, students not only have to cope with varying course content during the learning process but they also need to complete various practical projects for core courses during their spare time. Design students spend a considerable amount of time on professional courses while frequently neglecting other courses or even complete assigments for design practice projects in other classes. It is quite common for students with a design major to take a leave of absence from other courses or even work all night for assignments. These students do not have time for association activities (Yang, You, and Lin 2003). Therefore, it is clear that time managemnet issues for students of design education are worthy of discussion.

Method

The study aims to discuss time management issues for students in industrial design education, in an attempt to gain insight into students' use of time management in the process of professional learning.

Subjects

The study objects ranged from sophomores to seniors in industrial design education from universities and colleges in Taiwan. The study adopted a questionnaire survey with a total of 652 respondents from seven departments and colleges. After deducting six invalid questionnaires, the number of valid questionnaires came to 646. Among the seven schools that responded, two were national universities, two were private universities, two were national universities of technology, and one was a private university of technology.

Data Collection and Analysis

To understand the time management of students in industrial design education, the study adopted The University Student Satisfaction and Time Management Questionnaires v.6 designed by Neill (2012). The questionnaire consists of learning satisfaction and time management; nonetheless, the study only adopted the questions on time management with detailed information as shown in Table 1. The questionnaire scale adopts a 5-point Likert Scale, where 1 represents "*this statement doesn't describe me at all; it isn't like me*" and 5 represents "*this statement describes me very well; it is very much like me*". The study first obtained consent from the targeted departments and assigned survey personnel to assist with issuing questionnaires in person or via the relevant teachers or graduate students from the schools. Each questionnaire took about 20–30 minutes to complete. The questionnaires were manually input into Microsoft Excel which was then sorted and proofread before conducting statistical analysis using Statistical Package for Social Science (SPSS) statistical software package.

Table 1. Time Management Questionnaire (Sourced from Neill (2012))

No.	Questions
1	My life is well organized.
2	I manage the way I use my time well.
3	I am clear about what I want to accomplish.
4	I do things in order of priority.
5	I use my time effectively.
6	I procrastinate over doing difficult tasks.
7	I accurately predict how long tasks will take.
8	I waste a lot of time.
9	I am on top of my important tasks at the moment.
10	I accomplish what needs to be done each day.
11	I do the most important tasks during my most energetic periods of the day.
12	I prepare a daily or weekly "to do" list.
13	I spend a lot of time mucking around.
14	I meet deadlines on time.
15	I easily get distracted from important tasks.
16	I get tasks done on time.
17	I find myself procrastinating over tasks that need to be done.
18	I have a weekly schedule on which I record fixed commitments.
19	I spend too much time on trivial matters.
20	I complete important tasks before they are due.
21	I often get interrupted when working on tasks.
22	I am in charge of how my time is spent.
23	I am satisfied with the way I use my time.
24	I find distractions to be very tempting.
25	I make and follow plans to achieve my goals.
26	I have a hard time concentrating.
27	I balance work, rest, and play.

The original design of the time management questionnaire consisted of 27 questions divided into three sections, as shown in Level 1 of Figure 1, namely *Time Management Effectiveness*, *Time Management Action* and *Procrastination*. To validate the survey results, the questions from the questionnaire underwent factor analysis to carry out classification validation. The analytical results showed that all questions could be divided into five factors, and these factors are named *Time Management Effectiveness*, *Attention*, *Time Management Action*, *Planning*, and *Procrastination* according to the content comprising the questions. The relationship between the five

factors and the original design constructs of the questionnaire is shown in Figure 1. Table 2 refers to the factor analysis results, where each factor's Cronbach's alpha (α) is also listed. The Cronbach's α of *Time Management Effectiveness* is 0.722, *Attention* is 0.831, *Time Management Action* is 0.753, *Planning* is 0.719, and *Procrastination* is 0.554. The overall Cronbach's α of the entire questionnaire is 0.670.

Figure 1. Time Management Scale Structure

Table 2. Time Management Scale Structure

	Factors				
No.	Effectiveness	Attention	Action	Planning	Procrastination
5	0.758	-.200	.228	.158	-.099
2	0.756	-.160	.193	.199	-.153
23	0.671	-.181	.201	.129	-.097
1	0.648	-.156	.264	.301	-.086
7	0.579	-.073	.223	.019	.087
8	-0.512	.429	.080	-.146	.401
4	0.479	-.170	.440	.183	-.146
27	0.425	.060	.305	-.077	.154
11	0.363	-.168	.275	.253	.050
24	-.136	0.805	-.108	-.037	.107
26	-.085	0.798	-.239	-.043	.002
15	-.060	0.778	-.203	-.099	.107
21	-.120	0.659	-.004	.084	.044
19	-.429	0.537	.167	.030	.317
13	-.233	0.504	-.008	-.328	.423
20	.086	.027	0.692	.059	-.169
3	.212	-.165	0.624	.128	-.002
16	.363	-.071	0.595	-.010	-.253
9	.222	-.236	0.578	.061	.236
22	.161	-.059	0.564	.234	-.060
10	.403	-.095	0.438	.081	-.193
18	.075	-.045	.077	0.86	-.008
12	.210	.013	.188	0.781	.000
25	.430	.003	.308	0.457	-.138
6	.183	.039	-.193	-.008	0.719
14	-.445	.273	-.046	-.110	0.554
17	-.363	.284	-.099	.089	0.509
Total	4.456	3.502	3.007	2.089	1.861
% of Variance	16.505	12.969	11.137	7.736	6.892
Cumulative %	16.505	29.474	40.611	48.347	55.24
Cronbach's α	0.722	0.831	0.753	0.719	0.554

Results

The time management questionnaire survey results for undergraduate industrial design students engaged in professional learning are shown in Table 3. The table includes descriptive statistics of genders and courses. In view of the overall student data, the three questions with the highest score in the time management questionnaire are ***Question 20****: I complete important tasks before they are due*. (M = 3.730, SD = 0.930), ***Question 22****: I am in charge of how my time is spent*. (M = 3.620, SD = 0.878) and ***Question 3****: I am clear about what I want to accomplish*. (M = 3.600, SD = 0.982). The three questions with the lowest scores were ***Question 23****: I am satisfied with the way I use my time*. (M = 2.760, SD = 0.996), ***Question 2****: I manage the way I use my time well*. (M = 2.810, SD = 1.017) and ***Question 26****: I have a hard time concentrating*. (M = 2.830, SD = 1.093).

Table 3. Descriptive Statistical results of Time Management Scale (Questions with a black background are questions with the highest scores and the questions with a gray background are the ones with lowest scores.)

			Gender				Year of core courses					
	Total		Female		Male		2nd		3rd		4th	
No.	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	2.940	0.998	2.950	1.000	2.940	0.988	2.910	0.965	2.920	1.006	2.990	1.040
2	2.810	1.017	2.820	1.052	2.810	0.957	2.740	0.995	2.810	1.010	2.900	1.055
3	3.600	0.982	3.590	0.979	3.630	0.980	3.610	1.008	3.610	0.992	3.590	0.940
4	3.410	0.948	3.450	0.974	3.370	0.914	3.410	0.941	3.360	0.970	3.450	0.948
5	2.900	0.959	2.910	0.973	2.890	0.931	2.810	0.957	2.840	0.937	3.060	0.967
6	3.290	1.006	3.280	1.009	3.320	1.000	3.290	1.014	3.320	1.011	3.270	0.996
7	3.000	0.949	2.980	0.975	3.050	0.900	2.960	0.996	2.980	0.933	3.070	0.898
8	3.390	1.032	3.360	1.043	3.440	1.014	3.480	1.062	3.440	0.990	3.250	1.006
9	3.250	0.833	3.260	0.858	3.260	0.796	3.280	0.840	3.190	0.756	3.280	0.889
10	3.040	0.941	3.020	0.935	3.070	0.953	3.080	0.924	2.960	0.975	3.050	0.941
11	3.210	1.036	3.200	1.052	3.230	1.014	3.170	1.006	3.210	1.103	3.260	1.027
12	3.210	1.094	3.330	1.120	3.030	1.030	3.230	1.102	3.190	1.131	3.190	1.052
13	2.870	1.050	2.850	1.050	2.910	1.053	2.870	1.050	2.860	1.093	2.890	1.011
14	3.250	1.151	3.280	1.155	3.200	1.152	3.290	1.177	3.260	1.134	3.210	1.132
15	2.950	1.116	2.890	1.127	3.030	1.104	3.010	1.128	2.930	1.148	2.880	1.078
16	3.580	1.002	3.570	1.019	3.610	0.974	3.690	0.995	3.460	1.068	3.540	0.949
17	3.090	1.062	3.110	1.078	3.040	1.041	3.090	1.083	3.100	1.078	3.090	1.019
18	2.980	1.111	3.150	1.135	2.720	1.027	3.050	1.129	2.930	1.113	2.920	1.078
19	3.500	0.973	3.520	0.959	3.460	0.999	3.550	1.007	3.490	0.985	3.440	0.903
20	3.730	0.930	3.730	0.939	3.740	0.923	3.850	0.951	3.640	0.925	3.630	0.897

No.	Total		Gender				Year of core courses					
			Female		Male		2nd		3rd		4th	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
21	3.220	0.987	3.210	0.981	3.230	1.002	3.320	0.976	3.130	1.003	3.150	0.981
22	3.620	0.878	3.630	0.870	3.630	0.884	3.740	0.855	3.480	0.921	3.560	0.858
23	2.760	0.996	2.770	1.004	2.760	0.984	2.720	1.025	2.720	1.017	2.850	0.939
24	3.260	1.099	3.180	1.118	3.370	1.068	3.240	1.124	3.270	1.185	3.290	0.996
25	3.270	0.860	3.300	0.855	3.230	0.870	3.290	0.894	3.180	0.871	3.290	0.788
26	2.830	1.093	2.740	1.064	2.940	1.130	2.820	1.137	2.880	1.139	2.780	0.993
27	3.420	1.025	3.390	1.001	3.480	1.055	3.500	1.046	3.350	0.995	3.340	1.014

The results show that students of industrial design highly recognize the importance of time management while most students believe that good time management will help them to learn. Nonetheless, in view of the questions with the lowest scores, students may know the importance and effectiveness of time management, but the number of students who actually use good time management is relatively lower.

Time Management and Gender

According to the statistical results by gender in Table 3, the three questions receiving the highest score for male and female students are identical, namely, ***Question 20****: I complete important tasks before they are due*. (Female M = 3.730, SD = 0.939, Male M = 3.740, SD = 0.923), ***Question 22****: I am in charge of how my time is spent*. (Female M = 3.630, SD = 0.870, Male M= 3.630, SD = 0.884) and ***Question 3****: I am clear about what I want to accomplish*. (Female M = 3.590, SD = 0.979, Male M = 3.630, SD = 0.980).

The three questions where male and female students received the lowest scores differed somewhat. The three questions for which the female students received the lowest scores were ***Question 26****: I have a hard time concentrating*. (M =2.740, SD = 1.064), ***Question 23****: I am satisfied with the way I use my time*. (M =2.770, SD = 1.004) and ***Question 2****: I manage the way I use my time well*. (M =2.820, SD = 1.052). Therefore, the female students are dissatisfied with their performance in terms of time management.

The three questions where the male students received the lowest scores were ***Question 18****: I have a weekly schedule on which I record fixed commitments*. (M = 2.720, SD = 1.027), ***Question 23****: I am satisfied with the way I use my time* (M = 2.760, SD = 0.984), and ***Question 2****: I manage the way to my time well*. (M =2.820, SD = 1.052). Only few male students have the habit of recording work to be executed while they are also dissatisfied with their time management and effective use of time.

To further understand differences in different gender responses, the study conducted analysis of variance (ANOVA) and listed those questions with a significant difference in scores according to gender, as shown in Table 4. The questions where male and female students showed significant difference in scores were ***Question 12****: I prepare a daily or weekly "to do" list*, where female students received higher scores for planning to-do-lists than male students, indicating that more female students plan work time in advance. In addition, on ***Question 18****: I have a weekly schedule on which I*

record fixed commitments, the results showed that female students have weekly timetables where they record and routinely execute work in a significantly higher ratio than male students. Furthermore, on ***Question 24****: I find distractions to be very tempting;* the statistics show that male students are more easily distracted than female students. This is borne out in ***Question 26****: I have a hard time concentrating* where the statistics show that male students find it harder to concentrate than female students. In general, female students are more diligent in making notes and time planning, and they also routinely record to-do lists in their schedule. Their attention is more focused than male students. Both male and female students are clear about their tasks and objectives and can complete work within the due date. However, they are both dissatisfied with the section on self-control of time, indicating that the male students could not effectively manage and use their time well.

Table 4. The ANOVA Test Results for Time Management Scores in Different Genders (* p < .05, ** p < .01, *** p < .001, F: Female, M: Male)

No.	Question	F	P	
12	I prepare a daily or weekly "to do" list.	11.533	.001**	F > M
18	I have a weekly schedule on which I record fixed commitments.	23.730	.000***	F > M
24	I find distractions to be very tempting.	4.642	.032*	M > F
26	I have a hard time concentrating.	5.159	.023*	M > F

Time Management and Courses

From the perspective of courses, the results listed in Table 3 show that the three questions receiving the highest scores by sophomores were ***Question 20****: I complete important tasks before they are due*. (M = 3.850, SD = 0.951), ***Question 22****: I am in charge of how my time is spent*. (M = 3.740, SD = 0.885) and ***Question 16****: I get tasks done on time*. (M = 3.690, SD = 0.995). The three questions receiving the lowest scores were ***Question 23****: I am satisfied with the way I use my time*. (M = 2.720, SD = 1.025), ***Question 2****: I manage the way I use my time well*. (M = 2.740, SD = 0.995) and ***Question 5****: I use my time effectively*. (M = 2.810, SD = 0.957). The three questions receiving the highest scores from the juniors were ***Question 20****: I complete important tasks before they are due*. (M = 3.640, SD = 0.925), ***Question 3:*** *I am clear about what I want to accomplish*. (M = 3.610, SD = 0.992) and ***Question 19:*** *I spend too much time on trivial matters*. (M = 3.490, SD = 0.985). The three questions receiving the lowest scores were ***Question 23****: I am satisfied with the way I use my time*. (M = 2.720, SD = 1.017). ***Question 2:*** *I manage the way I use my time well*. (M = 2.810, SD = 0.1.010) and ***Question 5****: I use my time effectively*. (M = 2.840, SD = 0.937). The three questions receiving the highest scores from seniors were ***Question 20****: I complete important tasks before they are due*. (M = 3.630, SD = 0.897), ***Question 3:*** *I am clear about what I want to accomplish*. (M = 3.590, SD = 0.940) and ***Question 22:*** *I am in charge of how my time is spent* (M = 3.560, SD = 0.858). The three questions receiving the lowest scores were ***Question 26:*** *I have a hard time concentrating*. (M = 2.780, SD = 0.993), ***Question 23****: I am satisfied with the way I use my time*. (M = 2.850, SD = 0.939) and ***Question 15:*** *I easily get distracted from important tasks*. (M = 2.880, SD = 1.078).

From the results above, it can be inferred that the students tend to have better time management as they grow. However, their awareness of achieving goals declines

accordingly, which could be due to special themes and graduation project production from senior learning courses, where the scope of teaching curriculum topics is more general. As a result, students can select their main topics and plans based on their preference. Questions for sophomore and junior students are mostly drafted by teachers for single product design or design competitions; hence, sophomore and junior students have a smaller and clearer scope of topics and objectives compared with senior students.

The results of ANOVA test analysis and Duncan's multiple range test of time management in different courses is shown in Table 5. This only lists those topics showing a significant difference, described as follows. ***Question 5****: I use my time effectively*. The results show that seniors use time more effectively than sophomore and junior students. **Question 16:** I get tasks done on time. The results show that sophomore students complete work on time more than juniors. ***Question 20****: I complete important tasks before they are due*. The results show that sophomore and junior students can complete important tasks on time while senior students are less likely to complete important tasks; in other words they experience delays. ***Question 22****: I am in charge of how my time is spent*. The results show that sophomore and junior students have more autonomy in their time use; that is, they are more actively scheduling their time while seniors have a lower sense of autonomy over their use of time. In general, students believe that their utilization of time management improves over time; however, they could not complete work or important tasks on time. The results indicate that there are certain conflicts in self-identifying by students. By inference, the results show that the progress of professional course of sophomores and juniors is arranged by the teacher. Therefore, students find it easier to control the amount of time for tasks and hence can complete their important tasks more easily than seniors.

Table 5. The ANOVA test results for time management scores of different courses (* p < .05, ** p < .01, 2: Second year, 3: Third year, 4: Fourth year)

No.	Question	F	p	Duncan
5	I use my time effectively.	4.355	.013*	(2,3) < (4)
16	I get tasks done on time.	3.107	.045*	(2,3) ≥ (3,4)
20	I complete important tasks before they are due.	4.136	.016*	(2,3) > (4)
22	I am in charge of how my time is spent.	5.232	.006**	(2,3) > (4)

Concluding remarks

The purpose of this study is to investigate undergraduate industrial design students' attitudes and behaviors toward time management. The research findings show that most students are clear about their objectives of work and tasks while completing them timeously. Nonetheless, the students are less efficient in terms of time control; they are also dissatisfied with their method of time use and they can easily be distracted.

Time Management and Gender

The difference in attitudes and behaviors of time management for different genders are differentiated in five factors from the questionnaire for discussion. The results of the survey show that female students tend to be more effective in time management

than male students. In other words, female students organize and plan their time to effectively manage and use time, in addition to completing projects in the order of priority. Male students perceive that they need to take care of work, leisure and entertainment. In terms of attention, male students are more likely to be faced with distraction and could more easily be interrupted during work. Female students also record their daily or weekly to-do list on the calendar and will work one by one through tasks until completion. As for delays, the female students are most likely to face delays. Male students often process difficult things at the last minute while female students may not be able to solve difficult things in the middle and get stuck with, which may ultimately cause delay in completing tasks.

In general, a higher proportion of female students carry out time management than male students. The main similarity between the male and female students is the clarity in achieving goals as well as completing tasks before the due date. However, neither male nor female students are satisfied with their time use and could not manage and use time effectively.

Time Management and Year of Study

From the perspective of the year of study, students of higher grade can use time more effectively. Senior students have fewer elective courses than lower grade students. Hence, they have considerable more flexibility and freedom in choosing electives. Students can take into consideration their daily routines for the scheduling of core courses. In view of the five factors of time management, students with more seniority present higher effectiveness in time management and they will have better organization and planning skills to enable them to effectively utilize time. In terms of attention, students with higher grade tend to be more focused while spending less time on errands or allowing themselves to be interrupted during work. In terms of action though, students with higher grade have lower accomplishment in terms of timely completion of work and completion of important tasks before the due date. Furthermore, in terms of planning, students of higher grade are less likely to routinely record to-do lists or draft plans. In sum, students of higher grade identify with effective time management. But for some reason, they could not complete work on time despite having plans for time management.

In terms of course content and teaching objectives, the teaching objective for sophomore design courses mainly focuses on teaching students to learn design through the process. Teachers have standardized the design process in terms of course arrangement, where students only need to follow each process, and implement relevant design operations and tasks. So, most students can complete the goals on time. When they become juniors, the focus of courses will change. The learning objective of the course transforms from learning design procedures toward an emphasis on capability in design practices. The project themes and implementation are different from those of the sophomores. Students are encouraged to move toward independent thinking in the course and have more flexibility in terms of design and speed requirements. The senior courses are mostly project-based design, where students are required to complete graduation projects independently. Students can control the theme and progress by themselves. This could lead students to understand time management, although the many uncertain factors stemming from project design could make it hard to follow the original schedule and therefore impede progress to complete all tasks on time.

Design students are faced with many problems in learning. Time management is one of the most important factors. This study emphasizes time management attitudes and behaviors. The research results show the following propositions which merits further discussion. For example, is there any relationship between time management and learning outcome? Does time pressure affect the attitude and behavior of time management? There are many issues which should be explored in design education, and further research is clearly required.

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Normal Creativity: What 1,038 t-shirts can tell you about design education

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Abstract: *The study of creativity in design has tended to emphasise its value, scarcity, and location in the individual designer rather than in choices made by a consuming public in the context of a wider culture. This paper, in presenting and developing a view of creativity in design as a normal concept, will present initial results from a study of 1038 student design assignments obtained from a distance-learning course in Design Thinking from The Open University in the UK. We show how 'normal' distributions of design outputs can be contived from a structured design process and argue that the creativity that is displayed is a natural result of the 'grammar' of that process, in a similar way to the syntax of a sentence allowing new combinations of words and meanings to be easily formed. Seen like this creativity is less of an individual 'gift', as some theories imply, but a common everyday response to open-ended problems.*

Keywords: Creativity, assessment of creativity, originality, design process, design education, design assessment.

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Introduction

The study of creativity in design has tended to emphasise its value, scarcity, and location in the individual rather than the wider culture. The idea of the 'creative genius', central to Enlightenment thinking, has cast a long shadow over our understanding of creative ability and led us to treat it more as a 'gift' than as a natural result of human diversity. This has been especially so in work looking at fine art, musical composition, scientific discovery, invention, and other areas where key moments of insight and outstanding technique were considered to have an element of magic about them. Poincaré's four stage model of creativity – preparation, incubation, illumination, verification – presented as a description of the creative process in the early 1900s, only served to reinforce this idea, with individuals operating in different disciplines readily using it to describe their own work and tacitly, or perhaps explicitly, propagating the idea of their own genius. There has been a body of work criticising the idea of 'sudden genius' (Robinson 2010) but studies of creativity (Mackinnon 1965; Sternberg 1991) have generally tended to focus on individuals qua individuals in explaining its nature and origin.

There are, however, more complex and alternative views of creativity that place emphasis on it being a more social and commonplace process (Coyne 1997), an effect of expected cultural types combined with a diverse population. In this respect, a more structuralist explanation based on grammars of creation (Steiner 2002) is an interesting development of Chomsky's famous sentence 'colourless green ideas sleep furiously' (Chomsky 1965) which illustrates that humans can be effortlessly creative if an appropriate grammar of production and understanding exists; we have no problem in creating sentences that we've never said before. Indeed there is evidence to suggest that just by telling people to be creative, when they are asked to solve open-ended problems, results in a more creative outcome (O'Hara and Sternberg 2001).

Applying these theories of creativity in education occurs largely at an instinctual level – that is, it will largely be the beliefs of the teacher that will be expressed explicitly and implicitly. A teacher who believes in a normative view of creativity will respond differently to those who might adopt a structuralist or relativist approach. The importance of the teacher's own perceptions of creativity are critical in the fostering (or stifling) of creativity in students (Craft 2006). In design education in particular, many of the prejudices and opinions we form as designers are transferred to teaching – whether these are explicit or implicit. One key example of this is the definitions we form of creativity and the assumptions we make about its articulation and operation.

Originality and divergence from expected norms are often cited as essential aspects of creativity – after all, what value might we derive from a solution that already exists? But in education, this must be tempered by the fact that *individual* creativity is the ability we wish to develop, an important aspect of the investment theory of creativity (Sternberg 2012). Educators would hardly call a five-year-old child uncreative for drawing a house with four windows and curly smoke coming from the chimney. To do so would be to significantly impede the progress of creative processes – drawing from imagination, communication, projection, representation, etc. This lies at the heart of Craft's notion of using 'wisdom' when considering creativity (Craft 2006).

A new Open University distance learning course in Design Thinking, launched in 2010, the details of which are described elsewhere (Lloyd, in press; Jones and Lloyd, submitted to this conference) provided us with an opportunity to look afresh at the idea of creativity in relation to design. The Open University has a unique demographic

among universities, being a provider of distance learning. Students of all ages study with the Open University, with a particularly high proportion of mature students; almost all students study part-time, and many work in full-time jobs across a wide range of professions. Furthermore, as the university doesn't require any previous level of qualification, students often have little experience of study in further education, and often low levels of confidence. This contrasts greatly with most conventional universities (and most universities where studies in creativity are carried out with students as participants) where first year design students often have existing creative qualifications, tend to come from a similar age group, and have shared values and backgrounds.

To some degree, then, the population of first year Open University students might be considered more demographically 'normal' than a first year cohort in a conventional university, certainly in terms of age and providing a broad cross-section of society. That has provided us with a unique opportunity to study creativity in design from a slightly different, perhaps more naïve, perspective in determining what 'normal' creativity might look like. To date, over 2000 students have studied the Design Thinking course and that number, together with the fact that students all have to submit their work online, to the same format, presents an opportunity for a large scale analysis of the work they have produced.

This paper presents results from an exploration of data regarding a design assignment to design a T-shirt. We first describe the 'participants' in the study, 1038 students whose T-shirts were looked at. We then describe the design task and lay out our method of analysis, before presenting the results in a number of bar graphs that deliberately contrive normal population distributions. We have used the data generated, and the means of generating it, as a tool to consider more philosophical questions about the nature of creativity in terms of its production and consumption. Our central question, however, has been to find out what creativity might look like, or how it can best be represented, across a large population of design students.

Method

Participants

Students from three cohorts of the first undergraduate level Design Thinking course (U101) were treated as participants in this study. 314 students completed the course in 2010, 493 in 2011, and 272 in 2012, making a total of 1079 students who had submitted a T-shirt for their first design exercise.

Across all cohorts, 47% of these students were female, and 53% male. The average age was 30-39, with an age range from 16 to over 65. 12% of students had a registered disability. For 40% of students, U101 was their first Open University course ('new students'), while 60% had studied other courses at the Open University ('continuing students'). A proportion of students had experienced some kind of creative education, some in higher education, though the majority had not. The vast majority of students (more than 95%) studied the course part-time.

Task

Students studying U101 receive a creative welcome pack in the post, containing (amongst other things) a white T-shirt and a sheet of A4 T-shirt transfer paper – see Lloyd (in press) for further details. These are used for their first design assignment of

the course, completed over a three week period, 5 weeks after course start. The three week assignment follows a prescribed design process (shown in figure 1) with an exploration phase, a concept phase, a detail or proposal phase, and an evaluation phase. Students record their activity in each phase, and add it to the 'nodes' of Figure 1 using the specially created software environment CompendiumDS.

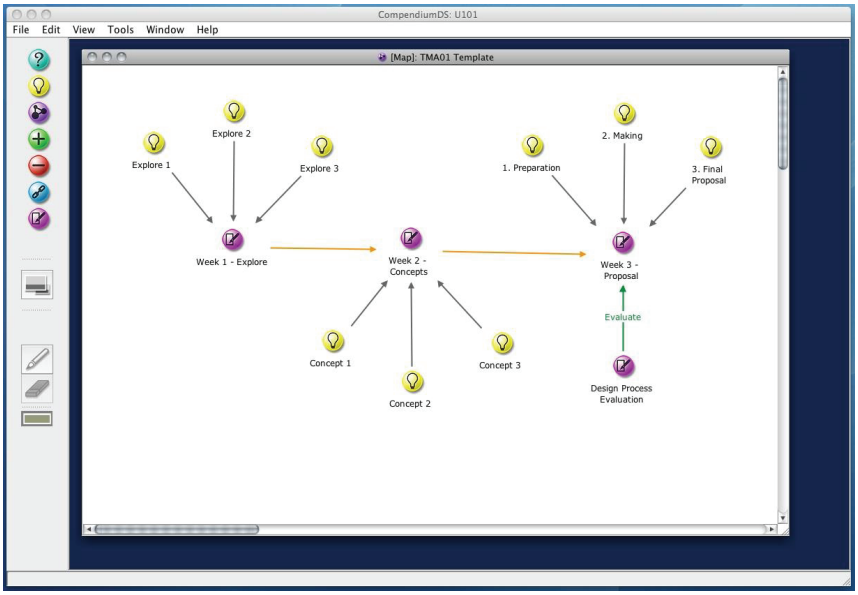

Figure 1. The design process for the T-shirt design task. Students record their activity with images and text and add these to the nodes of the figure during four phases of design: exploration, concepts, details, and evaluation. Each phase consists of three alternative directions.

The overall task in creating a T-shirt is to use the hand as an inspiration, and tracing around photos as a method of drawing. For the exploration phase students are asked to consider: (i) a particular aspect of their hand, (ii) a story about their hand which might involve a particular object, and (iii) a gesture that they make with their hands. For each aspect they are asked to take a photo. Figure 2 shows an example photo that students are shown for part (i) of this phase.

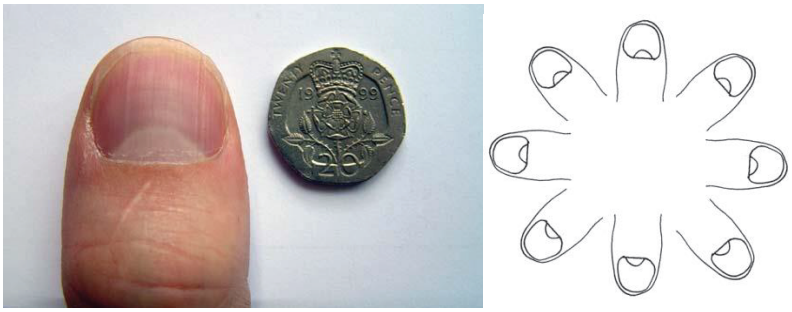

Figure 2. Example images for the 'observation' concept source: a photo of a thumb (left), and pattern derived from tracing the image (right).

In the concept phase students are asked to take each of the photos they produced in the exploration phase, trace round them on paper, and then develop each one in simple ways – with (i) pattern, (ii) colour, and (iii) text. Figure 2 shows an example that students are shown for part (i) of this second concept phase.

In the detail phase, where the students make their design proposal, they are directed to choose their favoured concept and develop it further before they print it on to the T-shirt transfer paper and transfer it to their T-shirt. One of the ways in which further development is suggested, if students are having trouble choosing, is by combining concepts from the second phase of their design process. Once printed the students transfer their design on to their T-shirt with a hot iron and then complete a final design process evaluation.

Once all phases are completed and their design activity added to the nodes of figure 1, students then submit their CompendiumDS 'maps' for assessment. During their design process students use an online design studio and portfolio, and when they have finished their T-shirt assignment they upload a photo of it into their portfolio. This photo is available for all other students (and tutors) to view once it has been uploaded, which is not necessarily after the cut-off date for the assignment. The assignment is assessed on their design process, not on the quality of their T-shirt outcome.

Analysis

Our analysis centred solely on the T-shirt outcomes that were produced from the design task. In thinking about how to analyse these we decided on two types criteria: objective criteria related to both the task and the classification of the T-shirts; and subjective criteria related to the quality of the T-shirts themselves. This provided us with a corpus of data reflecting production, output, and consumption, our underlying theory being that 'creativity' resides in some combination of these things.

For the main objective criteria we classified T-shirts by:

- Concept source (observation, story/object, gesture, unknown)
- Centre placement (yes, no)
- Multiple transfers (yes, no)
- Use of text (yes, no)

T-shirts were further broken down in the 'concept source' categories of 'gesture' and 'story/object':

- Type of gesture

- Type of object

Figure 3 shows examples of T-shirts from the four concept source categories. Figure 4 shows examples of all eight yes/no combinations of centre placement / multiple transfers / use of text.

Figure 3. Example T-shirts showing concept sources: observation (top left), gesture (top right), story/object (bottom left), unknown (bottom right).

Figure 4. Example T-shirts illustrating every combination of centre placement (Y/N), multiple transfers (Y/N), and T-shirts containing text (Y/N). Clockwise from top left: NYN, NNN, NYY, YNY, YNN, NNY, YYY, and YYN.

For the subjective criteria we classified T-shirts on one quality dimension:

- Would you purchase the T-shirt? (potentially, maybe, probably wouldn't)

An initial selection of 25 T-shirts was collated to pilot the classification criteria with two raters (the authors of the paper) and to discuss their relevance in the light of example T-shirts. Good agreement was obtained for the concept source category though some development of definition was required.

A pre-selection menu of 10 popular gestures was made for the gesture sub-category, with an 'other gesture' option provided along with a further gesture description field. No pre-selection menu was set for the story/object sub-category, but a description field was provided.

Excellent agreement was obtained for the 'centre placement', 'multiple transfers', and 'use of text' criteria so these were unchanged. There was some disagreement in the subjective criteria of quality. This was as expected, due to differences in taste, but the category wording was amended to provide a subtler gradation in quality rating ('potential purchase', 'maybe', 'probably wouldn't purchase'). From the pilot, three categories were thought to be a sufficient discriminator of both the quality of T-shirts, and of rater taste.

A total of 1038 T-shirts were classified, 500 by rater 1, and 636 by rater 2. This meant that 102 T-shirts were classified by both raters, providing further data about rater agreement. Both raters had, over the three years of the course, some familiarity with a small proportion of the T-shirts, but this was not thought to present significant problems to rater objectivity.

Results

Rating agreement:

Table 1 shows the level of agreement obtained between the raters for the 102 T-shirts that were rated by each rater.

Table 1. Rating agreement for T-shirt rating criteria.

Rating Criteria	Level of Agreement
Concept source	73.5%
Centre placement	89.2%
Multiple transfers	96.1%
Text	92.2%
Quality	44.1%

The criteria of concept source had slightly less agreement than was expected. On further analysis there was a 17.7% difference in interpretation (where raters could agree to either rating category) and 8.8% attributable to either genuine disagreement or a category error. Agreement about quality, at 44.1% was in line with expectations as well as the results from the pilot study. Three 'potential purchases' were agreed upon and these are shown in Figure 5.

Figure 5. The three T-shirts out of a sample of 102 where both raters agreed with the judgement 'potential purchase'.

T-shirt classification

Figure 6 shows the distribution of T-shirts by concept source. The expectation had been for a relatively even distribution between concept sources, but Figure 6 clearly shows just over half the T-shirts deriving from the 'gesture' category. The potential fixation effect of showing images relating to the 'observation' category (Figure 2) appears not to have resulted in a choice for that concept source. This is an important finding for the continued use of this as a formative and summative assessment – we are now able to confirm that students, on the whole, are not fixating on examples given in the assignment description.

The choice of gesture might be due to apparent simplicity – especially in photographing and tracing – but it is not obviously easier than other concept sources. One possible explanation might be to do with student confidence, where the perceived need to communicate their idea may play an important role. By using symbol, gesture or text as a familiar element of language, students might be relying on these familiar modes of communication to gain confidence in representing their ideas in an unfamiliar environment.

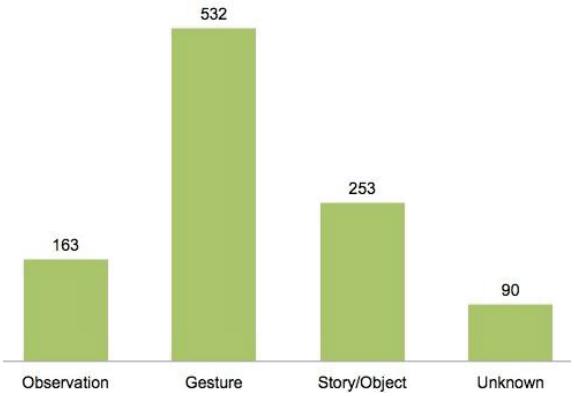

Figure 6. Distribution of T-shirts by concept source

The 'type of gesture' sub-category is broken down in Figure 7, for all 532 T-shirts choosing gesture as a concept source, and where the gesture count was greater than 4. The expectation was that 'thumbs up' and 'ok' gestures would be most popular, but the range of gestures (88 in all) was a surprise. Gestures that we had preselected for categorisation did prove among the most popular though gestures figuring in the 'other gesture' category, notably a heart and animal shape made with the hands were equally as popular.

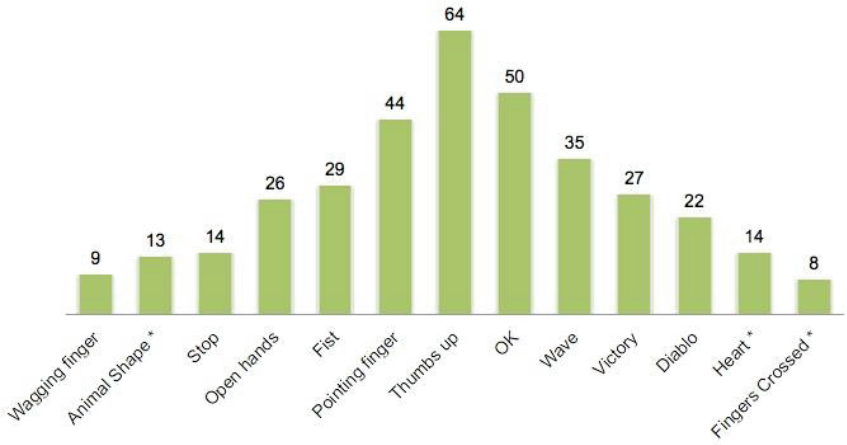

*Figure 7. Breakdown of different gestures in the 'gesture' concept source. *denotes gestures that were not in the original pre-selection for raters.*

The second most popular concept source was story/object and the most popular objects that were used in the T-shirt designs, scoring a count of more than three, are broken down in Figure 8. We had expected that pens and pencils would figure prominently, but we hadn't expected the guitar to be quite so popular. Figure 8 indicates that object examples were proportionally less popular than gestures (i.e. the most popular gesture was just over three times as popular as the most popular object), and the range of objects depicted much wider (132 in total). What was a surprise was

how natural and obvious objects seemed once they were seen, although being difficult to predict in advance.

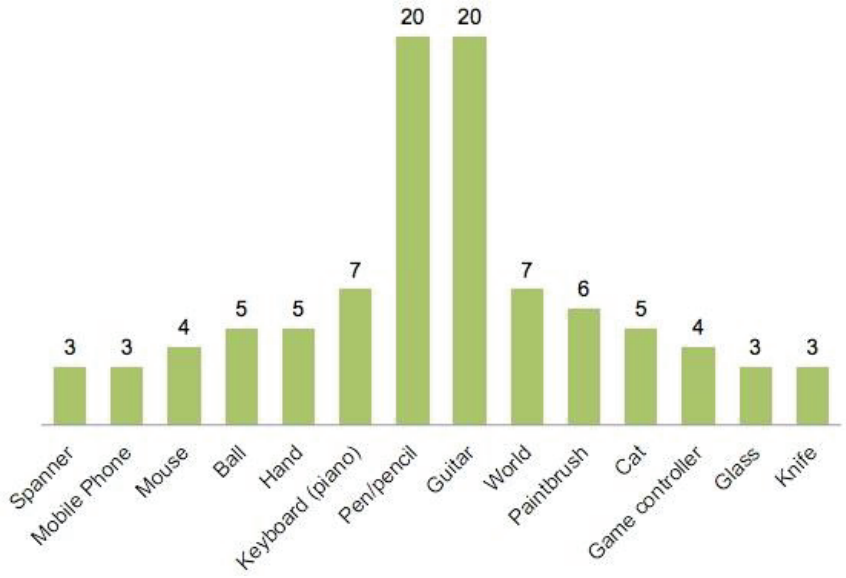

Figure 8. Most popular objects for the story/object concept source.

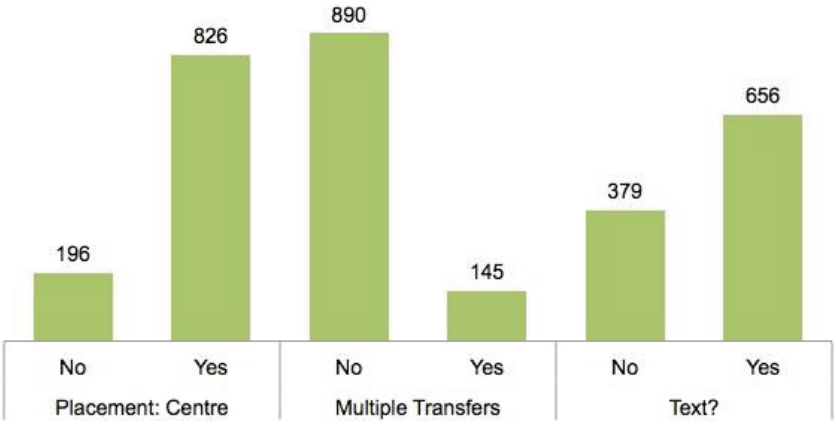

Figure 9. Distribution of T-shirts by centre placing (left), multiple transfers (middle), and T-shirts containing text (right).

Figure 9 shows the raw distribution for the 'centre placing', 'multiple transfers', and 'use of text' criteria, with Figure 10 showing the distribution of all combinations of these criteria.

Our assumption was that centre-placement and one transfer would be the norm, with a preference for the use of text, and this was borne out in the data (the YNY

category). One central motif on a T-shirt with or without text is by far the most popular means of presentation for T-shirts on the market, so it was no surprise to see student T-shirts reflecting this. What is perhaps surprising is that 24% of T-shirts, one in four, deviated from this norm. It may be possible that students, too, realise this and deliberately choose solutions that obviously express this deviation, believing that 'different is creative'.

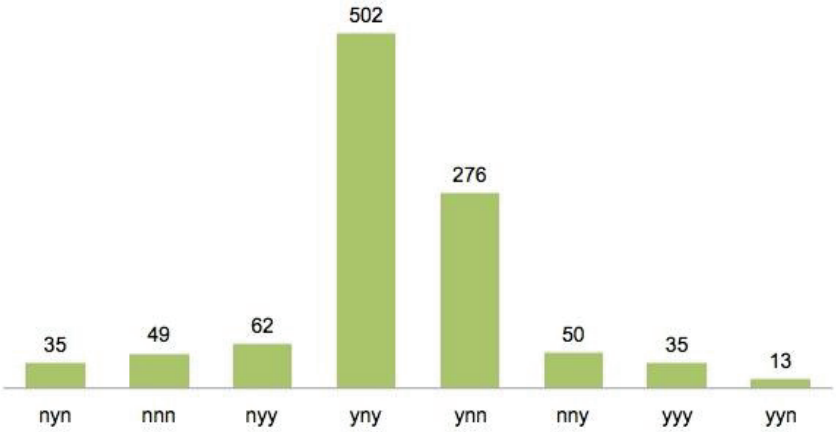

Figure 10. Percentage distributions of all combinations of centre placement, multiple transfers, and T-shirts containing text.

Finally, figure 11 shows how the two raters compared in their judgements about whether or not T-shirts were potential purchases. Overall rater 2 tended to like more T-shirts than rater 1, categorising 58% in the 'potential purchase' and 'maybe' categories against rater 1's 38%. Both raters recorded similar levels of 'potential purchase' judgements however, 12% for rater 1 and 16% for rater 2, roughly 1 T-shirt in 7 for both raters. This might indicate some kind of tacit expectation on the part of raters that achieving a certain threshold quality should be uncommon, but not rare. The ratio of 1 to 7 appears appropriate in that respect.

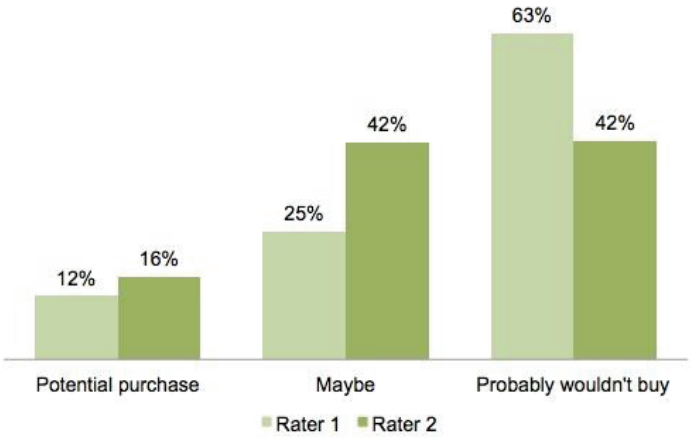

Figure 11. Judgments about T-shirt quality by rater.

Discussion

The results as presented provide a snapshot into a student population that we have argued is more 'normal' than most design student populations. Obviously students self-select to study a course in design, so the student population presented here could not be said to be representative of the population as a whole, but there is an argument that they better represent the demographic of the general population than do many other courses in design, particularly in terms of age, general qualification, and vocation.

We started the paper by contrasting two views of creativity. One view considered creativity as some kind of 'gift' while the other view considered creativity more as a commonplace activity; a human response to being set a structured but open-ended problem. Clearly the data reveals that there are differences in the quality level that students achieve, which would indicate varying levels of ability and the possibility that some students have more of a 'gift' than others. What we think the data shows is that 'the gift', whatever that is, is normally distributed. Some students have a lot of the gift, perhaps as a result of previous experience, while some have less of the gift, perhaps those new to creative work. But in completing their T-shirts, and with a task that takes out what students consider to be specialist design skills like drawing, all students demonstrated creative ability at some level.

The idea of creativity as a normal thing is reflected in the deliberately contrived way in which we have presented our analysis as distributions of data. Figures 6, 7, 8 and 10 can all be interpreted as a kind of bell curve, a classic distribution of a normal population, though this is merely a presentational choice for discrete data – there is no defined independent variable in these graphs. Rather, the graphs show that there is a stable preference for certain forms and ideas and that a 'norm' can be projected on to the data, although even when considering a popular idea like the 'guitar' object the range of responses, in terms of quality, belies that classification. Normal, in this instance, seems to be much more of an expectation for the people rating the work.

The second view of creativity, and the kind of explanations it implies, seems, in our view, to account for the data much more comprehensively. For example, the task we gave had a predefined 'grammar' to it; a prescriptive process that students couldn't

help responding to creatively. In this sense creativity is the natural outcome of committing to a defined process, and the course provides the necessary framework for that commitment. Indeed, one of the most popular comments from students, to the extent that it became commonplace for tutors marking their work, was that they didn't realise that they were capable of achieving what they produced.

Among many comments are those that show surprise at how much creativity can be generated from such a simple exercise and it is this very simplicity of structure that provides students with the opportunity to generate such variation. By providing a clear, activity-based design process, students are able to 'trust' the procedure but at the same time diverge in their thinking along a number of routes. Students consistently raise concerns prior to this assessment about their artistic abilities and lack of imagination. At the end of the activity they are beginning to realise that it is the act of making as thinking (doing) and trust in the process (committing) that really matters.

In terms of task there are some possible effects that need to be taken into account. The first is the use of an online design studio where students could upload images and photos of the T-shirts they were working on, as well as including an image of their final design at a point before the official assignment cut-off date. What happens in this space (see Jones and Lloyd, this conference) is social; students see the completed work of others and have these outcomes available as exemplars for their own work – in terms of method, technique, or more generally as inspiration. That means that students, unsure of their own 'creativity' and what to do, draw on the work of others. Such a mechanism could have several potential effects. Overall, it may drive up quality – however we define that – but there is also a possibility of fixation and, on a larger scale, a coalescence to a more restricted norm. It could, of course, have the opposite effect. Students may deliberately position themselves against what they see by, for example, choosing different placements and numbers of transfers for example. If both effects were the case, they would tend to cancel each other out, but this social aspect to the task should be noted. In relation to the two views of creativity, online activity could be argued both ways. Students might orient themselves to what they perceive as 'gifted' students, reinforcing the aura of individual genius; equally they may draw succour from the sheer numbers and variations they perceive in thinking of themselves as 'normal'.

The influence of the raters is another factor to take in to account. The categorisation scheme we developed had both objective and subjective elements to it and in piloting the scheme we were aware of some differences, particularly in the 'concept source' category, that then needed further definition and examples for clarification purposes. The data in the final study, although having less agreement than the more objective criteria of positioning, multiple transfers, and use of text, was thought to be good, particularly for an initial exploration of the data. Were we to obtain independent raters to categorise the T-shirts in developing this study it would be interesting to see the level of agreement. Ideally we would also have liked to have categorised all T-shirts by two raters, rather than a sample of 10%. Time was a factor here, and is also something that would be addressed in developing this study further.

The disagreement in judgments about quality was expected, and would be expected in further study. What was interesting was the broad agreement of the 1 to 7 ratio for identifying T-shirts as potential purchases. That figure would be used as a hypothesis in a further study to determine whether it applied more widely, to other people assessing a large number of creative objects of a type, and with varying experience of design. The idea that we 'expect' to be drawn to 14% of the things deriving from a creative task

seems to balance out a need to experience novelty against a need for rough similarity. Creativity, then, could be said to lie more with the consumer who chooses the T-shirt, rather than with the designer whose task, in this formulation, is to provide novelty around the top of the bell-curve – 'most advanced yet acceptable' in Raymond Loewy's phraseology (Loewy, 1951). There are various ways of achieving that. One is by presenting a surprising idea, but more often than not factors like quality of detailing, presentation of image, and even the type of model, played a role in the purchasing decisions of the raters. That won't be a surprise to anyone familiar with the marketing literature, but it does diminish the 'creativity as a gift' view. The point for design education is that these things can be taught, and easily taught. We have not attempted to teach students about creativity in their T-shirt task, rather we have assumed that creativity will take place in teaching them about the process of design.

This is the irony of the idea of creativity as originality – it relies on a 'normal distribution' in order to identify the outliers. Just as we as individuals rely on the society and context within which we live to construct who we are, the creative object also relies utterly on those objects around it to provide contrast. The prejudices we all hold towards creativity are then projected and expressed in the distribution of 'normal creativity'.

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Creativity in the subject Art and Crafts: the weak link between learning and assessment

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Abstract: *This paper explores the assessment of creativity in the Norwegian school subject Art and Crafts. Creativity, or its sibling, originality is frequently used as an assessment criterion in assignments given to pupils at the level of lower secondary education. Written assessment criteria contribute to the public face of the subject, revealing core values to pupils, parents, headmasters and politicians. I have studied the assessment repertoire of teachers when negotiating final grades and legitimising their assessment practice in interviews.The teachers struggle to find words to describe what makes pupils' design creative or original. Creativity seems to be something that just happens or not. Some pupils come up with design solutions that fit the teachers' specifications; others remain frustrated and have to ask for the teacher's help, which they know from previous experience will lower their grade. The teachers find themselves caught in an educational trap: If they aid the pupils, they could end up assessing their own ideas. Without help, some of the pupils would not proceed from the drawing table to the making of objects. In this, I identify a paradox: one of the subject's undisputed diamonds, creativity, has a weak link between learning and assessment.*

Keywords: Assessment, creativity, lower secondary education.

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Assessment of creativity

This paper explores the assessment of creativity in the Norwegian school subject Art and Crafts. Creativity, or its sibling originality, is frequently used as an assessment criterion in assignments given to pupils at the level of lower secondary education. Written assessment criteria contribute to the "public face" (Eisner 1991, p. 85) of the subject, revealing core aspects and values to pupils, their parents, headmasters and politicians. I have studied teachers' assessment repertoire when negotiating final grades and legitimising their assessment practice in interviews. The discussion in this paper is a continuation of my PhD thesis (Lutnæs 2011). I revisit the fieldwork with the scope limited to the assessment of creativity. When I trace the teachers' descriptors of creativity, it emerges as a volatile concept in their assessment repertoire. The teachers struggle to find words to describe what makes designs by their pupils creative or original. Creativity seems to be something that just happens or not. Some gifted pupils come up with spontaneous and unique design solutions that fit the teachers' specifications. Others remain frustrated and have to ask for the teacher's help, which they know from previous experience will lower their grade. If they make an object based on an idea by their teacher, they miss the opportunity of being awarded as creative. With assessment criteria such as originality and creativity, the teachers might find themselves caught in an educational trap: If they aid pupils, they could end up assessing their own ideas. Without help, some pupils would not proceed from the drawing table to the making of objects. In this, I identify a paradox: one of the subject's undisputed diamonds, creativity, has a weak link between learning and assessment.

The public face of connoisseurship

The assessment of pupils' work is an act of connoisseurship and educational criticism, between which Elliot Eisner (2002) makes a distinction in his book *The Arts and the Creation of Mind*. Connoisseurship is a process that can be carried out in solitude and without uttering a word. Educational criticism is the task of making public what one has experienced as a connoisseur and requires words (Eisner 2002, p. 187). As the silent act of connoisseurship can be elusive as an empirical material, I have studied the "public face" (Eisner 1991, p. 85) of connoisseurship, educational criticism. More specifically, I observed two teams of teachers when negotiating pupils' final grades and interviewed them regarding their assessment practice. The grade given in the subject Art and Crafts equates with grades given in subjects such as English, Science and Norwegian in the certificate awarded to all pupils when they leave the ten-year compulsory school. The grades that the teachers make use of range from 1 to 6, with 1 the lowest grade and 6 the highest. The current curriculum, "Knowledge promotion" (Kunnskapsdepartementet 2006), provides learning objectives, but does not state expected levels of achievement as is done in e.g. Sweden and England. The development of assessment criteria that echo the complexity of the main subject areas visual communication, design, art and architecture, is part of each teacher's professional responsibility. In my study, the assessment vocabulary of Art and Crafts teachers came to be a main focus, which grew more relevant due to a reform of Norwegian teachers' assessment practice.

The tail of underachievers

I started out as a PhD candidate in 2006. At that time, a reform initiated by the Ministry of Education and Research was in its first phase. The aim was to improve the assessment practice in Norwegian schools and the reform had its origin in a governmental vision. That is, education is regarded as a tool to reduce differences in society. A national goal and overriding principle is to provide equal opportunities in education regardless of abilities, age, gender, skin colour, cultural background, place of residence, parents' education or family finances. Everyone should have the same possibility of developing themselves and their abilities (Norwegian Directorate for Education and Training 2008). An Organisation for Economic Co-operation and Development (OECD) report published in 2005 concluded that the Norwegian compulsory school system produces a tail of underachievers. In comparison with international peers, 15-year-old Norwegian pupils underachieved, and one reason was seen to be a culture in which children are under-challenged:

> We believe that one of the reasons for underachievement at age 15 may be the predominance of a culture in which children are under-challenged. We have been impressed by the quality of care provided for children, the emphasis on social development and the priority given to out-door play, but worry that expectations about intellectual development are too low (Mortimore 2005, p. 52)

To know if a pupil falls behind, tools are needed to monitor their learning progress. As a means to change the culture in Norwegian classrooms, the OECD report recommended clearer subject standards in the curriculum and to establish a research project to consider the implementation of age-related subject benchmarks. The portrayal made by the OECD report was supported by research. There was a lack of subject-related feedback in Norwegian classrooms. Stars, smileys and comments such as "good" and "nice work" without subject-related information on progress and achievement were common (Klette 2003; Furre et al. 2006; Dale and Wærness 2006). This was considered to be a threat to the vision of equity in education, as unclear, diffuse and implicit assessment criteria are more easily decoded by pupils with highly educated parents (Norwegian Ministry of Education and Research 2006, p. 7).

As a solution, the Ministry of Education and Research launched an assessment reform seeking to facilitate a more subject-related and fair assessment practice. The research project recommended by the OECD report was established with the optimistic title "Better assessment practice". Its mission was to give the Ministry of Education and Research an answer to the question of whether age-related subject benchmarks ought to be implemented or not. The benchmarks were called assessment criteria of goal achievement and surfaced as rubrics articulating expectations at three achievement levels low, medium and high. However, the assessment criteria developed as part of the research project were not applauded as functional descriptors of quality in pupils' performances by the participating teachers. Briefly described, the ambition of implementing national assessment criteria in all subjects was reduced to the development of voluntary criteria of goal achievement in four subjects (Utdanningsdirektoratet 2009, p. 25).

Curricula in terms of evaluation

National assessment criteria of goal achievement were not implemented, but if you visit a lower secondary school today, you are likely to find an extensive use of rubrics similar to the ones tested in the research project. A trend has spread across the

schools of Norway: teachers make rubrics articulating expectations at a low, medium and high achievement level. Rubrics with levels of achievement are used as a tool to meet the new regulations on individual assessment (Kunnskapsdepartementet 2010), and include the following: 1. The pupils shall know the learning objectives and what the teacher will assess, thus the teachers must verbalise their subject-related expectations. 2. The goal of formative assessment is to enhance learning, thus the teachers must explain their assessment and give pupils advice for future learning situations. 3. The pupils shall participate in the assessment of their own work and progress in all subjects, thus assessment must be translated into a vocabulary that pupils can understand and use. The new regulation has put pressure on the assessment vocabulary of teachers in all subjects. In his paper *Political Governing and Curriculum Change*, Ulf. P Lundgren, a Swedish professor in pedagogy, stated, "Curricula are now expressed in terms of evaluation" (Lundgren 2006, p. 12). The current assessment reform challenges all subjects to express their curricula in terms of evaluation. Two sets of assessment criteria published in the Norwegian journal of Art and Crafts teachers, *FORM*, illustrate the change in detail after the reform:

2001

Assessment criteria

1. Creativity in design
2. Functionality
3. Craftsmanship

Andersen, Dagi. 2001. ”Noe å sitte på”. *FORM.* 35 (2) p. 24–25, my translation.

2010

Local objectives	Criteria of goal achievement		
	Low competence	Medium competence	High competence
Make a photograph	I can make a photograph of a jump with a pre-adjusted camera	I can adjust the camera and photograph a jump	I can choose adjustments on the camera and make a photograph of a jump that emphasises speed and action
Manipulate pictures in Photoshop	I can use the lasso tool to separate the jumper from the background put the jumper into an artwork talk about some of the tools that I used in Photoshop	I can combine the lasso tool and the magic wand to separate the jumper from the background with accuracy adjust the size of the jumper, position, colour and contrast to match the artwork describe how the tools that I have used in Photoshop work	I can separate the jumper from the background with great accuracy manipulate the picture of the jumper to underline the visual elements in the artwork explain my choices of tools and adjustments in Photoshop
Talk about elements and principles of design	I can point at some similarities and differences concerning visual elements in the artwork and the manipulated photo	I can describe some similarities and differences concerning visual elements in the artwork and the manipulated photo	I can explain my choices of visual elements in the manipulated photo

Moe, Eivind. 2010. ”Hopp – bildemanipulering av kunstbilde”. *FORM*. 44 (3) p. 16–17, my translation.

Figure 1 *Assessment criteria published in Norwegian journal of Art and Crafts teachers, FORM.*

In fact, the teachers have ended up developing the rubrics that the Norwegian Directorate for Education and Training were supposed to provide. To develop rubrics demands a lot of spare time, not exactly the core characteristic of teachers. As Kajsa Borg points out, “Teachers, of all categories assess what they have vocabulary for, instead of developing vocabulary for those aspects that should have been assessed” (Borg 2008, p. 209, my translation). My fieldwork came to an end before the rubric

trend hit and was analysed as the reform evolved. In the thesis, examples of assessment vocabulary available in the field for Art and Crafts teachers to make use of at a critical moment are documented. What was the status quo regarding the assessment vocabulary of Norwegian Art and Crafts teachers? Does the assessment vocabulary demonstrate the vigour needed to cope with the reforms' demands?

Fieldwork amongst best practice teachers

I chose to do fieldwork amongst two teams of best practice Art and Crafts teachers. The concept, best practice, refers to profiled, educated, experienced and admired teachers. My agenda as a researcher was to explore what teachers valued after ten years of compulsory education in the subject Art and Crafts. The fieldwork was limited to the negotiation of the final grade, summing up the pupils' achievements after ten years of compulsory education in the subject Art and Crafts. I was in the midst of the teachers' assessment practice for nearly two months, attending their meetings, listening to their negotiations, conducting interviews and collecting the assessment tools they used. This combination of methodology was chosen to thoroughly document the challenges and dilemmas of assessment in the subject, and the vocabulary and strategies teachers draw on to solve them. Etienne Wenger's theory (1998) on the negotiation of meaning in communities of practice provided the concepts used in my research questions. I analysed the two teams of teachers as communities of practice, locally negotiated regimes of competence, and focused on their assessment repertoire.

Etienne Wenger makes a distinction between the repertoire the members of a community of practice have produced and the repertoire they have adopted (Wenger 1998, p. 83). When assessing the work of their pupils, the teachers can draw upon the history of their profession, and thereby adopt earlier solution strategies and concepts used as descriptors of quality. They also have their own history of negotiations to reuse as a repertoire when they face similar dilemmas of assessment, e.g. what grade should they give products they suspect to be finished by mom? These histories of interpretation create shared points of reference, but, as Wenger states, "they do not impose meaning" (ibid.). As a resource for the negotiation of meaning, the repertoire remains inherently ambiguous; ambiguity is a condition of negotiability. The teachers negotiate what part of history to make "newly meaningful" (Wenger 1998, p. 137) when assessing pupils' work within their local school context and current national curricula. On the one hand, ambiguity makes the negotiations of quality in pupils' work more difficult, while on the other hand, it legitimises the connoisseur, educated Art and Crafts teachers who know the repertoire of the practice. In the thesis, I discuss the two teams of teachers' assessment repertoire in light of the present curricula and historical texts. In this paper, I revisit the fieldwork with the scope limited to the assessment of creativity.

Creativity as a volatile concept

When they negotiated the pupils' final grades in the subject Art and Crafts, all the teachers valued craftsmanship. They expected the technical conventions explained in class to be repeated in the objects made by their pupils. However, it was not sufficient to demonstrate excellent craftsmanship by copying an idea of the teacher or fellow pupils. In order to achieve the highest grades, the pupils were expected to develop their own, original designs, to add their own creative twist to the objects in question. As I analysed the teachers' assessment repertoire, a distinction became apparent. They all had a well-functioning linguistic repertoire related to the assessment of technical

performances, but struggled to find words to describe what made pupils' designs original or creative. Their struggle is an indicator of an assessment repertoire that can cause the teacher problems when giving criticism. How can the teachers promote creativity if they lack words to identify achievements? How can they help pupils see what they otherwise might not have noticed and, if not noticed, not understood (Eisner 2002, p. 187)?

Creativity and originality are described as assessment criteria in both assignments and the rubrics used by the teachers to document their assessment of pupils' work. These concepts appear as a prioritised aspect of pupils' work in the subject Art and Crafts. In the interviews, the words creativity and originality are used interchangeably, directed towards the outcome of making, not the process of innovative problem solving. Their mutual foci point seems to be the following question: Is this object made by my pupil creative/original? In the following section, I will describe two cases from the fieldwork. The point of departure will be the assessment repertoire of the teachers and as I discuss the challenges they face, I will introduce prior research and definitions.

In a group interview, a team of three teachers started an extensive discussion when I asked them to describe what they put value on concerning the assessment criteria for creativity in their assignment on contemporary art. The teacher who first answered linked the assessment of creativity to the subjective preferences of each teacher. Creativity depended on what the teachers liked, identified as "exciting and resilient" (Lutnæs 2011, p. 186). This descriptor makes quite an unpredictable compass for the pupils and I continued by asking the teachers how they explain the assessment of creativity to their pupils. Another teacher stated that creativity is about creating the new, to create something that is new to you. With this approach, creativity depends on the pupils' earlier achievements. Two seemingly identical works would be given different grades, a low score to the pupil that just replicated a previous success and a high score to the pupil that freshly unpacked the same concept.

My next step as a moderator of the discussion was to reactivate the teachers' preferences as a compass when assessing creativity by asking the question; what if a pupil made something "new to him or her" and the teacher did not like the design? The third of the teachers participating in the group interview replied, "You do not even need to like it, but you could be surprised" (Lutnæs 2011, p. 187). The moment of surprise as an important aspect of creativity was supported by another teacher as he gave examples from art history of works that had surprised in their time. He explained that new surprising artworks come as a result of previous artworks; it is a twist, a response to history, and he continued by saying, "If you have that skill, then you are creative" (Lutnæs 2011, p. 188). I remarked that it is demanding for pupils in tenth grade to reach this level of performance. The teachers agreed and returned to their "creative for you as an individual" path, but as their discussion evolved, they ended up degrading this as relevant assessment evidence; they claimed to assess the pupils' products as they are, and not by comparing them to the pupils' previous design processes.

In summary, creativity emerges as a volatile concept in their assessment repertoire, an unpredictable element of surprise to the pupils. The teachers were not able to identify a robust set of descriptors they could agree upon related to creativity in their joint assignment on contemporary art. With this appearance as nothingness, creativity seems more like a buzz word, an ornament on the subject's public façade than the public face of Art and Crafts teachers' connoisseurship. To put it simply: they see

creativity in the designs of their pupils and assess it, but when it comes to the task of making their experience public, they lack words to describe it.

Originality in works of pupils

At the other school I visited as a researcher a teacher used the word originality when assessing objects in wood. In the individual interview, she told me that assessment of originality is limited to the varieties within the class and the school, not the whole world. It is not regarded as original if pupils copy an idea they have seen in the previous year's exhibition or one of the teacher's examples. To assess whether pupils' works are original or not, one needs in-depth knowledge about what happened during a project. This criterion makes the pupils' teacher the sole connoisseur. The teacher is the only one who knows what design solutions she or he made available in class as examples, not to speak of which one of the pupils originated an idea first. One need not be an Art and Crafts teacher for long to discover how ideas drift amongst a group of pupils, especially the ideas that are appraised by a teacher in class. Sharing ideas could be seen as a sign of a sound and dynamic setting for learning, but, as the awaiting assessment values unique and independent ideas as proof of originality, it could be recognised as a problem. The pupils tend to hide their sketches or to make sure that the teachers keep track of whom to award as the original and whom to discredit as the copycats.

The same teacher revealed doubt about the relevance of assessing originality in pupils' work, as when she appraises an idea of a pupil it usually turns out that the pupil has seen a similar object elsewhere. Then, she said, the idea is not original as first anticipated, and continued, "Maybe it is stupid to put as much value to originality as we do. Most things are already thought of. . . What is the good in always expecting works to be original? Maybe we should return to the practice where pupils replicated the teacher's models?" (Lutnæs 2011, p. 197). The teacher drew my attention to the pupils' works on the wall behind us and stated that all of them are slight variations of the same design —a design developed by the teacher. The pupils have redesigned the teacher's model and her doubt about expectations of originality is reasonable. This contrast between the verbally expressed intentions of originality and the practice of redesigning that goes on in the workshops have been previously discussed by Karen Brænne (2009). Compared to the actual practice of creating documented in her case study ALU 04/05 at a Norwegian University College, originality in student design is overstated by teachers and students. Brænne sees the concept of originality as a signal to the students that their design solution should not be an exact copy. The dominating representation in her case study is the practice of redesign. The objects that are made by the students all have obvious references to visual genres and cultural conventions. The students combine and reuse parts of what others have made before them and stand on the shoulders of earlier generations' experience. Still, this is not explicitly addressed or explored by the students or their teacher. They talk about originality and as Brænne concludes, a gap exists between words and action.

Jan Michl's paper "On Seeing Design as Redesign" is a key reference to Brænne's discussion. Michl's agenda is to adjust the education of designers to the practice that awaits them. He wants to challenge the idea that it is best not to be inspired by others amongst design students: "It is a fact that all designers, the outstanding ones as much as the mediocre or inferior ones, always build on, modify and continue the work of other designers, and that no one can avoid doing precisely this" (Michl 2002, p. 12). To aim for originality is to aim for unachievable goals. He launches redesign as a more

appropriate notion to the practice of designing to underline the collective and evolutionary dimensions of designing. Helene Illeris has a similar agenda in her article "Copying – You Just Aren`t Supposed to Do That!" related to the field of art. She argues that the ideal of originality in the works of students seems outdated compared to the practice of the contemporary artist, in which:

> … originality and creativity are nothing but the question of finding the right forms or objects from art or from just anywhere *outside* yourself to take/buy/copy/sample/reconstruct/emphasize/internalize/transform in some way ((Illeris 2000, p. 68)

To claim that originality and authenticity come from the inside of practitioners risks ". . . creating serious feelings of shame in students who do not have a gift for (simulating) 'originality'" (Illeris 2000, p. 68). Michl and Illeris both make the point that the ideal of originality, as creating from scratch, Michl and Illeris both make the point that the ideal of originality, as creating from scratch, is discarded by the professional field of art and design. Why then should art and design education at a compulsory school level still struggle with expectations of originality? Is not the expected little twist of change blown out of proportion? In my view, originality is a utopian aim for pupils, who are most likely making a first attempt to create within whatever specific field of art and design the teacher has introduced them to. According to the points made by Illeris and Michl, it would also be a misleading approach if one goal of the subject at a compulsory level is to educate knowledgeable and critical consumers of art and design. Still, what concerns me more is that the striving for originality obscures what could be learned by exploring prior objects and professional art and design practices. The ideal to create a product uninfluenced by others is counterproductive to learning. Michl illustrates this by a striking example:

> If a student makes his own originality his goal, he will try, logically and naturally enough, to defend his own individual artistic "innocence" against what he sees as harmful external influence. This leads to a fundamental hostility to learning – because learning always implies being influenced by others and acquiring other people's solutions and approaches. (Michl 2002, p. 12)

In my study, the teachers approach the assessment of creativity by looking at the pupils' objects and ask if they convey proof of independent or new design. Strange as it may seem, the less you are influenced, the less you build on previous solutions, the less you have learned from others, and the higher the grade you will get. This is not a valid reading of the teachers' assessment practice. It only appears to be the case due to the unresolved challenges of framing the concepts of creativity and originality in the subject. The pupils' designs cannot possibly be 100% original. To be considered as a successful object, an answer to the assignment given by the teacher, the design has to repeat conventions from art and design practices. It is the conventions that give an idea wings. As Arnold Hauser put it in plain words:

> Completely novel forms devoid of every conventional element are unsuited from the beginning to communicate thoughts and feelings. For if it is their originality which makes them worth communicating, then it is conventions which make them capable of communicating. (Hauser 1982, p. 39)

To be creative is not to do whatever you want – it is to solve a problem in a context. This context provides certain possibilities and hindrances, tools, materials and a history

of prior solutions to similar problems, a repertoire to adopt and redesign. Could the assessment of creativity be reframed in ways that acknowledge redesign? What if the focus shifted from the "new" in pupils' designs to an exploration of the repertoire they have built on? What if the exploration of this repertoire was awarded as creativity?

Don't give ideas to your pupils

Michl (2002) displays how the ideal of originality makes teachers' instruction difficult. In my fieldwork amongst Art and Crafts teachers, I found that the period of awaiting assessment further restrains teachers in the first phase of a project. With assessment criteria such as originality and creativity, the teachers find themselves caught in an educational trap: If they aid the pupils, they could end up assessing their own ideas. Without help, some of the pupils would not proceed from the drawing table to the making of objects. This dilemma is acknowledged by the teachers in my fieldwork as part of their daily life. True to a tradition that the initial idea should come from the pupils, the teachers express a fear of giving away ideas. Their strategy is to keep back and try to get pupils started by asking questions. If they have to give ideas away and a pupil makes a product based on exactly the same idea, the consequences take the form of a lower grade. It is stated as unfair of a teacher to assess such a product on the same level as a product based on an idea developed exclusively by a pupil. In the first phase of a project, the teachers are sidelined, patiently waiting for original ideas to pop up amongst the pupils. Then they could re-enter the stage and aid the pupils in the realisation of their ideas. As mentioned earlier, when it comes to craftsmanship, in a narrow understanding, as skills to make ideas real, the pupils are expected to reuse the technical conventions developed by earlier generations of makers. Strategies of construction and the use of tools to manipulate and transform materials into the intended object are free to copy. The ideal of originality is preserved in form and content. Originality is the assessment evidence of creativity, and seems to be something that just happens or not. Some gifted pupils come up with spontaneous and unique design solutions that fit the teacher's specifications; others remain frustrated and have to ask for the teacher's help, which, from previous experience, they know will lower their grade. This approach makes creativity something you are, an inherent ability the subject allows you to make use of, not something to learn and expand through Art and Crafts classes. The assessment evidence, which the teacher values as creativity, is not a continuum of a learning process planned by the teacher.

Reframing of the concept of creativity

The assessment of creativity in the teachers' assessment repertoire is linked with the assessment of the final object. Seemingly, they look at an object made by a pupil and ask, is this creative? Does this object convey proof of an independent design solution? The framing of creativity as independent ideas makes a weak link between learning and assessment. The teachers wait for unique ideas to surface in the pupils' sketches, while the pupils, caught in a culture that disparages sharing, protect their ideas and their artistic innocence from the repertoire of generations of makers within the fields of art and design. The assessment evidence, independency, is counterproductive to learning and reveals an urgent need for reframing the concept of creativity. It is crucial to identify relevant educational content and develop an assessment vocabulary that would allow teachers to put value on the creative aspects of pupils' designs. Art and Crafts classes ought to be an arena where all pupils are challenged to refine and expand their strategies of creative making. The teachers need

to have an answer ready when the pupils ask what creativity is and what the teachers propose as identifiers of creativity across the main areas of the subject: visual communication, design, art and architecture. When answering, the teachers need to ensure that the assessment evidence is a continuum of the learning process they planned for their pupils, a result of their attentive teaching, and not just a bonus to the gifted ones. To the question, "What is creativity?", Rollo May answers, ". . . the process of *bringing something new into being*" (May 1975, p. 39). In the context of design education, I propose the opposite italics, italics that put the emphasis on the process and to put the word "new" into a parenthesis, "…*the process* of bringing something (new) into being". In my view, a multifaceted repertoire of strategies to solve design problems is the relevant educational content of creativity. As assessment evidence, these strategies could provide the needed shift from awarding the "new" in objects to encourage the process of redesigning. To arrive at this point, further research and joint efforts are needed by researchers and teachers. Again, there is no starting from scratch, rather, a need to draw upon previous research projects (Gardner 1996; Atkinson 2001; Kimbell 2005; Lindström 2005, 2006; Borg 2008; Kreitler & Casakin 2009) and to redesign them in the context of the Norwegian subject of Art and Crafts. The Swedish professor Lars Lindström (2007), approach the challenges of assessing creativity in an exemplary manner by the questions he asks in the article, "Creativity: What Is It? Can You Assess It? Can It Be Taught?". The article is based on a research project (Lindström 1999) that identified four dimensions of creative ability, developed and tested a rubric describing levels of performance related to four process criteria: investigative work, inventiveness, the ability to use models and capacity for self-assessment. In the article, he takes the research project one step further by giving advice on how the four dimensions of creative ability can be taught and thus makes the crucial link between learning and assessment that are weak regarding creativity in my study.

Although this paper seems to be about the assessment repertoire of teachers, the real agenda is to discuss what kind of subject their assessment vocabulary makes possible. Assessment vocabulary is important because it contributes to the "public face" of a subject for pupils, their parents, headmasters and politicians and therefore it paves the way for what is really important: the skills, identity and ambitions the subject seeks on behalf of future generations. There is no return to the replication of the teachers' models from the earliest days of the subject, as we need to prepare the pupils to step into the making and problem solving of tomorrow. The diamond, creativity, calls for grinding to escape its current state as a volatile concept.

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Art as a Way of Learning: An Aesthetic Environment Assessment Tool

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Abstract: *This paper introduces a model and tool for creating and assessing aesthetic aspects of early learning environments based on five aesthetic operations: repetition, formalization, dynamic variation, exaggeration and surprise. It discusses the impact of aesthetic decision-making on learning, the brain, and child development. Traditionally, childhood environments have focused primarily on the organization of furnishings, displays, and space, or accessibility for children with disabilities. However, there is a renewed interest in the aesthetics of environments for young learners inspired by an arts integration model and Reggio Emilia. Early childhood education is steeped in child development, health and safety, curricular best practices, and engagement with families. Background in design and aesthetic principles are sorely lacking with regards to preparing accessible, culturally rich, aesthetic learning environments that reflect understanding of how individual children grow and learn in a particular community. Current literature expounds the role of the environment as the "third teacher", even though teachers have little guidance in viewing, assessing or using aesthetics in developing engaging environments for learning. This model and assessment tool affords multiple opportunities for intentional aesthetic decision making to impact learning in early childhood environments.*

Keywords: Early learning environment, Assessment, Aesthetic operations

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Introduction

Teaching is a complex, multi-faceted profession with teachers engaged in diverse roles throughout their day-to-day work. A primary role of the teacher is to set the stage for student learning. In the classroom, the task is to take into account design elements with relation to space, materials, movement, furnishings, time and student needs, and organize these into a coherent and engaging setting. Our background as educators and designers provide a wide lens to view classrooms and early childhood settings. A model and resulting assessment tool are based on anthropological and brain research, and have been utilized by elementary and early childhood teachers and administrators to evaluate the aesthetic characteristics of learning spaces. Mindful attention to the aesthetic design aspects of environments promotes cognitive connections, social engagement and emotional well-being.

The educational background of teachers is steeped in child development, curricular decision-making and evidenced based practices, as well as strategies on how to work with each child and family to advance learning. A review of elementary (K-6 grade) teacher education outcomes at the state level, curriculum development for teacher education, and texts about becoming a teacher, present only a cursory view of aesthetics in the design of classroom environments. Teacher education at this level offers limited information on aesthetic theory or the elements and principles of design in relation to classroom space. Teacher education at the early childhood level (birth to third grade) includes richer information on classroom environments with the primary focus on aspects of classroom organization to facilitate accessibility, classroom management and movement, and how to arrange a variety of learning experience. There is more rhetoric about the importance of both the indoor and outdoor environment at the early childhood level with many examples of creative ways to organize space. Current classroom-based assessment tools focus primarily on safety, teacher-child interactions, and classroom centers. These measures have significant impact on educational accreditation and the quality designation and accreditation of programs. However, the aesthetic aspects of the classroom are not systematically examined.

There is a growing interest in the design aspects of learning spaces. This is due to a refocus on the whole child at the national level (ASCD; NAEYC) and developmentally appropriate practices (Copple, & Bredekamp, 2009), universal design (Cunconan-Lahr & Stifle, 2007), socio-constructive theory (Connery, John-Steiner, Marjanovic-Shane, 2010), and new understandings in neuroscience (Damasio, 2010; Ramachandran, 2011). Early childhood models which are rich in arts integration, emergent curriculum, and the influence of Reggio Emilia schools (Edwards, Gandini, Forman, 1998) have invited educators to look more deeply into the relationship between aesthetic concepts, student learning and well-being. Educators have begun to think of the classroom environment as a "third teacher" in the teaching-learning experience and reevaluate their role as a designer in the classroom (Pairman & Terreni, 2001).

The role of "teacher as designer" is an integral aspect of *Art as a Way of Learning®* (Pinciotti, 2001), a professional development framework for integrating the arts into the daily lives of children. *Art as a Way of Learning®* (AWL) professional development strategies are based on current reaearch and expertise of practicing classrom teachers, art specialists, college faculty and community artists-in-residence. This arts-in-education framework was developed in a buisness education parternship between Northampton Community College in Bethlehem, Pennsylvania (USA) and Crayola, Inc. *Art as a Way of Learning®* is based on the belief that the arts, as a language, empower

children to construct, communicate and express understanding and meaning. Teachers, art educators and community artists discover ways to enhance knowledge, skills, dispositions, and feelings in the four *Art as a Way of Learning®* program components: *Artistic Literacy, Aesthetic Environment, Creative Collaboration, and Teaching Strategies.*

From its inception, the aesthetic learning environment has been an essential component and integral to understanding how intentionally designed spaces can promote curiosity, exploration, investigation, creativity, and meaning. AWL recognized that classrooms, greeting areas, and outdoor play spaces communicate expectations, ideas and feelings to both young learners and adults. A federally funded grant (PASELA) afforded a unique opportunity to expand conversations with teachers and artists about aesthetic environments, and develop and test a tool to systematically view and evaluate learning spaces (Phillips, Gordon, Pinciotti, & Sachev, 2010). The aesthetic environment tool took a number of forms over the course of three years with teachers and administrators testing its concepts, feasibility, and friendliness. The tool was shared with a group of critical friends, including designers, educational and arts researchers, and artists. The tool has been significantly restructured after their feedback, as well as after reading the work of Ellen Dissayanake (2007). Her five aesthetic operations provided the "missing link" to coalesce environmental design aspects in a more provocative construct. The tool in its current form is ready for a wider audience by those in varied educational settings. A digital application is in development to support ease of use and efficiency, shifting from the analog version to both phone and tablet platforms. This app will allow for intuitive analysis of learning spaces, provide suggestions, and promote connectivity and sharing information and images with other users.

This unique tool examines the sometimes more elusive or subtle aspects of the classroom that may seem hard to define or explain – **the aesthetics aspects of the learning environment.** The *AWL® Aesthetic Assessment Tool* is intended to supplement classroom inventories that look primarily at the quality of the curriculum, safety, children's development levels, and other key aspects of *high-quality, universally designed* early childhood programs. This dynamic tool extends and reinforces the *Art as a Way of Learning® (*AWL) belief that the arts as a language empowers children to construct, communicate, and express understanding and meaning. The learning environment acting as a "third teacher" affords opportunities for children to construct who they are in relation to others and materials, and uncover what they know and can do in various spaces.

This AWL® aesthetic measure provides a pathway for understanding the elements of an aesthetic environment and how to recognize, assess and create places that promote a sense of well-being, competence, and community. An environment that attends to the aesthetic elements awakens a feeling of belonging and identity, creating a felt sense of competence. Creativity and meaning are promoted and constructed in these exciting spaces. Children's ideas are supported as they seek to realize the invisible or unexplainable. This AWL® tool advances understanding of how decisions related to the aesthetic aspects of the environment will create more intentional, inspiring space for teaching and learning. Using design elements and aesthetic operations, we can assess and create places, shared living and learning spaces, classrooms, centers, and outdoor play spaces to support engaging learning, intentional teaching, and Art As a Way of Learning®.

Aesthetic Environment: The third teacher

Those who teach young learners often recount early memories of "playing school". Setting up environments for these teaching interactions was integral to the playful drama. Often how they *set up* the imagined classroom is described in rich detail.

"My kindergarten was a large inviting room, divided roughly into three areas. One area included our cubbies where we kept our stuff, and table and chairs for more pencil-paper work. The center area had a piano with floor space for group time and rest time on rectangular rag rugs. And the third space was a large motor area for playtime and center work. I remember being surprised by the slide in the classroom, enthralled by the piano, and a felt sense of joy and excitement probably from some colorful displays or curtains. The room was filled with light even though it was a basement classroom. We once put on a circus for our parents in the large motor area and the slide took center stage!"

How many years have you spent in classrooms? What do you think of when you recall your first learning spaces? Do you see white boards, green chalkboards or black chalkboards? Do you smell markers or feel chalk, the hardness of chairs, the color or light in the room? Or do you see jungle gyms, trees, dirt or asphalt? Your experiences in learning spaces build your image and feeling of what a learning place can be.

With a strong background in child development, educators know that children learn everything through their bodies, with their senses as portals to this learning. We continuously make connections as we seek out familiar patterns or uncover what is new or novel around us. The body and brain is literally built to make sense of everything encountered in the world. However, as clear as the connection is to design elements and the creation of rich learning environments, the impetus for this to occur on a daily basis has been replaced by a culture of testing. When all learning is focused practicing for *tests* instead of *learning*, the use of movement in space is limited, as is any focus on the special design of a classroom.

What we fail to remember is that we have an inborn aesthetic capacity that is hardwired into our brain/body system. We are aware of a "felt sense" in an environment, and we recognize this through such comments as: "That classroom **felt** so welcoming", or "children must **feel** so inspired in that place. I had a **sense** this was a good place for children to learn." **We sense a place with our whole being**. Everyday teachers "set the stage" for learning, whether they are aware of this or not. Ellen Dissanayake (2007) puts forth a theory linking five aesthetic operations – repetition, dynamic variation, formalization, exaggeration, and surpise – to early mother-child interactions. These aesthetic operations shaped the development of a civilization and the rise of culture and the arts. These five aesthetic operations advanced evolutionary success, and are neurologically hard-wired to support how we operate in today's complex world (Ramachandran, 2011). An environment organized with aesthetic operations in mind demonstrates both social and personal benefits.

The question then becomes: how can educators capitalize on what the body and brain already knows naturally? Are they aware of the aesthetic operations in their surroundings? How can teachers use these powerful, transforming design ideas and aesthetic concepts in learning spaces?

A Sense of Place

Teachers may intentionally prepare an accessible, culturally rich, aesthetic learning environment that reflects understanding of how individual children grow and learn in

their particular community. They can consciously create overlapping "learning zones" that promote child-adult collaborations and advance learning and development on multiple levels. They can rethink and recreate a "sense of place".

The early childhood environment, including classrooms and outdoor play spaces, communicate a great deal of information, inspiration, and expectation to children and adults. The physical environment, including organization, accessibility, and aesthetic aspects for those who move, play, interact, and work in the space shapes everyone in very significant ways. Aesthetic decisions influence children's interactions, play, daily routines, investigations, and development opportunities, as well as directly impact curriculum and programs. Learning how to create spaces that sustain attention, generate feelings of belonging, intimacy and competency, while providing opportunities for investigation, collaboration, and learning is a critical aspect of a teacher's role – *teacher as designer*.

The elements to be considered are:

1) Aesthetic Operations in the space: repetition, dynamic variation, formalization, exaggeration and surprise

2) *Design Aspects* of the space: lines & pathways, color & light, shapes & objects, smell & taste, texture & temperature and sound & dialogue.

Aesthetic Operations: A common language

The etymology of the word *aesthetic* means to awaken. The *AWL® Aesthetic Assessment Tool* shifts the meaning of the word *aesthetic* from beauty to *awaken*, building a common language for teachers to look at spaces with new eyes.

Therefore, an *aesthetic environment*:

• awakens the senses, focuses attention, and engages each learner in a perceptually rich and visually cohesive learning space

• awakens each child and adult to the patterns and uniqueness of each other and the world around them

• awakens a sense of belonging, mutuality, meaning, competence, and a caring about important things by those who play and work in the space;

• awakens how *aspects of design* can communicate, guide actions, and inspire curiosity, imagination, and feelings about a place;

• awakens and reinforces the unique role the arts play in development, learning, and sense of well-being.

The five Aesthetic Operations**, *repetition, formalization, dynamic variation, exaggeration,*** and ***surprise*** are evident in our natural world and are an essential inborn capacity of who we are as humans (Dissanayake, 2007). *Picture a place you enjoy, your backyard, a view of the city, forest, ocean, or countryside.* Zoom in on parts of the imagined scene. What is repeated…the shapes of the leave, the overlapping waves? Is there a balance of textures, shapes and colors? What varies in your scene keeping you interested? How would you describe the essence of this place? What stands out or surprises you?

These same operations vividly seen in the interactions between infants and mothers as they engage in the physical, visual, and verbal exchange of looks, touch, gestures, and words. *Imagine playing peek-a-boo with a toddler.* Through this intimate, playful exchange a toddler sense of self and mutuality is being developed. Interactions in your social and natural world give you a sense of purpose, belonging, and competence.

Engagement in your world with others gives it meaning and help you make what may be invisible, your thoughts and feelings, visible to others.

The five aesthetic operations, occurring naturally in our physical and social world are also evident in every art form. The art of dance, music, drama and the visual arts evolved from the rituals and interactions of daily life long ago in Pleistocene times. Repetition, formalization, dynamic variation, exaggeration and surprise are found in musical arrangements, dances, compositions of paintings, collages, sculpture, and in dramatic stories.

Brain research can explain how aesthetic operations occur in your body and mind, and how these inborn operations help your brain/body system know everything. Neuroscientists clarify how these aesthetic operations also serve you in important ways to make sense of yourselves and create meaning in your life (Rachmanadan, 2011; Damasio, 2010)**. These five operations – *repetition, formalization, dynamic variation, exaggeration, and surprise* – are an intrinsic and natural part of who we are and how we become fully human.**

Designers, architects, sculptors, choreographers, set designers, musicians and artists intuitively and intentionally consider the ***five aesthetic operations*** in their work. They deliberately arrange aspects of their medium to create compositions and arrangements that awaken something in another. **Teachers who think like designers and artists can intentionally use the five operations to transform daily teaching and learning, making every day a work of art.** (see Table 1).

Table 1. Basic Aesthetic Elements. This chart shows the dynamic relationship between the five Aesthetic Operations and the design aspects of environments.

Aesthetic Operations	*DESIGN ASPECTS*					
	Line & Pathways	*Shape & Objects*	*Color & Light*	*Smell & Taste*	*Texture & Temperature*	*Sound & Dialogue*
Repetition *pattern, rhythm, expectation*						
Formalization *space, balance, unity*						
Dynamic Variation *movement, variety, contrast*						
Exaggeration *emphasis, scale, proportion*						
Surprise *manipulated expectations, novelty*						

Teacher as Designer

Early childhood programs are situated in a center that should reflect natural, physical, social, and cultural characteristics, as well as the diversity of the community. The **design aspects** and **Aesthetic Operations** work together in a consistent way, but yield different results based on how the above "situated" factors are realized in your space. To begin this process teachers must **learn to see** and develop abilities to think and work like a designer.

Learning to See: Designing Eyes

The field of design has a significant impact on our daily lives in every way from what we wear, how we live, travel, what we see and hear. The products created by designers are thought of as a "second skin" – your shoes, coat, house, or car. Designers make decisions intuitively and intentionally based on the aforementioned **design aspects** and **Aesthetic Operations.** Teachers can use these same elements to create engaging, inclusive, environments that surround us and create a strong sense of place for learning.

Creating a Sense of Place

Recall a favorite place from childhood, a recent vacation, or a movie or a book you have read. Close your eyes and visualize the place or setting. Examine the details in your mind's eye – colors, time of day, lighting, season, temperature, sounds, and the objects you see or feel. All of these **design aspects** create a sense of place and time, a feeling and memory of your experience. Senses were awakened to color, light, sounds, textures, temperature, smells, objects, and movements. The **design aspects** of a place are taken into consideration to analyze and interpret each **Aesthetic Operation's** power to transform your learning spaces.

- ❑ **Color and Light** has a significant impact on how we feel in a place. Color and light create a mood, making a place seem cold or friendly, quirky, peaceful or boring. The **Aesthetic Operations** can assist in creating consistent and thoughtful use of color and light in an environment.
- ❑ **Texture and Temperature** is the most tactile of the **design aspects**, also relating to visual sensation. We often make very quick decisions about a place based on how it feels to the skin and the eye.
- ❑ **Lines and Pathways** create edges and a sense of movement, often providing direction for looking and actions. These are essential **design aspects** that can make a space chaotic or calm. The **Aesthetic Operations** provide a range of ways to vary lines and pathways that communicate how to move and what to do.
- ❑ **Shape and Objects** take into account the overall structure, furnishings, materials, and details of a space. The **Aesthetic Operations** allow for zooming out and zooming in to fine tune spaces and create a sense of overall unity.
- ❑ **Smell and Taste** is the most primitive of the **design aspects,** since they make an impact upon entry to any new place. Subtle, not always obvious, but critical in providing a welcoming and inspiring environment.
- ❑ **Sound and Dialogue** requires attention and are essential for conversation and building relationships. The relationship may be with another or with oneself in nature, but both involve an exchange of listening carefully, responding, and communicating.

The Aesthetic Operations at Work

Since the five aesthetic operations are hard-wired, we need to reawaken teachers' awareness and engage them in the conscious dialogue about how these are realized in their space and the benefits of design decision-making.

Repetition

Upon entering a space, the eye travels from one part to another, searching for similarities, cautious of differences. The brain is always working to find patterns to help make sense of where we are and what we are to do in this space. The environment is literally "read" for clues. Repetition creates an overall pattern, grouping perceptions together. Recognition of these patterns makes us feel like we belong and our surroundings make sense. You know where you are. Repetition of color, shapes, sounds, movements, lines, and texture creates the rhythms and patterns found in nature, daily life, artworks, and your community. Repetition helps you and children identify relationships and recognize routines and expectations. Repetition promotes a sense of mutuality, identity, and competency in your classroom or play space.

Formalization

Formalization mirrors the unity or overall structure and intention of the environment. Formalization creates a visual harmony among the various classroom elements, promoting a sense of completeness and purpose in the learning environment. Viewers' eyes are naturally led from one area of the classroom to another, linking them into a cohesive whole. Just as an integrated curriculum includes a balance of content and learning experiences, an aesthetic environment conveys a balanced effect on our sense of well-being. Attention to formalization relates important messages about "what happens here" – the meaning of this space. Balance among the design aspects (color, pathways, light, sound, textures, scents) and the physical weight and size of objects and furnishings distributed within the environment produces a formal balance in the space. Children and adults feel the completeness, meaning, and sense of mutuality in the space when formalization is considered.

Dynamic Variation

Dynamic Variation is one of the ways to sustain attention over time. **Attention** is the first step in the learning process. Varying the sensory aspects of the classroom create interest and sustains engagement over longer periods of time. **Variation** emphasizes contrast in size and scale (big or little), light (bright or soft), sound (loud or soft), movement (fast or slow), color (dark or light), texture (soft or hard) and levels (high or low). **Dynamic variation** evokes movement and curiosity, denotes a change, or distinction, which makes one wonder *"What comes next?*". Changes in variation can be a gradual shift in sequence or provide a stark contrast. **Contrast** invites comparisons between similar or diverse objects, elements, levels, or ideas. **Movement** is another way to produce variety in the classroom. This includes *simulated* movement as in the swirls on a pillow or *actual* movement as in a mobile or the blowing of sheer curtains. Children and adults feel **energized** and **competent** in the presence of dynamic variations and can sustain engagement longer.

Exaggeration

Exaggeration requires a focus on the **essence** of an object or space. This is a more pronounced **distinction** than found in dynamic variation. You tune in to differences, but these differences make us stop, look again, re-engage and see more clearly. **Proportion** emphasizes the relationship of one part to the whole or another part. The **size, scale or amount** of color, texture, lighting or smell can be exaggerated or limited. Imagine an all white room with a vase of red tulips. An object is seen more clearly in relation to its surroundings if it is exaggerated. **Emphasis** on one aspect to the exclusion of another creates a **point of focus** in a learning area. Some ways to exaggerate an object or space is to **isolate** it, **change** the scale, **distort** an aspect or **pare** it down. **Simplifying**, editing, or taking away extraneous items is another way to exaggerate, presenting an essential idea in a zen-like fashion. Less IS more! Consider carefully how to present complex ideas or activities by exaggerating a specific aspect, limiting design aspects, or changing the scale or proportions of objects in the space to call attention to it. The *selective use* of **Exaggeration** can effectively highlight **meaning** and purpose in a classroom and encourage creative and critical thinking.

Surprise

Surprise catches one unaware. A surprise can astonish, amaze, annoy or even startle us into paying attention. Surprise brings emotion to the surface of our experience – joy, fear, wonder, laughter and even tears. Surprise changes or manipulates our expectation and puts us on **high alert**. The **surprise** found in a unified space creates opportunities to uncover **new ways of seeing** and feeling while offering new ideas to investigate. "How did that happen?" Surprise can also **make the invisible visible,** or the **ordinary special**. Ellen Dissanayake calls this "**artifying",** which gives something you see every day new meaning**.** Surprise often helps you to see what is important again, bringing pleasure and a range of positive interactions among individuals – *"You made my day!"* Children delight in the intermittent surprises they find in nature or within their classroom. Surprises help us care about what is important again. Surprising discoveries are highly **motivating**, **generate energy and mutuality**, and provide a **sense of wonder** in the everyday.

Design Challenge

When you link teaching with a thoughtfully planned aesthetic environment, you purposefully extend and invite opportunities for children's learning and engagement. As you set up your classrooms and outdoor play spaces, wonder:

- ❑ How can the design and arrangement of space, light, furnishings/equipment, tools/materials, and storage area work together to create an inclusive, inviting, engaging learning spaces for each child and family?
- ❑ What types of settings, materials and resources promote each child's sustained learning, imagination and meaning making through the visual arts, math, music, dance, literacy, and other languages?
- ❑ How can aesthetically pleasing, culturally diverse, environmentally friendly, natural materials support each child's inquiry, sense of well-being and competence within his or her surroundings?
- ❑ What types of implicit and explicit messages and documentation assure that each child's learning is visible to families, colleagues, early childhood education students, and community members?

You might already be speculating, "How can I capture the **aesthetic quality** of a classroom or a play space? Isn't beauty in the eye of the beholder"? Agreeing on a **common set of aesthetic elements** facilitates an ongoing dialogue about learning, design, environments, and teaching. Belief in your capacity to uncover aesthetic operations in any setting is important as well.

To develop your "Teacher as Designer" skills we suggest getting a spiral bound, unlined artist journal to keep your inspirations and assessments of spaces in your environment. To awaken your discriminating eye before you start looking at your own spaces, find a picture of a room created by a designer. You can pick any room, a kitchen, bedroom, living room, or print one from one of the many home design websites. Paste it in on the left side of your journal. Begin to look for and label the Aesthetic Operations you see at work in the room. Can you identify all five Aesthetic Operations? Are the *design aspects* evident? Where? Do this activity with your teaching partner and share your thoughts.

Another way to awaken your "Designing Eyes" is to partake in any of the activities listed below. Do you see *repetition, formalization, dynamic variation, exaggeration, and surprise* in the world around you? Practice refines your sensibilities.

- Take a walk outside in nature or go to a park
- Find a painting by a favorite artist
- Go to a flower shop and look at how they combine plants in an arrangement
- Go on line or visit a museum to view artist's work
- Look through design magazines, comparing the same room (e.g. living room) by different designers
- Look at rooms in your own home to see if the five operations are present.

NOW you are "tuned in" to the five **Aesthetic Operations** and **design aspects** - Ready to assess your learning spaces?

How To Assess Your Environment

Imagine you are a child, entering your classroom or outdoor play space for the first time. Or picture yourself as an architect, curious to see how design affects learning. How fascinating it will be to look at, analyze, and design your learning environments from this new perspective!

With this Art As a Way of Learning® Designing and Assessing Aesthetic Learning Environments tool, you will

- See your teaching space more objectively, through the eyes of a designer who also understands each child and family;
- Discover how your decisions about *design aspects* such as light, color, pathways, textures, and shapes, influence each family and child's sense of wonder, investigations, and interactions with one another;
- Uncover creative, original ways to furnish, arrange, and prepare your space every day to invite curious, active children that are engaged in learning.

FIRST, zoom in by choosing a learning space – a specific area of your classroom or school – to examine closely. Once you become familiar with the tool and thinking like a designer, select additional areas of your environment to assess and rethink.

NOW you will use a practical tool—called a **rubric**—to assess each area's **aesthetic elements** and potential**.** As you analyze the space, you will become more familiar with the **design aspects** and how you can use the **Aesthetic Operations** to transform learning in your environment.

FINALLY, you will identify ways to more intentionally awaken ALL who enter your classroom to a fuller, richer learning experience. Each time you select another area of your space for analysis, you open another door to assure that each child and adult are **learning by design.**

As an ***Aesthetic Learning Environment Designer,*** you will apply the Aesthetic Operations and design aspects to communicate:

- Your unique approach to encourage each child's safe and independent inquiry and engagement;
- A spirit of an inclusive place that welcomes diversity and values each child and their family;
- Beliefs about the universality and uniqueness of each child as capable and curious who can represent their learning in a variety of languages including the visual and performing arts, words, and numbers;
- Your support for the idea that learning is multi-sensory and interactive, including the use of assistive technology;
- A "third space" in which each child constructs knowledge about the world through explorations co-constructed with intentional, creative adults.

Impact of Aesthetic Decisions

Much like a like a great meal, the "experience" is more than just the food eaten. The experience is greater than the sum of the parts, since it involves the people, conversation, setting, presentation, and of course the food. In the chef's recipe, the **design aspects** serve as the cooking ingredients, while the ***Aesthetic Operations*** are used to determine how much of each *design aspect* to include and the ways to combine them. If all elements are considered and connect for an overall experience, then the result, whether a memorable meal or an engaging classroom, is inviting and pleasing to all of the senses and for all involved. You feel satisfied and happy.

This is true for our early childhood programs as well. The overall "experience" of interacting in this environment is "felt" by adults and children alike. Encounters within an organized, accessible, aesthetic environment are greater that the sum of their parts. This tool will allow you to examine both the individual spaces in your center or classroom as well as the overall "composition" created by those parts. Thoughtful consideration of the Aesthetic Operations and *design aspects* has a powerful influence on how everyone interacts and feels in this space.

The impact of intentionally considering the aesthetic elements has far-reaching benefits for all who work, imagine, play, and learn in any environment. Across all cultures and through time, the mindful, routine use of the *five Aesthetic Operations* within a culture or environment creates:

- **A sense of Mutuality** – a feeling of closeness and intimacy with one another,
- **A sense of Belonging** – an identity as a member of a group,
- **A sense of Competence** – a feeling that there is something important to do and learn here, socially, physically, and cognitively,
- **A sense of Meaning** – gives value and purpose to what has been done in the past, what is happening now, and what could happen in the future,
- **A sense of Artifying** – demonstrates a regard for life and the caring about important things by making the ordinary special and the invisible visible. (Dissanayake, 2007, p. 794.

Intentionality about the aesthetics aspects of a place or environment can become an exciting catalyst for change. Mindful choices based on *Aesthetic Operations* help focus each child's attention, attune us to important aspects of an experience, activate curiosity and imagination and provide opportunities for inquiry, intentional learning and creative engagement. The interaction among each child, the caring adult, and the aesthetic environment creates what is often called a "third space". This dynamic, in-between space is where learning and meaning making are negotiated and constructed within and through multiple learning experiences.

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Evaluating Architecture students' perspective of learning in peer reviews.

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Abstract: *Existing research suggests that peer review is a highly effective method for delivering formative feedback, and that it embodies numerous qualities that align closely with creative programmes. However, little research has evaluated creative students' qualitative opinion of the process. This paper summarises a case study that identified Architecture students' perceptions of peer reviews, addressing: how they compared to traditional feedback methods, the value of peer feedback, and how peer review contributed to their learning both in relation to the work being evaluated and beyond. Peer reviews were held with a group of final year undergraduates to provide feedback on their concurrent design project, and the students' views of the experience identified through a questionnaire. A key objective was to draw conclusions on the nature of learning associated with peer review, and its appropriateness as a forum for formative feedback. The study found that students valued the feedback from their peers, and that the process contributed to their own critical thinking in subsequent work. They were generally highly supportive of peer review, but not as a substitute for traditional feedback methods. Some notable contradictions with existing research on peer review were observed.*

Keywords: Peer review, formative feedback, design review, student perceptions.

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Introduction

Existing research suggests that peer review – students providing feedback to those in the same year, as defined by Topping (1998, 250) – has numerous attributes as a learning method, many of which align closely with learning objectives in creative programmes. These include: developing analytical and evaluation skills, fostering independent thinking, heightening engagement, increasing the quantity and range of feedback students receive, developing an understanding of what constitutes good work (and why), developing team-working and collaborative skills, increasing confidence and empathy, and encouraging deeper learning (Pearce *et al*. 2009, 4; Vickerman 2009, 222; Liu and Carless 2006, 288; Boud *et al*. 2001, 8; Falchikov 2001, 70; Orsmond *et al*. 2000, 35; Topping 1996, 324). Ramsden (2003, 199) suggests that structured use of peer review encourages a more responsible and self-critical view of student's achievements, and Stuart-Murray (2010, 16) identifies student-led reviews as showing higher levels of both participation and understanding, as the process is cognitively demanding rather than passive (Nicol 2011a, 2). A study cited by Berry and Sharp (1999, 29) found that co-operative learning tends to promote higher achievement than individualistic methods. However peer review is not without potential issues; for example, students may not believe they can learn anything worthwhile from their colleagues (Boud *et al*. 2001, 11). Studies have found that students can find it difficult to be critical of their peers (Lindbolm *et al*. 2006, 59; Falchikov 1995, 184), which would create a significant problem in creative disciplines such as Architecture, where critical evaluation of project work is a fundamental objective of formative feedback.

The annual UK National Student Survey (NSS) repeatedly shows that students are least satisfied with assessment and feedback, and that dissatisfaction is higher than average amongst creative programmes - especially Architecture (Vaughan and Yorke 2009, 8). In design modules of Architecture programmes formative feedback is unwaveringly delivered using the design review (Stuart-Murray 2010; Parnell *et al*. 2007; Ilozor 2006; Koch *et al*. 2002; Nicol and Pilling 2000; Anthony 1991). In its traditional format a cohort is divided into groups of 15 to 20 students, who each stand in front of their drawings and models before a small panel of tutors and deliver a brief verbal overview of the work and the ideas that underpin it. The tutors – varying in number from two to six or more and seated immediately in front of the student – then ask questions and provide feedback verbally on strengths, weaknesses and areas for development. Students are critiqued in turn, and those not being reviewed observe in an informal semi-circle behind the tutors.

Boud (1995, 40) argues that Higher Education must equip students to self-assess in their professional lives through developing self-assessment activities. Indeed, developing students' critical evaluation skills is a quintessential objective in architectural education – albeit often an implicit one (Nicol 2011a, 3) – in order that they can learn to critique their own work and give feedback on that of others. Although tutors might believe that the traditional design review develops such skills, in reality it is notably ineffective in doing so. As Sadler (2010, 544) highlights, students need experience of being involved in making judgements about quality themselves. The degree of involvement of the student audience in traditional design reviews varies, but typically they will passively observe from behind the tutors. This is due in part to the physical layout of the review, as tutors sitting in front of the work create an effective barrier to observing peers, which makes it difficult for them to see the work being discussed let alone engage in the critique. Also, students are reticent about

contributing due to the student-tutor power dynamic (Webster 2006, 289), not wishing to openly criticise a peer in the presence of tutors (Wilkin 2000, 105) or to make inarticulate comments.

There is some research exploring peer review in architecture (Parnell 2003; White 2000), however little (CUDE undated) focuses on students' qualitative evaluation of them. This case study sought to identify students' opinions of peer review, in particular on: how they compared to traditional design reviews, how they valued feedback from their peers (compared to their tutors), and – importantly – did they consider that the process contributed to their subsequent critical appraisal of their own work? The latter is particularly significant in terms of identifying the development of critical analysis skills – a key attribute cited of peer review (Sadler 2010, 542; Boud 1997, 200).

The study focussed exclusively on formative feedback, as a primary objective was to evaluate peer review as an alternative to the traditional design review as a forum for developmental feedback. Both Liu and Carless (2006, 282) and Nicol (2011a, 4) highlight that most published studies of peer review focus on grading rather than formative feedback, and reassert Topping's proposal (1998, 258) that research is needed on peer review as a process where students develop critical judgement by reviewing the work of others.

Methodology

The study involved students from a cohort of NQF Level 6 (final year) undergraduate Architecture students studying for a three-year degree within a United Kingdom university, all of whom working on their final project – a 20-week design module. Every student in the cohort of 68 was invited to participate by email, giving an overview of the project, what involvement would entail and the project timescale. The Participant Information Sheet was attached, confirming: the purpose of the study, that participation was voluntary and that participants could leave at any time, what participants would do, any risks and benefits of being involved, that participation and contributions would be confidential, and what would happen to the results of the study.

Given an obvious comparability between peer reviews and focus groups – an open exchange of ideas about a given subject – a group size of eight students was based on an ideal for a focus group (Litosseliti 2003, 3). Had the number of respondents exceed this then participants were to be selected on the basis of those who responded first; however, in the event the number of respondents matched the intended group size. Whilst this method of participant selection was not without short-comings, others were considered more problematic. As the peer reviews would take place in self-directed study time – independent of tutorials, traditional reviews and lectures – it was important that participation was voluntary.

The project was approved by the host university's Research Ethics Committee. Informed consent was gained by each participant completing a consent form before the first peer review session, at which they were re-issued with the Participant Information Sheet. The students were assured they were within a confidential, non-judgemental environment; research seeking students' opinions is more robust when participants feel that they can freely express themselves (Merton *et al*. 1990). Although this would be their first experience of peer review, encouragingly the volunteers included a balanced mix of abilities, and therefore it was not a format that only appealed to stronger students – a possibility given that they were providing feedback to each other in an

open forum. The gender ratio of the group was 12% female and 88% male; this is discussed in the context of the cohort's gender ratio later.

The peer reviews were held in a similar format to traditional design reviews as an objective of the study was to evaluate how students compared them; also, providing feedback to their peers would be a novel experience without further complication of a new format. This arrangement also aligned with the relevant features of van der Berg *et al*'s optimal model for peer review (2006, 34). Additionally, Sadler proposes that peer review should provide participants with an experience as similar as possible to their tutors' in order to facilitate students' understanding of tutors' feedback (2010, 541). Combining this format with students' reviewing their on-going project work also ensured strong alignment with concurrent learning objectives (Gielen *et al*. 2011, 144).

Two peer review sessions were held. The participants pinned up their current drawings and models in the design studio, and were briefed on the objectives of the case study and the nature of feedback to be provided. Each in turn described their work to the peer group – sitting in a loose semi-circle around them – who gave the presenting student mutual feedback (Gielen *et al*. 2011, 146). Throughout the process the tutor sat at the back and refrained from commenting. Parnell (2003, 2) suggested that students could critique work first followed by the tutor, but White (2000, 218) considered that this might suffer from the traditional student-tutor dynamic, either reducing the perceived value of peers' comments or ignoring them in favour of the tutor feedback to come; therefore the tutor maintained a role purely of facilitator. The first peer review session took place mid-way through the module (week 11) with the second two weeks later, so participants had opportunity to reflect on the process and to incorporate feedback into their work. Each session lasted between two and three-and-a-half hours.

As the first session progressed there was very little need for tutor intervention - only to move the group on to the next review. Participants were strikingly forthcoming with feedback; the level of engagement from each student was very high, with no evident reticence in contributing. Whilst there were clearly leaders within the group who would be first to feedback, or contribute more to the commentary, no-one dominated the sessions. The quality of feedback was also notable. Previous research suggests comments might deal with peripheral issues so as not to openly question fundamental elements of each other's work, but there was no evidence of this. Feedback was generally high quality, relating to issues central to the development of the work. The level of engagement and quality of feedback suggests an answer Pearce *et al*'s question of whether students take peer review seriously if it does not count for marks (2009, 5) – in this study, without a doubt.

Analysis and Findings

Student evaluation of the peer reviews was established through a questionnaire, issued to participants following the second session. This consisted of 11 open questions which started generally, asking how they compared them with traditional reviews, and moved on to more specific issues such as the value of feedback, and the potential role of peer review. The response rate was one hundred percent. The responses were studied anonymously through relational content analysis (Marshall 2011, 161), from which a report summarised key concepts and responses associated with them. The following synopsis identifies the group's general consensus on these key concepts, and uses representative responses to illustrate significant points.

What were the differences between peer and traditional reviews?

The traditional design review is used almost exclusively to deliver formative feedback throughout the undergraduate course – between five and ten times each year. The participants were unanimous in perceiving that the peer reviews had positive qualities not found in traditional reviews, but the nature of those qualities varied. Although in traditional reviews an audience of peers is always present, three participants highlighted that they received feedback from their peers in a way that doesn't occur in traditional reviews, with one confirming the view that students are reticent to participate in traditional design reviews. The peer reviews generated a very different environment; indeed, several participants highlighted that this enabled them to articulate themselves better. This suggests that the peer reviews facilitated clearer thinking – and therefore potentially learning – than traditional reviews, as this response illustrates:

> There was a calmer, friendlier, relaxed atmosphere with the peer reviews which then allowed you to express every step of the project painting a clearer picture in the reviewers' mind of the scheme. This atmosphere allowed me to think quicker and remember some points than in a traditional review.

Whilst responses implied that aspects of peer review are unique, equally there were qualities that participants didn't get from the peer reviews that they do from traditional ones. One negative perception associated with the peer reviews arose as a consequence of the open debate that they instigated. Whilst this was generally seen as positive in the sense that many ideas were generated which inspired students, one participant highlighted a lack of direction at the end of the sessions. Two participants considered the peer review sessions to be less onerous than traditional reviews, and consequently produced less work in preparation for them. Also of concern is the perception given in four responses (half of the group) that their peers' feedback had less significance than that of their tutors, as the following response exemplifies:

> I think some students treated the peer reviews with less gravity and didn't see the ideas discussed as significant as those of a traditional review.

The participants' overall consensus was that peers have more empathy than tutors, and that the more informal atmosphere of the peer reviews generated greater interaction, enabled students to express themselves better and articulate their thinking more clearly. The informality compared with traditional reviews encouraged debate and more opinions to be expressed; there is evident benefit in challenging the tutor-student power dynamic that clearly impacts upon learning in traditional design reviews (Sara and Parnell 2004, 2). However, concern was raised by half of the participants over the depth of feedback received; this is discussed in more depth later.

Did participants feel more engaged in peer reviews than traditional ones?

One of the qualities existing research highlights of peer review is encouraging higher levels of engagement. This was reinforced by all of the participants. Peer reviews were unanimously considered more engaging, with two participants highlighting that in traditional reviews it is easy to become removed from the process, supporting Vu and Dall'Alba's (2007, 542) statement that peer assessment promotes discursive interaction

in relation to a task. Four participants commented specifically that both the process itself – being expected to deliver feedback to each other – and the intimacy of a small group contributed to this. One of Thomas's findings (2012, 72) was that promoting supportive peer relationships in HE, such as active participation and interaction, is a key characteristic of fostering belonging, contributing in turn to retention and student success. However, although participants were more engaged in the sessions on the day, it is worth re-iterating that some prepared less for them and were less engaged in that respect.

Did participants consider that feedback from peers contributed to their design project?

Participants were asked if the feedback received from their peers contributed to their learning about their project, to identify if feedback was valued in terms of the development of their work. All of the participants responded positively. More than half of the group commented specifically on the process as being very dynamic and fostering creative thinking; it was considered more multi-directional than traditional reviews, where dialogue is predominantly between the tutors and the student being reviewed:

> During the reviews a lot of the students were bouncing ideas off each other at quite a fast rate. I feel that by doing this it encouraged us to use our creative thinking at a quicker rate.

It is noteworthy that participants both respected and valued feedback from their peers, who would have no involvement in the final assessment of their work. They were unanimous in commenting that feedback from peers had a positive contribution to their project, which contradicts previous research (Nicol 2011b, 6) that found a large number of students claim that peer reviews they receive are not helpful.

Did reviewing work of others help thinking beyond the sessions themselves?

The next questions delved deeper, seeking to identify if critiquing the work of others had developed skills used outside of the sessions. This would establish if the peer reviews had value beyond learning derived from the feedback itself, and if learning developed through the process of questioning – a powerful quality if present. The participants substantiated this. Indeed, it is striking to note that every response was positive; clearly participants found they took a significant level of learning from the peer reviews. Particularly interesting is that learning varied from student to student, including: decision making and thoughtfulness, creative thinking and inspiration, and awareness of specific issues. Analysing and providing developmental feedback on each other's work evidently facilitated thinking about similar issues in participants' own work. Learning from the work of others, and understanding the standard of their work and where they are up to, was a clear feature of the sessions.

Of all the positive qualities that the literature review highlights of peer review, arguably the one most closely aligned to architecture and other creative programmes is its contribution to developing critical analysis skills. Therefore a key ambition of the study was to identify the nature and extent of learning participants identified in this respect. All of the participants identified learning beyond the peer reviews, with three-quarters making direct reference to applying the critique process to their own work as a direct result of the sessions, which validates an increase in self-critical analysis – one

of the key objectives of the process. This supports Topping's (1996, 325) suggestion that peer review contributes to students' self-assessment, as the following response exemplifies:

> After the peer reviews when working on my design I thought about each aspect of the design with a critical mind asking "do I need this here?" and "what does this contribute to my project, is it positive or negative?"

Some participants also identified wider learning from the sessions, including debating skills and presentation techniques. Amusingly, one commented on problems deciphering other students' plans, giving them insight into what tutors express on numerous occasions during reviews and tutorials! Having to critique each other revealed the need for clarity in presenting work so that reviewers are able to read and understand it. It is widely recognised that that one of the most effective routes to learning something is to act as the teacher (McKeachie *et al*. 1986, 63; Topping 1996, 324), and research on peer teaching finds that both parties benefit in peer teaching, but the tutor more so than the tutee (Biggs 2003, 112); this study suggests that the same is true of peer review.

How confident did participants feel giving feedback to their peers?

In a design review work is presented and feedback given in front of colleagues and tutors. Therefore the participants' experience of providing feedback to their peers was explored, firstly in terms of how confident they felt delivering it. With just one exception, the participants felt confident delivering feedback to their peers. This is very positive, particularly bearing in mind that it was done verbally – directly to the student in an open forum – and not anonymously through a written feedback sheet. It is noteworthy that the one participant did not feel confident only because they did not know some of the peer group and therefore did not know how they would react to feedback. This was reinforced by others, who highlighted that they felt confident for two reasons: firstly as final year students they feel more experienced and that they have greater understanding, and secondly that familiarity between the peers enabled them to give stronger feedback.

Did participants find it awkward to give critical feedback to each other?

Delivering feedback directly has many advantages, such as facilitating a dialogue between tutor and tutee (Smith 2011, 59), but could create tension between peers in a manner that does not exist in traditional reviews due to authority in the tutor-student power dynamic. Therefore, as well as having the confidence to deliver feedback, a related issue was whether participants found it difficult to make critical comments to their peers:

> At first it seemed almost hard to criticise someone's work, knowing how much effort they put in. However after the first two or three presentations, there becomes a more relaxed atmosphere and it becomes easier to give feedback because you know that they appreciate the help.

Two participants stated they were initially cautious of giving critical feedback, but for both this diminished as the first session progressed; the rest were unanimous that making critical comments of colleagues' work was not awkward. These responses

suggest that in the environment of peer reviews students did not feel that their peers would be adversely affected by critical feedback, contradicting Lindbolm *et al*'s (2006, 59) study where students found it difficult to be critical towards a peer. Two participants specifically highlighted as feeling that they could give more critical feedback to peers with whom they were familiar, which contrasts with Falchikov's research on peer assessment (2001, 2). Nicol (2011b, 6) found that students value anonymity in peer feedback, however in this study familiarity was more important when giving more critical – and arguably more insightful – commentary. The informality of the sessions and familiarity between the peers was fundamental in facilitating critical feedback. Participants recognised the mutual critique between each other, felt open-minded to new ideas, and in a position of wanting to assist each other's work.

How did participants perceive peer reviews in terms of feedback received?

A key issue was to establish the participants' opinions about the quality of feedback that they received from their peers, particularly in comparison to that delivered in traditional reviews. Although one of the objectives of peer reviews is to develop critical analysis skills, if students do not value the feedback they receive this undermines the process as a whole; if feedback is valued in addition to developing such skills, then it is a win-win. Encouragingly, the feedback participants received was generally perceived positively by the significant majority of the group, as the following response demonstrates:

> I feel it was really helpful in discussing ideas about how the project could move forward. Unlike a traditional review, we had more time to relax and discuss the ideas in more details, which we don't always get the chance to do in traditional reviews.

However, two participants suggested that although the feedback was varied and diverse – which was perceived positively – it also meant that within the limited time frame of a review the feedback might not be as specific, or therefore in-depth. Also, one participant suggested that with peer review being a new experience they sometimes found it difficult to express points clearly and concisely, whereas in a traditional review the tutor critic would have much more experience in articulating feedback.

There were evident differences perceived in the nature and quality of feedback between peer and traditional reviews. None of the respondents directly questioned the validity of feedback from their peers, some even describing it as more palatable and less confusing! Furthermore, feedback covered areas not normally considered in traditional reviews, such as presentation techniques. The peer review environment fostered rapid sharing of diverse ideas, and therefore the feedback had a broader scope. However, half of the participants considered that the process lacked tutors' foundation of experience – such as an appreciation of wider architectural issues – and as such the feedback lacked depth, reinforcing the findings in White's study (2000, 215). Also, the feedback highlighted and discussed issues but did not necessarily suggest solutions in the way that a traditional review might.

What is the role of peer review?

The questionnaire concluded by asking how participants perceived the role of peer reviews in design modules. They were unanimous that peer review is a valuable complimentary session to – but not a replacement for – traditional reviews. The participants found peer reviews to be interesting, engaging and inspiring; they were unanimous in supporting them as a method for generating formative feedback on their work. One student commented that they didn't think colleagues in the year give each other enough feedback, and that the peer reviews were a good platform to voice opinions on each other's work. Participants also felt motivated following the sessions. Whilst both traditional and peer review are a form of oral evaluation, the latter is weighted much further towards 'dialogue' as opposed to 'presentation' in Joughin's range of interaction (2003, 148). Therefore it could be argued that peer review is more appropriate in generating formative feedback, particularly in the early stages of a design project where students are exploring ideas rather than refining them.

If staff-to-student ratios continue to rise then peer review might present an appealing strategy for providing formative feedback (Boud 1995, 36). However at a time of increasing fees is it acceptable for students to be adopting the role of critic, in place of tutors? Biggs (2003, 191) notes that some students resent reviewing other students' work, believing that is the tutors' responsibility. In this study the participants all supported peer reviews, but not as a replacement for traditional ones. For example, alternating peer reviews with traditional was suggested. One participant perceived the peer reviews more as an advanced tutorial than a formal review, which suggests a potential role for peer reviews between the tutorial and traditional review.

It is worthwhile noting that notwithstanding the unanimous positive responses of this study – a series of incidental events that took place outside the concurrent module – peer review is most successful as an integral element of the overall course (Sampson and Cohen 2001, 21). However, Vickerman (2009, 226) cautions that while useful for some, peer review is not a strategy for all students, and problems of acceptance are elaborated on further by Cohen and Sampson (2001, 61). Whilst participants were unanimously supportive it must be noted that they were all volunteers, and therefore others may be less so.

Conclusions

Some critical remarks can be made regarding this study. Firstly the sample size was small and there was a significant gender imbalance within the group; therefore conclusions drawn from the study must be treated with a degree of caution. Also, the facilitator for the project was one of the cohort's tutors, which may have impacted upon questionnaire responses. However, the very high incidence of unanimous responses is indicative of some robustness. It could be argued that volunteers are more likely to respond positively than if it were a requirement of all, but Boud suggests that those reluctant to participate might be more keen through experience in the process (2000, 157).

To answer Vickerman's (2009, 223) question of whether students find their peers' feedback valuable, the participants in this study were unanimously positive. Involvement clearly benefitted subsequent self-critical analysis, where heightened awareness caused participants to question their subsequent work as they designed it. They identified other learning in addition to the feedback received on their project, and beyond the peer review sessions themselves, such as: decision making, communication

skills, and inspiration. Being asked to critique work also effectively demonstrated the need for clear representation so that critics can understand a project through drawings and models. Participants did find it challenging to articulate their feedback clearly, however this was an unfamiliar experience.

Pond *et al* (1995, 317) highlight issues of low student motivation in peer review that had no bearing on assessment. In sharp contrast, although the reviews in this study had no summative dimension the participants were unanimously more engaged than in traditional reviews. However, this should be cautioned with the participants' perception that peer reviews were less onerous than traditional reviews, and therefore some approached the sessions with less preparation.

Contrary to existing research the majority of participants did not find giving their peers critical feedback awkward; this is particularly worthy of note given that participants were delivering verbal feedback, face-to-face. That participants felt able to be more critical with peers they were familiar with has implications for structuring peer groups. The peer reviews created a different environment to traditional reviews, in which participants could think more clearly and articulate themselves better; this generated very open dialogue with a wide range of opinions being expressed – something not experienced in traditional reviews.

Liu and Carless (2006, 285) comment that whilst research indicates students are able to make reliable summative judgements compared to tutors, the issue of students' expertise when delivering feedback remains unclear. In this study participants were generally supportive of the quality of feedback received from their peers, highlighting that valid and useful issues were raised that were often more palatable and less confusing. However, half the participants identified that the greater depth of tutors' knowledge gives deeper insight than a more basic comment from a peer, and that there were probably issues that were not raised in the peer reviews that would have been during a tutor-led one. Also, the open debate that was seen by some as a positive quality also meant that there was less direction given by the end of the review, and therefore less understanding of what participants' next step should be. Whilst Pearce *et al* (2009, 13) suggest that this helps students learn to distinguish between helpful and unhelpful feedback, it was clearly a matter of concern. Evidently peer review is not seen as substitutional (Topping 1998, 256) to tutor-led formative reviews.

Whilst nothing can be robustly concluded, the discrepancy in gender ratios between volunteers for the study and the full cohort is worthy of comment. The ratio of volunteers was 12% female and 88% male – very different from 36% female and 64% male of the cohort. It was not clear why this occurred. If it was due to female students' unease at the prospect of reviewing or being reviewed by their peers, then it could have serious implications on the appropriateness of applying peer review to a whole cohort. Research on gender in peer review is inconclusive. Topping (1996, 328) reports a study that compared Grade Point Averages for peer tutored and non-tutored students, which found that male peer tutored students achieved higher GPAs than non-tutored, but that female did not. However this contradicts the view of Boud *et al* (1999, 415) that collective peer learning may better suit female students, and Sara's (2001, 11) argument for feminising the architecture curriculum through increasing collaborative learning such as peer assessment.

Participants were unanimous both in their support of peer review as a part of the learning process, and in seeing them as supplementary to traditional reviews. In their collective responses there is strong validation of Sadler's view of peer review as a valuable pedagogical strategy (2010, 548). Peer review clearly has an important

potential role to play in architectural education, and indeed other creative subjects, particularly in the early stages of a project where ideas are being generated and explored. However the contradictions with existing research and the unresolved question of how gender impacts on peer review mean there is significant need for further research. The author's ambition is to integrate peer reviews as a formative assessment method within design modules. It will be particularly informative to introduce peer review across the full cohort, or across all undergraduate levels, thereby increasing students' familiarity with the process, and undertake a similar study of establishing the students' perceptions.

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Internationalisation of design education

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Design Education and non-EU students: shifts in teaching practice

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Abstract: *The number of UK international HE students has gradually increased over the last decade, in particular the number of non-EU Chinese and Indian students. This influx has resulted in the recognition that exposure to an unfamiliar pedagogical cultural habitus can cause problems, often compounded by language problems. This paper outlines the response of an MA teaching team at Coventry University to misconceptions that a cohort of Chinese and Indian students expressed during a research methods module. This was evidenced by uncertainty as to what they were expected to produce in terms of a research proposal, as the extension of the boundaries of creative thinking necessary to tackle 'wicked problems' seemed beyond their capabilities. This echoed previous undergraduate research, which surfaced a threshold concept, 'the toleration of design uncertainty'. Using this as a baseline, the teaching team shifted from a sequential method of teaching, towards a much more conceptual mode, underpinned by use of visual tools and a greater emphasis on group collaboration. These innovations are now been embedded within the curriculum, and early indications are that students are much more engaged and confident in the embracing of research territories: the innovations have also been introduced across the whole MA curriculum.*

Keywords: Internationalisation, Masters Course, design education, design education methods

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Introduction

The number of international students studying in the UK has gradually increased over the last decade, in particular the number of non-EU students. According to Universities UK (2011), the numbers have more than doubled, and there was an increase of 11.7% between 2009 and 2010.

Further, according to UKCISCA (2012), there were 298,000 non-EU students in 2010-11 and of these the majority (43%) were postgraduate taught students (followed by first degree students at 38%), with the top non-EU sending countries being China and India (67,000 and 39,000 respectively). China (excluding Hong Kong, Taiwan and Macao) provided the second highest number of students for postgraduate taught courses, and India the highest. (Universities UK 2011)

This large representation of Chinese and Indian students in the non-EU student figures, particularly in taught postgraduate courses, is reflected in the experience of Coventry University, in relation to industrial design Masters and MSc courses. In 2011/12, of the 37 students on the course, 14 were from China and 13 from India; in the current academic year, the figures continue to show dominance in terms of Asian students, comprising 24 out of 31.

The preponderance of Chinese and Indian students on a creative arts course perhaps reflects the recognition of the link between creativity, competitiveness and global marketplace success. This is a link that the UK has long recognised with the consequent need to focus on and develop this to enable UK competitiveness within a global marketplace (HM Treasury 2010).

However, it seems that the Asian hemisphere has also recognised that creativity and innovation is crucial to its success on the world stage, and has thus established a renewed focus on the development of creative thinkers. Specifically, in China the focus is on educational courses that feed and develop its creative industry (British Council 2012) and in India the pedagogic focus has moved from rote memorisation to conceptual understanding (Stewart 2009).

But, despite any changes in their educational systems, all non-EU students will still have to make adjustments within an unfamiliar pedagogic culture or habitus (after Bourdieu 1989), when they arrive in Western Universities. For Carroll and Ryan (2005) this means that they have to face “different social and cultural mores and customs, norms and values from the ones they have known; different modes of teaching and learning; and different expectations and conventions about participation and performance”. This is echoed by Kutieleh and Egege (2004), who highlight the depth of cultural shift required by international students and indicate that many Western rooted educators act on an implicit cultural assumption that critical thinking is core to good thinking but unintentionally overlook that this is not rooted in most Asian education systems.

Linked to the lack of embedded critical thinking within the curriculum is the reluctance by many Asian students to interact within the classroom. For Chinese students, this is thought to be related to the power-distance dimension – the further away from the source of power a learner is, the more powerful the teacher is, and vice versa. In Western cultural pedagogy, there is a low power-distance, so students are expected to question, criticise and interact with teachers; in contrast, Chinese students see the teacher as a source of knowledge with a responsibility to lead sessions. This is seen as the Confucius educational model which is based on “respect for authority and

consensus seeking and collectivity" (Hongsong 2007:3), and is therefore "fundamentally didactic"(Beck et al 2009).

Similarly, India's National Institute for Design recognises that its initial task in relation to its undergraduate students is to "nullify the pedagogical shock by making the [undergraduate] student unlearn old things and old ways that are carried with them into higher education from a system that is an over structured, didactic, rote routine restriction type". (Balaram 2005:16).

This adjustment to a different cultural pedagogy is perhaps especially difficult when non-EU students enter a creative discipline which privileges individual agency as a core part of its curriculum. Thus, the unfamiliarity with both pedagogic culture, and a concomitant discipline freedom can negatively impact non-EU students' ability to manage the transition from a more structured educational habitus towards coping successfully with an open brief environment.

This unfamiliarity was reflected in data gathered from a longitudinal study carried out between 2005 and 2010 by Coventry University's Centre of Excellence for Product and Automotive Design (CEPAD), which identified 'the toleration of design uncertainty' as an undergraduate threshold concept. Threshold concepts are defined by Meyer and Land (2003) as:

> akin to a portal, opening up a new and previously inaccessible way of thinking about something...a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress.

This identification of the 'toleration of design uncertainty' (Osmond et al 2010) - defined as the moment "when a student recognises that the uncertainty present when approaching a design brief is an essential, but at the same time routine, part of the design process'"- led to a redesign of the undergraduate curriculum in 2010. The focus is now on the provision of safe spaces for industrial design students within which they can experience the intense uncertainty that is a routine part of the design process.

Part of the longitudinal study also involved interviewing international students who outlined how different the open brief environment was from their previous educational experiences. Therefore, the international students seemed to find the negotiation of the journey through an uncertain and unsafe creative space more problematic than domestic students, as many of the former had not already experienced such spaces in their previous educational background.

This has also been reflected more recently with a cohort of non-EU Masters level students. This necessitated both local analysis of the pedagogic approach and a consequent shift in teaching practice within a module focusing on design research activity.

For Wagner *et al* (2011) there is currently no pedagogical culture established in relation to teaching research methods, especially from a critical and creative perspective within higher education and, taken on an institution-to-institution basis, the status and functions of those that teach design research "vary widely". As well as arguing for a widespread debate on this subject, Wagner et al also argue that understanding what students' conceptions of research are can allow a "more carefully targeted pedagogy".

This is reflected by Farfán *et al* (quoted in Wagner) in that understanding what students' conceptions of research are is even more essential as they recognise that there is a challenge inherent in teaching students "whose epistemologies differ

significantly from those that dominate the research paradigm of most methods courses".

The need to support international students reinforces this debate about the structure and techniques for imparting a critically centred design research approach.

The following case study illustrates some instances of unfamiliarity with a Western cultural pedagogy and consequent misconceptions in terms of design research methods that both Chinese and Indian students expressed during Masters level industrial design modules. These misconceptions resulted in the initial teaching strategy being reshaped and the acknowledgment that the threshold concept identified for undergraduate students now has some currency in informing future curriculum design for non-EU students.

Methodology

The focus was on 14 Chinese and 13 Indian students undertaking an MA Research Methods module during the 2011/12 academic year. The research goal 'How can we enhance critical and creative design thinking abilities with international cohorts' were to be achieved through interventions, evaluation, key observations and outcomes as detailed in Figure 1.

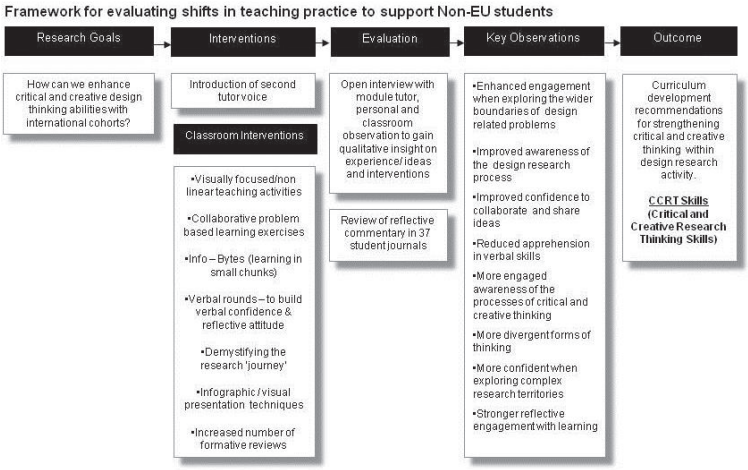

Figure 1:Framework for Evaluation

Teaching Design Research to Postgraduate Students

This case study explores the experience of a postgraduate teaching team in the Industrial Design Department of Coventry University that were tasked, in 2011/12, with facilitating design research thinking with a Master level cohort predominately made up of non-EU students. It was the first experience of this teaching team working with an almost entirely international cohort on these modules.

The aim of the teaching is to get the students to creatively engage with the research process and so they are expected to identify a research problem and frame a feasible

proposal that is likely to lead to a strong design 'innovation angle' to inform well evidenced design activity. The process is centred on generating a self-defined problem/opportunity informed by in-depth research to propose a design solution, manifesto or guideline that is creative, innovative, socially relevant and intellectually challenging.

The course sits over a traditional undergraduate degree course in product or transport design and aims to equip graduates to operate successfully as visionary design strategists, design managers, consultants and interdisciplinary contributory thinkers who have the skills and imagination needed to effect real change through design. In other words, the aim is to help students to "think big" (Brown, 2009), act as design thinkers and challenge existing preconceptions about the problems and opportunities of the world and its societies. This skill is potentially important at all levels of the design process, from identifying strategic opportunity, through to ensuring good understanding of customer experience (Hunter 2012).

The design research teaching is structured in two phases (Figure 1). Firstly project formulation which then, secondly, leads into a final major project. These phases are complemented by a whole range of other modules that engage students in learning surrounding the critical and creative design process and its related activities and skills development.

As the first term progressed, the teaching team became very concerned about the challenges students faced. Commonly for example, Chinese and European students had had a very strong design practitioner training, but Indian students tended to be from an engineering or business background and thus had very logical mind-sets and saw researching as a highly procedural activity with little appreciation of context. Many of them found written English a challenge and referencing a very difficult concept, which seemed strongly linked with cultural tradition and practice. To begin the module students are required to bring a problem/opportunity to the teaching team for discussion. This proved to be the most challenging phase of activity and one that centred around the framing of a research question and definition of a research territory – often recognised by the tutors as a 'troublesome activity'. Many of the students had never had to independently formulate their own research question or problem statement before, as prior teaching had evidently been centred around 'given' objectives.

It was also apparent that while international students are often very comfortable with desk-based research, they found the "wicked problem"(Buchanan 1992) nature of design research a challenge as it is in a highly empirical and inductive research domain.

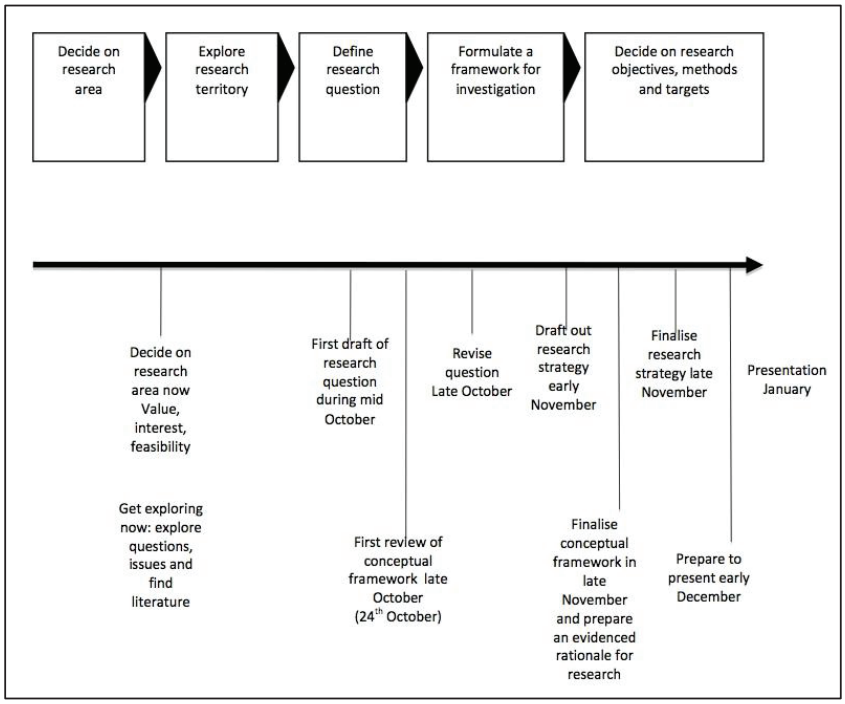

Figure 2:Example framework for completing the project formulation phase

As such this was often outside many of the students' more natural engagement with deductive forms of research and analysis. The inductive exploration of research objectives (Figure 2) was often very uncomfortable for the students, leading to much uncertainty and appearing 'needy' as a result of not having clear boundaries or solution focus. Confidence to engage with research arguments proved to be a central challenge for students and echoed 'the toleration of design uncertainty' undergraduate threshold concept identified previously by CEPAD.

Therefore, whilst many of the students understood the creative boundaries of tackling a design brief by researching around a given set of constraints, they were less able to operate successfully when there were none and only a problem territory to explore. It seemed difficult to explain to the students the key focus of the major project - to put across a 'design argument' centred around often tacit and/or intuitive starting points about design and problems of the world. To encourage confidence with more experiential forms of design, the students were strongly encouraged to select research areas that were quite personal to them, for example, sports, music, personal interests, as it was thought likely that their experience of these subjects would make it more 'natural' for them to explore on a more holistic and intuitive level. Value metrics were introduced to help the students recognise the value of their own experiences as a potential project starting point. However one student often apologised for having a project she was passionate about, thinking that in some way this was a negative basis for a project.

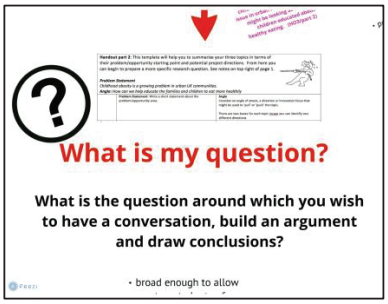

Figure 3: Sample screen from 'Exploring Research Territory' lecture

This difficulty was exaggerated by significant classroom challenges in getting students to speak out in a seminar situation, especially in relation to project progression. Teaching methods initially comprised lectures with groups of 37 with scope for activities and questions (Figure 3). Often it took much effort by the tutor to facilitate an engaged conversation from more than a few students, and break-out cross-cultural groups seemed difficult to achieve. By the end of the first term it was evident that the Chinese students tended to stick together, with only one or two people speaking on their behalf. Consequently, the tutor was uncertain as to how much the students were in fact understanding the lectures, and the result was fairly disappointing module results at the proposal stage. Meanwhile the Indian students appeared confident in speaking independently and held strong viewpoints, but these viewpoints were often lacking a 'depth of evidence' This necessitated a number of students having to redirect their project foci.

After the challenges of the first term which was mainly lecture/seminar driven, a second tutor who specialised in critical and creative thinking joined the team. Immediately the advantage of having a second voice bringing a much more discursive teaching style: having a shared perspective in the teaching team enabled strong self-analysis of the teaching approach and many ideas for classroom intervention.

M134ID Insight, Inspiration, Innovation, Investigation

This series of activities is designed to kick start your experience of gaining insight and inspiration for design innovation. It will help you become familiar with the Coventry University approach to investigation and knowledge development for design.

Living Climate Change

Schedule:
Tuesday 4th October room GS222
Taking a topic and exploring its possibilities

Objective: To work as a group to recap on research investigation and knowledge extraction methods in order to identify an innovation opportunity.

Outcome: To produce a presentation slide which evidences an innovation opportunity based upon a pertinent global challenge.

10.00 Introduce the Grand Challenges Research Agenda to the module group as starting points for projects. http://wwwm.coventry.ac.uk/researchnet/grandchallenges

- Integrated Transport and Logistics
- Digital Media
- Ageing Community
- Low Impact Buildings
- Sustainable Agriculture and Food
- Low Carbon Vehicles

11.30 Ideo 'Living Climate Change' challenge

Brainstorm: 1 - aspects of human life affected
2 - knowledge of climate change issues

14.00 Pin up personal slide with **Who Am I?** slide: Make sure name is on it

Group work - GS220 & 222
Discuss an aspect of human life affected by climate change that emerged from the brainstorm session, re-watch the videos.

Decide on an angle for investigation and what your group needs to know more about - use post-its to capture everything, then prioritise issues that interest the group.

Figure 4: Example of an early task set to promote team working and creative topic exploration

For example, it was identified that it would really help to get a better balance between traditional PowerPoint-led lectures and non-sequential delivery which focused more flexibly around problem definition, framing of research, methods, analysis of results and planning: in short, a visual and discursive teaching method was employed to help promote understanding. This was in contrast to the initial goals which were linear and straightforward in approach in order to support language confidence. To implement this new approach the team put together a programme of critical and creative research technique skills through visual tools such as short videos and Prezi presentations combined with practical activities such as drawing out research journeys. (Figure 4).

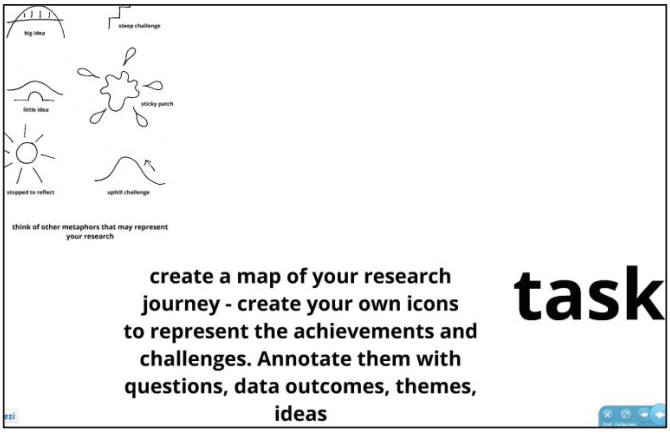

Figure 5: Screen shot of a seminar task delivered via Prezi

Prezi is a free cloud-based presentation tool in the form of an open canvas that can be explored in a much more spontaneous way than PowerPoint. A path of content can be followed but allows emphasis and exploration of the presentation space. The

prioritisation of content according to the different emphasis needed can be specified - for example, the ability to hide detailed text, whilst at the same time allowing large and visible key prompts throughout the presentation. For the teaching team this provided a way of presenting explorative materials and concepts and thus enabled a more holistic way of expressing 'thinking styles' and critical and creative approaches to research. In short, the team aimed to move out of the procedural and into the conceptual levels of engaging with design activities. Short videos were also used, such as YouTube movies, tutor blogs and lectures that utilised graphic examples and other media to explain how data might be drawn together or explored. Another activity introduced was a lecture called 'research by metaphor' which was designed to get students to understand the approach as a 'journey of discovery'. (Figure 5).

To support this the students were introduced to methods of presenting information in the form of iconographics to help them transform research data and explain ideas in fewer words. This proved useful in explaining complex terms in a more universal language. This also aimed to support the preparation of research posters that evidenced the students' thinking processes. London-based author, data journalist and information designer David Candless's[1] work was referred to in order to encourage the students to appreciate that complex information can be designed.

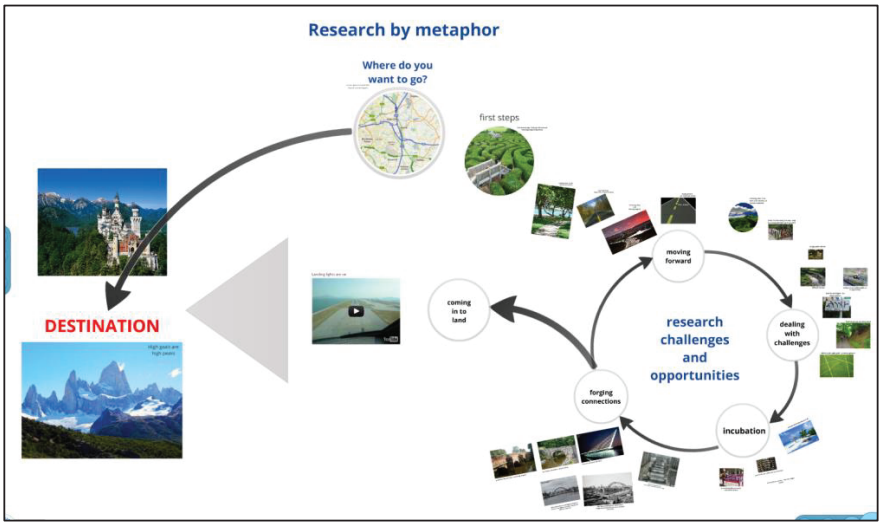

Figure 6: Research by Metaphor

Alongside this were scaffolded verbal presentation activities which aimed to gradually improve the student's comfort zones when presenting in front of colleagues. This was especially pertinent in relation to challenging research concepts and arguments where students lacked confidence to speak on a subject that was often inductive or contextual in nature. Thirty-second round-room individual presentations were organised and over the weeks built up to full length 'mock vivas'. It was felt that this approach also encouraged a more reflective attitude to learning and from the second term the student voice became central to activities. For example, the students

[1] http://www.davidmccandless.com

were asked to express their personal learning experiences and design knowledge and analyse texts to highlight themes and make connections. In other words, the students, both individually and in groups, were encouraged to deconstruct and verbally present their views.

Over the year the idea of group debate become more dominant in the teaching approach and helped the students not only grow their confidence, but also put their own research into an 'active space' (rather than a 'step-by-step' procedural space).

As the major project progressed into its final weeks there seemed to be an 'enlightenment moment' where students suddenly became more engaged in seeing the opportunities and thinking more creatively about the research outcomes, although it is acknowledged that one motivating factor may have been the added element of time pressure.

One example of this involved a Chinese student who initially focused his study on the limited scope of using a memory stick (Figure 6), but eventually engaged with the critical challenge of exploring how to capture and interact with digital memories, and went on to produce a future concept for a gesture-controlled product that helps to store, recall and interact socially with memories (Figure 7)

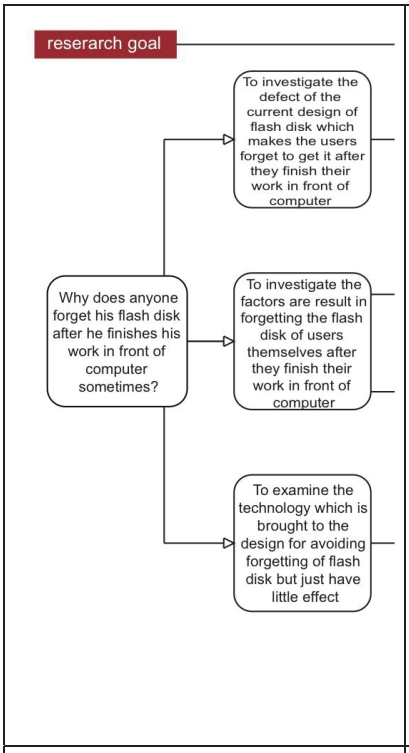

Figure 7: Initial student proposal which lacked a critical approach.

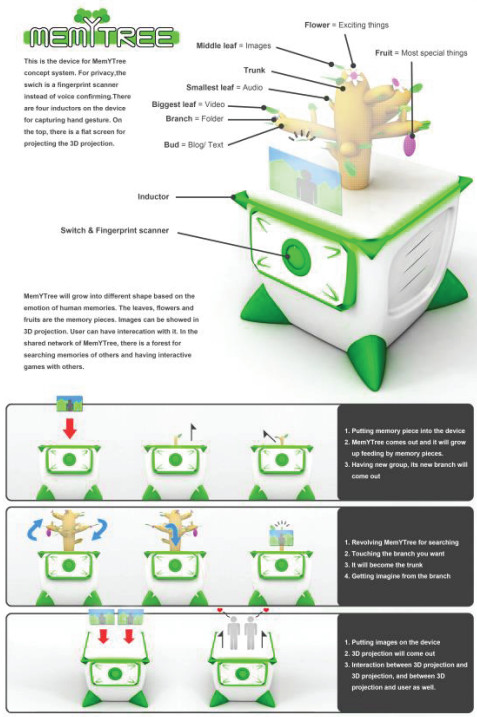

Figure 8: Final proposal which has a deeper level of critical engagement

The following feedback from the students at the end of the major project module reinforces that the shift in teaching practice from a procedural model to a more

discursive and visual approach, did enable many of them to embrace more deeply the critical and creative design thinking processes.

> I began to recognise that research was not just a collecting process, but one of analysis with one's own data.
> One thing about Chinese education is that we are taught with the same skills that teachers have. But here, the teaching goal is to let people find themselves in every subject. It paid more attention to the creative part and how to shape those fancy ideas into the real stuff.
> Before this, I thought that the ideas which came from the human head could be a little different from each other. It really shocks me when I compared the ideas from my French classmate with my Chinese classmates: I have to say I am inspired by those wonderful ideas.
> Before, I would treat any lamp as what it is. A tool we need in the dark, maybe gives it some beautiful form to let it be romantic. And that is it, closed the question. But now, I learned to look at it in different aspects. Now, my brain would give me crazy ideas like: if the goal is to see things clear why use lamp, we could use several other ways to fulfill that needs. How about using supersonic wave? How about glowing objects? How about changing the range of eyes' adjustment?
> As I started progressing in my research I've learnt to continuously ask 'Why' at different levels. This has enhanced my reasoning capabilities. Internet, Books, inside and outside experts helped me propel through my research. The library started becoming my second home.
> This project has enriched my way of thinking and helped me to realize the importance of research process which I have regrettably underrated during my previous projects. It also forced me to overcome the apprehension of talking to people in a foreign language and thus improved my self-confidence.

The approaches outlined above have now been integrated into the very start of the new academic year – particularly those that encourage group based object analysis on artworks in the city, in order to get students speaking out very quickly about ideas and potential research challenges. To begin with a one-week intensive set of workshops were introduced aimed at getting students to talk to each other, work collaboratively and explore problem/opportunity contexts to form the basis of new research questions. Now four weeks into teaching the 2012-13 cohort, the teaching team are seeing much more engaged and confident embracing of research territories.

Conclusion

As outlined in the introduction to this paper, there is evidence showing that within this module, the Chinese and Indian students experienced problems with an unfamiliar cultural pedagogy/habitus in relation to an initial sequential teaching method.

The teaching team identified challenges in relation to dealing with framing and engaging with ill-defined problems, and they also recognised that the students often had a very different power-distance dimension, in comparison to domestic students. This necessitated considerable engagement strategies in order to help them embrace a western model of design thinking whilst building on their own specialist and cultural foundations.

It was also recognised that the students had one challenge in common – the extension of the boundaries of creative thinking - from solution focused to problem

focused. This is the area that students did not appreciate, as it seemed 'wicked problems' as a concept was beyond their experience base. In essence, whilst the students with design experience understood the mechanisms of basic creativity for design exploration, they found the concept hard to translate into a wider problem-solving context. This was evidenced by uncertainty as to what they were expected to produce in terms of a research proposal: therefore, when presented with the freedom to set their own research focus, the students struggled to formulate this, despite efforts being made to encourage them to focus on personal experiences.

This difficulty was compounded by a reluctance to speak out in the classroom, with the Chinese students tending to rely on one 'spokesperson' to carry out this function. For the Indian students, although they were confident in speaking out, when they did so the result was a lack of deeper understanding of the subject matter. Thus, collaboration was also at the heart of this challenge: different cultural and educational values required the teaching team to work at engaging students in a collaborative dialogue about their research territories. Other problems included lack of proficiency in written English and unfamiliarity with referencing.

To tackle these problems, the teaching approach was revised to focus on a much more conceptual delivery, and thus moved away from a step-by-step process, which, it could be argued, was what the students were familiar with and did not help them to break away from a method that does not lend itself to creative and conceptual thinking. This conceptual delivery was underpinned with a strong focus on visual materials in the form of a presentation system that encourages 'mind mapping' and other visual tools - such as short videos, YouTube movies, tutor blogs, iconographics and lectures that utilised graphic examples. Another innovation was a much stronger focus on debate style classroom activities, in particular thirty-second round-room individual presentations, which built up to full length 'mock vivas'.

As a result of the changes, the teaching team did identify a leap in capability at the end of the year, helped by regular formative review points introduced for the last six months of study which involved submitting aspects of learning outcomes. These review points were aimed at supporting language difficulties, helping the students to build their research argument and trying to avoid problems such as plagiarism. In essence the teaching team offered in depth feedback through audio and written media as it was felt that this combination gave the students media that might be better suited to varied levels of English language comprehension.

The main pedagogic goal that the teaching team has taken away from this case study is the need to engage students early on with reflective tasks that allow them to build upon their cultural and discipline core with the experience of critically and creatively challenging problem contexts. This is to help students believe that they have valuable interests and experiences that provide good starting points for embracing intuitive and inductive research, and also help the tutors to better understand the students' experiences of learning.

Although there is much to do and much to learn in order to support the cultural and discipline richness of the student groups, the approach has been to focus on making intervention across the whole programme - rather than just the research modules - in order to embed a collaborative and integrative culture that has critical and creative challenge at its core.

Finally, the teaching team's recognition that the students' struggle with creative and conceptual thinking was linked to the undergraduate 'toleration of design uncertainty' threshold concept was useful in framing the curriculum intervention. That this

undergraduate threshold concept has also been evidenced with Chinese and Indian international students seems to point to the importance of previous educational backgrounds in the design field and how this can shape how students cope with the conceptual and critical thinking that allows them to test their own creative boundaries and thus build up the confidence to challenge design conventions.

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Multiculturalism as an Approach to Prepare Egyptian Government School Students for Micro-Scholarship Through Art Workshop

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Abstract: *Egypt today needs to build a modern democracy while respecting its own heritages and those of others. We should therefore invest in developing multicultural notions of peace that will help different people and nations to understand and respect each other. This would reduce conflict. Art enables students to express themselves and to convey information about their cultures. For this reason, this aspect of education may be considered to be one of the most important in promoting mutual understanding with other cultures, and achieving peace. The concepts of multiculturalism, cross-cultural empathy, awareness, responsibility, participation, personal achievement and mobility reveal to us multiple strains of thinking that now compete and coexist under the umbrella concept of global citizenship. This paper addresses the achievement of mutual understanding with other cultures through art workshops with secondary government school students in Alexandria, Egypt, who participated in The English Access Micro-scholarship Program (AMIDEAST) 2011 in order to: 1) Prepare students for diverse workplaces and multicultural environments. 2) Promote better understanding of other cultures and societies through art. 3) Nurture creative insight through cultural appreciation and comparison. 4) Facilitate problem solving and knowledge of other cultures. 5) Enable students to contribute to their societies' development.*

Keywords: Multiculturalism, Global Citizenship, Micro-scholarship, Art Education, Government school.

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Introduction:

Following the revolution of the 25th of January 2011, Egypt is still in need of a true democracy, which will not be achieved through elections alone. Democracy will come with a new constitution that enshrines equal protections for all, the rights to freedom of expression and association and, most importantly, a quality, democratically-based education that helps to convey citizenship values and skills for peace-building. Schooling can teach people to interact successfully with others, and demonstrates the benefits of civic participation, which reduces the likelihood of anti-democratic coups.

Multiculturalism is a system of beliefs and behaviours that recognizes and respects the presence of all diverse groups in an organization or society, and acknowledges and values their sociocultural differences. It deals with people's beliefs about others, their basic paradigms, and how these impact and are impacted by their behaviour.

Exploration of different cultures around the world is very important in fostering an understanding of similarities and differences among people and their cultures. A rich, multicultural education promotes global citizenship and an appreciation of what individuals bring to the larger community. Building this awareness in children from an early age helps them to develop compassion towards others and teaches them to navigate a diverse community.

Multiculturalism is a growing concern in many communities today. The international community is expanding, with a large number of people visiting and moving to other countries. Improved communications have also paved the way for closer global relationships. It is therefore important that students understand and accept the concept of cultural diversity. However, unfortunately, stereotypes and misrepresentations of ethnic groups still exist in many societies. This makes the need for an increased focus on multiculturalism even more urgent. Having an understanding of other cultures is crucially important, as it may help to maintain stability in society.

Egyptian students often hold narrow, stereotypical views of people and places around the world. These ideas are reinforced within many curriculum areas, including visual art. This is because the main objective of art as a subject at Egyptian government schools is for learners to learn about art's functions, aesthetics and techniques through exploring their own identities, and rarely through studying the art of others. Their knowledge and experience in relation to art from other cultures are therefore very limited.

I believe that students can learn about themselves and others through art education. This is especially significant in teaching and learning through different cultures and perspectives, as well as in understanding the value of art in society and its role in both initiating and documenting cultural change. Art is more than creative expression, which has been the dominant theme of art education for much of the twentieth century. Expression is important, but researchers are also finding connections between learning in the visual arts and the acquisition of knowledge and skills in other areas such as the development of higher order thinking skills, creativity, and problem-solving abilities.

Multicultural studies have focused on how art education is used to teach tolerance of differences and diversity, and the inclusion of multiple cultural perspectives in the educational curriculum (Badrul Isa 2006, p. 5). This curriculum is designed to develop students as citizens in a democratic society by considering all of their needs.

Art, according to Chalmers, is a powerful, pervasive force that helps to shape our attitude, beliefs, values and behaviors. An understanding of multiculturalism and art education concepts will help educators to build bridges amongst students. Chalmers believes that multicultural art education's advantage lies in allowing students to showcase their creativity, imagination and insight as well as incorporating and making history. In addition, important skills such as being able to communicate effectively, being creative and being able to criticize can be gained from the study of art and how it presents different cultures (Chalmers 1996, p. 12).

Egypt and Multiculturalism

We are aware of the difficulty in formulating a simple operational definition of culture, due to its many possible interpretations (Smith 2009: p. 267). According to the narrow definition, culture is characterized aesthetically, in which case the focus is on the arts; however, as a broader concept, culture includes the ways in which we live in our communities and societies.

Multiculturalism is a term indicating the presence of a relationship between and/or within two or more cultural groups. Egypt has always been a multicultural state. For example, in 3200 BC, the country saw the union of its northern and southern kingdoms; in 525 BC, it experienced the invasion of the Persians; in 27 AD, Christianity appeared; in 640 AD, Egypt was subject to the Arab Conquest, and in 1798-1801 AD, the French Invasion. Thus, Egyptian culture reflects Paranoiac, Nubian, Islamic, Hellenistic, Bedouin, Jewish, Christian, and Western influences. No one culture has been able to totally dominate; all have persisted alongside others. In Alexandria, Pompeii's Pillar sits side-by-side with a sphinx. The Belle Epoque architecture of downtown Cairo is influenced by the building of the Khedive Ismail and French architecture. Today, most celebrations have a religious orientation (Mounira 2012).

In the past, the ruling groups tolerated diverse cultures, but their aim was generally to integrate minority groups into mainstream culture. In order to understand the problems of today, it is worth investigating the dynamics of modern civilizations and the reasons why multiculturalism arose as an answer to the changing spatial pattern of cultures.

Contemporary multicultural today is differ from their antecedents in many ways. The process of globalization, which started at the time of the discovery, sped up dramatically in the second half of the 20th century due to new technologies allowing rapid travel and telecommunication. Because of the increased mobility linked with air travel, people in remote areas are discovering new ways of life through their contact with tourists. International migration has resulted in a growing number of foreign groups settling in the great cities of both developed and developing countries. New communication technology makes it easy for migrants to maintain contact with their home countries, and gives their cultures more of a chance of survival.

The immense cultural mix of Egypt population makes it a unique Middle Eastern Country. The culture of modern Egypt includes a variety of live traditions that remain from the time of the Pharaohs, as well as those that were brought in by the many invaders throughout the centuries. Contemporary Egyptian culture is a mixture of a multitude of elements, shaped by the progression of historical events, which has contributed to the development of Egypt's current atmosphere (Atta-Alla 2008, p.114).

The Egyptian educational system is geared to form a student who might academically be brilliant but very conservative from the social point of view. Egypt has

national k-12 curriculum mandated by the Ministry of Education to be taught in all schools. The national k-12 curriculum in Egypt is not culturally or religiously pluralistic.

It is essential to prepare educational policy makers, teacher educators, school administrators, teachers, and students for the increasing diversity in the classroom. The insensitivity of the educational policies, rules, practices, school culture, and curriculum in Egypt to the culture and needs of students from different background

Issues of cultural diversity, multiculturalism and global citizenship have become some of the most important concerns in education as globalization influences the cultural and personal perspectives of unique societies. Multicultural education functions as a tool for promoting justice and social change in three main ways. Firstly, the transformation of self enables individual awareness through teaching and learning. The second tier, which we will thoroughly examine, involves the transformation of schools and schooling. The third and final tier involves the transformation of society, furthering the ideas of justice and social change (Gorski 2010).

The issue of multicultural education is nowadays one of the most challenging and dominant topics in art education because art plays a role in instilling the awareness of other cultures. It also heightens the sense of belonging to one's own culture. As a medium of communication between particular cultures or groups, art increases awareness of cultural values and attitudes as well as beliefs. Hence, it is a tool that not only defines, but also instills and implants a sense of shared heritage and identity.

The teaching of art in schools and higher learning institutions varies from one place to another. For art to be valued, it is essential to understand what it is and how can it play an important role in developing good relationships between people of different cultures.

Global Citizenship and Multiculturalism in Art Education

Global and multicultural citizenship are two sides of the same coin, one internally focused; the other externally focused. Together, they promote social cohesion and economic advantage globally and locally.

To prepare students for citizenship in the global age, efforts need to be made to bring about changes in content, social context, and methods through which cultural values are taught. Anderson described these changes in terms of social context as moving from:

(1) a mono-national context to a multinational context;
(2) a mono-cultural context to a multicultural context, and
(3) a school-bound context to a community-involving context.

Here, art teaching is discussed from multinational, multicultural and community-based contexts, and as part of global education (Anderson 1979).

Art is unlike important as much as any other subject which sometimes require students to solve problems or issues on their own. Art is a subject that involves public response, and requires scholars to collaborate with each other in order to produce work. (Mason 1999) viewed art as the subject closest to culture. When culture is shared, understanding and respect can easily be cultivated.

Art is usually fun for most students, although some tend to get bored of it quickly. The key is to find activities that interest all of the students. As students learn more about cultural art, they are more likely to remain focused. This could help them to:

Appreciate the art and design production processes, symbols and aesthetics of different cultures;

Identify the potential and means to raise cultural awareness among themselves and others through art;

Nurture creative and artistic insights through cultural appreciation.

Global Citizenship in Art Education

Global Citizenship as a concept is not new but has taken on new meaning as a result of globalization and the understanding that what happens at local and national levels do have an impact globally. (Lynn Davies 2006 "Global citizenship" term, although is based on ancient concepts. In both Ancient Greece and Ancient Rome, a "citizen" was someone who not only belonged to a place, but also played a role in advancing society; someone who made life better. As the theory of "citizenship" developed and interaction between different countries and cultures increased, several Ancient Greeks and Romans began to call themselves "citizens of the world" or "global citizens". They started to look at their lives in a much wider context. (Goodwin 1871, p. 19).

As Schattle (2009) points out, the concept of global citizenship is not a new one; it can be traced back to ancient Greece. But the concept and the term seem to have new currency and are now widely used in higher education. Many institutions cite global citizenship in their mission statements and/or as an outcome of the liberal education they provide. Many have "centres for global citizenship" or programs with similar labels (Schattle 2009, p. 5).

Global citizenship education has grown out of the practice of global education which had its focus in international awareness through participatory learning and engaging in holistic learning activities. The overriding goal of global citizenship education is to prepare students to play an active and positive role in their dealings with school, family, society and world. This includes being active and responsible participants in their own communities, and, as far as possible, being active and responsible participants in the wider community of human being others living in their own region or country, and on planet Earth. In many settings, acceptance of diversity and respect for other human rights norms are of particular importance, as well as the development of a collaborative mindset that enables students to solve problems in a peaceful way.

According to (Banks 2004), global citizenship education needs to be changed in substantial ways to prepare students to function effectively in the 21st century. Citizens in the new century need the knowledge, attitudes, and skills required to function in their ethnic and cultural communities and beyond their cultural borders. It is also important to enable individuals participate in the construction of a national civic culture that is moral and just community and embodies democratic ideals and values, such as those embodied in the Universal Declaration of Human Rights. Students also need to acquire the knowledge and skills needed to become effective citizens in the global community.

Art lessons seem to be a particularly good forum for fostering this kind of understanding due to their focus on other cultures. Students can discuss and analyze traditions, customs and daily life in other cultures through their artworks. Finally, students can create, experience and their own art, reflecting their own culture and those of others. In addition to developing their own abilities and sharing meaning with classmates, students can send their masterpieces to students in other countries as well.

Including global citizenship in education will teach students:

To be more tolerant, understanding, and accepting of others;
About developing countries and how to discuss and represent issues through language and art;
To develop understanding of a variety of cultures;
To be more socially responsible.

Within the educational system, the concept of global citizenship education (GCE) is beginning to supersede movements such as multicultural education, peace education, human rights education and international education. Additionally, GCE incorporates references to the aforementioned movements. The concept of global citizenship has been linked with awards offered for helping humanity. Teachers are given the responsibility of being social change agents, which in turn reflects the shift towards a focus on human rights and responsibilities, implying a more active role that moves beyond an awareness of the issues.

Multicultural Art Education

The aim of multicultural education is the ability to celebrate the "other" in a manner that transcends all barriers and brings about a unity in diversity. Multiculturalism enables us to look upon the other —that which society has taught us to regard with distrust and suspicion— and to contribute as a beneficial partner (Rosado 1997, p. 2-4).

Multicultural education was beginning to take hold in Europe and North America. The main reason for this increase in the recognition of 'other' cultures was related to the increase in cultural diversity. As this continued to progress, art seemed especially relevant to multiculturalism, possibly more so than other subjects, for several reasons. (Boughton and Mason 1999) explain that art is not limited by language, and there are as many arts as there are cultures. It is a powerful tool for instilling a sense of identity.

The chief aims of art education should be to foster understanding of art from a variety of cultures, to enhance understanding of other cultures (Chalmers 1996, p. 9). Chalmers believes that multicultural art education has its advantage in allowing students to showcase creativity, imagination, insight as well as incorporating and making history. In addition, important skills such as being able to communicate effectively, being creative and being able to criticize can be gained from the study of art and how it presents cultures.

As state educational systems in many countries scramble to develop and implement multicultural art education curricula to meet the needs of a rapidly diversifying population, the need for analytical research directed at identifying and clarifying the unifying themes of multiculturalism are of major significance for turning theory into practice (Banks 1992, p. 32). The intention behind multicultural art education means that it must be oriented toward both the communication of knowledge about varying cultures, and a greater understanding of culture in pluralistic societies. This kind of education also supposes that each individual is conscious of his or her own cultural membership and looks at his or her own socialization in order to move beyond prejudices related to otherness, in whatever form, and thus better communicate with the other. (Trude. 2004).

The two aims of multicultural art education as defined by Chalmers are to:
Promote cross-cultural understanding through the identification of similarities (particularly in the roles and functions of art) within and among cultural groups, and

Recognize, acknowledge, and celebrate racial and cultural diversity while also affirming and enhancing pride in each individual's own artistic heritage (Chalmers, 1996, p. 5).

In accordance with Chalmers' ideas, I held a one-month art workshop in conjunction with AMIDEAST in Alexandria in 2011, for one month in order to help the students on the Access Micro-scholarship Program to take pride in their own culture as well as gaining respect and appreciation for the art and customs of other cultures. The workshop set promoting cultural awareness, promoting self-identity, and encouraging unity through diversity as its goals. As well as to increasing awareness of other cultures, students are taught to respect these differences.

Multicultural Art Workshop as a Tool to Prepare Students for Global Citizenship

Many national and international organizations and networks have devoted themselves to helping institutions promote global citizenship, although they may not necessarily use that term. For example, the Association of American Colleges and Universities sponsors a series of programs concerned with civic learning, a broad concept that includes several goals for undergraduate education: strengthening U.S. democracy, preparing globally responsible citizens, developing personal and social responsibility, and promoting global learning and diversity.

One of the institutions that promote global citizenship is AMIDEAST, a U.S. non-profit organization that works to strengthen mutual understanding and cooperation between Americans and the people of the Middle East and North Africa, it provides programs and services to improve educational opportunity and quality, strengthen local institutions, and develop language and professional skills for success in the global economy.

AMIDEAST promotes global citizenship through the English Access Micro-scholarship Program that was launched in 2004 and currently serves over 6,000 young people in nine Middle Eastern and North African countries: Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Tunisia, the West Bank/Gaza, and Yemen. (AMIDEAST annual report 2011).

AMIDEAST offers the English Access Micro-scholarship Program to provide a foundation in English language skills to talented 14 to 18-year -olds from disadvantaged sectors through after school classes and intensive summer learning activities. The goal is to prepare young people for life and active participation in a global multicultural society by developing in them knowledge and understanding of the world and Egypt place in it. The program encourages critical thinking skills, open-mindedness and creativity. The program gives participants English skills that lead to better jobs and educational prospects. The students also gain a better understanding of the cultures and values of America and Egypt.

As well as instilling an awareness of other cultures through art also heightens the sense of one's own cultural identity. As a medium of communication between particular cultures or groups, art increases awareness of cultural values and attitudes as well as beliefs. Hence, it not only defines a culture, but also instills a sense of shared heritage and identity (Boughton and Mason 1999, p. 15). Art workshops within the Micro-scholarship Program reflect our multicultural environment, which enables students to learn about the artwork of societies or groups of different cultures. It helps

students to express their ideas, whilst helping them to understand how others organize their worlds.

Trude mentioned, It is specifically that the art history component should include a consideration of the works of artists of diverse origins. Art should also be associated with international and intercultural understanding. This helps students to learn about themselves, to enter into relationships with others and to interact with their environment, its encourages the development of skills, which are transferable to other fields of learning. It also provides an excellent forum for openness to the world and for learning about cultural diversity (Trude. 2004).

Art is not usually a high priority in the majority of Egyptian schools. However, art educators may still reap its benefits by adding more art activities within or outside the classroom. Because of its openness to observation and interpretation, art can easily handle the diversity and complexity of concepts such multiculturalism. Art teaching is also flexible in terms of its methods; there are many ways in which students can relate to the topic. For example, outdoor learning, active learning, creativity, ICT or collaborative and cooperative tasks may all form part of a successful art lesson. This variety of approaches encourages democratic and participative modes of teaching and learning, which support global citizenship through the use of real-life.

Multicultural Art Workshops: A Practical Framework

Multiculturalism in education focuses on international concerns as well as those related to students' own communities. The aim of this is to develop their competence in communicating with people of different backgrounds, as well as fostering attitudes of openness, tolerance and solidarity. To this end, the multicultural art workshop run in conjunction with AMIDEAST emphasized commonalities shared by all people, and the importance of understanding and appreciating cultural differences.

The 2011 art workshops lasted four hours each, three days per week for one month. 30 14 to 18-year-old students from government schools in Alexandria participated in the program. The multicultural art workshop was held as part of the Micro-scholarship Program in order to:

- Promote better understanding of other cultures and societies through art;
- Explore possibilities for addressing global issues through artistic practice within formal and informal educational settings;
- Prepare students for diverse workplaces and multicultural environments;
- Teach students how to use different materials and media in order to express their ideas;
- Nurture creative insights through sensitive cultural appreciation and comparisons;
- Enable students to contribute to the development of their societies.

Students were required to examine and become familiar with the concepts of culture, identity and multiculturalism. This involved the study of processes and symbols from other cultures in art and design production. During these workshops, I conducted individual, semi-structured interviews with students in order to assess their expertise in artistic techniques, and their knowledge of artistic heritage. None of the students had any knowledge of Mayan, Indian, Chinese or Mexican cultures and 80% of students have confusion while classification art symbols of other cultures. 70% had some knowledge of Greek and Roman art. None of the students had any experience in collage

techniques, but 70% had experience in stencil printing, and 50% had used stamp-printing techniques before.

It is important for students to understand and learn from the past in order to make the future world a better place to live and thrive in. Art is a way of documenting our history by showing us what we were, how we live today, and where we might be in the future. Museums are a critical tool in this learning process. Museums are places for learning, experiencing, and engaging with ideas and objects, and institutions for life-long learning, it provides visitors physical places to contemplate and observe, as well as labels, maps, and programs to connect images and ideas with the context of the objects. They provide a unique space where difficult issues can be explored in the spirit of debate; they can be used not only for learning about past cultures but also to explore culture today (Pitman 1999).

First week activities

In the first week, I presented works of art from various museum collection during various activities, then students used the internet to visit museums and galleries with exhibits from other countries, such as the National Museum (New Delhi), the National Archaeological Museum (Athens), the Egyptian Museum (Egypt), the Metropolitan Museum, the New Museum (Berlin) and others. The aim was for students to come into contact with the history and art of another country (see Figure 1).

Next, the students observed and learned from art made by artists working with collage, paint, print and mixed media. A variety of artworks were made available for the students to view. Students compared and contrasted artworks from different cultures.

Figure 1. Students observing and learning about art from other cultures.

Second week activities

Each student identified formal elements that they wanted to use in their final project, such as symbols, icons and motifs from ancient cultures. They were taught how to create rubber printing stamps using these ideas (Figures 2 and 3). They also had the option of creating stencils and applying these to paper using acrylics. The students practised a lot during the second week in order to explore the potential of the materials and to develop their printing skills (see Figures 4 and 5).

***Figures 2 and 3**. Students preparing rubber printing stamps inspired by ancient culture.*

Figures 4 and 5. Students learning to prepare stencils as well as practising printing skills using stencils.

THIRD WEEK ACTIVITIES

In the third week, I presented works from collage artists inspired by other cultures, such as Nancy Spero. Students then practiced collage for themselves, starting by choosing pictures of cultural icons and figures from magazines and the internet (Figure 6). During this stage, I gave students the chance to create their own styles and elements using collage techniques (Figures 7 and 8).

Figure 6. Students choosing pictures from magazines.

Figure 7 and 8. Student collage artworks using symbols referring to ancient culture.

FOURTH WEEK ACTIVITIES

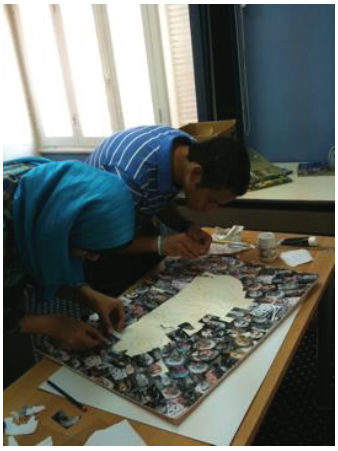
During this week, students looked at artwork from cultures with different levels of familiarity to them. For example, they picked one they knew a lot about, such as Egyptian culture, one they knew a bit about (Greek), and one they knew nothing about (Mayan). After that, they chose symbols from different cultures, which showed common traits, in order to use them in their artworks.

In the last week of the workshop, I divided students into six groups. Each group examined artwork that discussed cultural convergence, and created a mixed-media collage representing this concept. The students also identified symbols that represented different cultures in various artworks. The first three groups used reproductions of pieces of art from two or more cultures that had something common (Figures 9, 10 and 11).

The remaining three groups looked at representations of different cultures through the use of iconic figures (Figures 10 and 11). Students also investigated the representation of different cultures by identifying similarities shared by people from

different cultures. The aim of this exercise was to seek understanding and appreciation of cultural differences (Figures 12 and 13). In the final project, students expressed they ideas using collage and mixed media techniques. They were allowed to create their own elements and styles using any technique they had learned during the art workshop.

Figures 7, 8 and 9. Final projects of 3 groups who represented different cultures using collage and mixed media techniques.



Figures 10 and 11. Students representing different cultures using iconic figures (collage and mixed media).

Figure 12 and 13. Student projects emphasising commonalities shared by people from different cultures (collage and mixed media).

At the end of the workshop, students proudly showed their artwork in an exhibition. Not only did this encourage them to continue practicing their art, it also gave them the chance to share their knowledge with others (Figures 14 and 15).

OUTCOMES OF THE MULTICULTURAL ART WORKSHOPS

- Students gained knowledge of other cultures and societies through art. This will make them more tolerant and understanding of other cultures.
- Students built on their abilities to discuss and represent global issues such as respect for other human rights and acceptance of diversity through their art.
- They mastered the use of different materials and media to express their ideas in ways that were linked to the workshop themes.
- Students explored links between past and present through their artworks. They explored how we live today and where we may be in the future by discussing and making comparisons between artworks from different cultures.
- They become more socially aware through working in groups with other students from different backgrounds.
- The experience of the art workshop promoted curiosity and inclusiveness rather than fear of differences, preparing students for multicultural environments.

I observed the following during the workshops:

- Students had a lot of fun using mixed media artworks, and this helped to keep them involved and interested.
- All student feedback was highly positive, and they all seemed to enjoy it. The students were very enthusiastic about learning about other cultures, and by the end of the workshop, were eager to learn more.
- During the workshop, I was also pleasantly surprised to see that some of the students who seemed reluctant to approach the topic at first changed their minds and started to become more involved. In general, there was a high level of student participation, and I received quite a few questions and comments. These showed me that this workshop was well suited to students of this age group, and that they were engaged in the activities.

***Figures 14 and 15**. AMIDEAST Art workshop exhibition and graduation ceremony, American Consulate in Alexandria, 2011.*

Conclusion

Education in Egypt, as a multicultural, multi-ethnic, and multi-religious society, is supposed to encourage a greater openness towards others who have different cultural, social, ethnic, racial, or religious backgrounds. It should foster harmonious co-existence within and between multicultural, multi-ethnic, and multi-religious groups.

To build a modern democracy, Egypt needs to respect not only its own heritage, but those of others as well. Today's students have no choice but to be global citizens; their perspectives are therefore important. Because of its openness to observation and interpretation, art can easily demonstrate the diversity and complexity of concepts such multiculturalism. Art education provides a unique opportunity to look at the ways in which cultural differences are portrayed, and can therefore be used to increase students' awareness on the various cultures. Through this, they are taught to respect these differences.

The challenge for art educators is to provide experiences that integrate how students think, feel, and relate to others, develop students to become global citizens. Through well-trained art teachers who have Egypt's aspirations in mind, and supported by the National Educational Philosophy and government educational policies, the values of a united, democratic, just, liberal and progressive society may be instilled. Thus, a multicultural art curriculum with global citizenship in mind can do more than fine-tune students' creativity and appreciation of art. It can foster a high level of awareness and respect towards other people and cultures, and prepare students for their lives as global citizens.

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City reflections: design collaborations for cross-cultural learning

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Abstract: *Design educators must learn to develop and lead successful intercultural projects and exchanges for students entering into a globally connected and diverse profession. Teaching students to approach problems by using collaborative and interpersonal skills provides them with durable assets to better understand international audiences, colleagues, and perspectives. The proliferation and integration of first-hand cross-cultural experiences into design curricula can result in innovation and knowledge sharing, indicating synergistic properties in which the whole is greater than the sum of the parts. This research explores how collaborations between geographically separate design students in San Francisco, California, USA and Dubai, UAE—mediated by virtual communication—can impact learning, cultural awareness, and audience sensitivity. The two distinct courses challenge students to work together in teams, understand a range of audiences, give and receive critical feedback, exchange projects, and respond with culturally sensitive design solutions. The paper introduces the rationale, methods and design-related outcomes of a series of collaborations to encourage design educators to develop cross-cultural methods in their own classrooms.*

Keywords: Cross-cultural, design education, collaboration, internationalism, cultural perspective, virtual communication.

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Introduction

A case for cross-cultural design

While the need to design for—and within—different cultures is a present reality of the design practice, the design classroom presents a valuable, yet rarely utilized opportunity to help students develop cross-cultural communication skills and awareness (Schadewitz 2007, 2). With the use of current digital tools and an understanding of how to facilitate interpersonal interactions that transcend barriers of time, distance, language, and preconceived notions, it is possible for design instructors to guide students through immersive and collaborative processes, helping them develop techniques for communication with international audiences and design professionals (Blair-Early 2010, 213).

Classrooms located on opposite sides of the globe can emulate the communication realities of praxis, connecting through technologies such as email, cloud-based collaborative tools, and various social media (Moldenhauer 2010, 226). Integrating these methods into design curricula help students navigate behavioral intricacies of language and culture, rather than understanding other cultures through secondhand resources (Wang 2011, 244). The proliferation and integration of first-hand cross-cultural experiences into design curricula can result in design innovation and knowledge-sharing, indicating synergistic properties in which the whole is greater than the sum of the parts.

According to Sikkema and Niyekawa, “Methods and manners of communication are so ingrained in us through our culture that we normally do not even begin to become culturally aware until some kind of cross-cultural communication breakdown occurs and we find that things simply don't mean the same” (Sikkema and Niyekawa 1987, 28). This research explores how design collaborations between geographically distinct teams can improve cultural awareness and audience sensitivity beyond embedded cultural norms—forestalling these “communication breakdowns.” With the aim to encourage design educators to develop methods for intercultural collaboration in their own classrooms, this paper evaluates the rationale, methods and outcomes of a series of collaborations between design students in San Francisco, California, USA and Dubai, UAE.

Rationale for cultural awareness in the curriculum

Wang (2011) cites varying viewpoints to support the need for undergraduate students to cultivate “intercultural communication skills and sensitivity to cultural differences.” Rationales range from preparation to enter a “global marketplace” and developing “world mindedness” to inspiring students to “civic action to redress global injustices” (Wang 2011, 243). Beyond the practical application within industry, additional sociopolitical benefits to cross-cultural educational experiences include “respect for cultural diversity and preservation of the elements of cultural identity” (Sánchez Sorondo, 2005). For those living in ever-diversified environments, learning to understand and accept other cultures helps diminish conflict and serves local communities’ best interests (Gay 2000, vii–viii) "to promote peaceful understanding and tolerance, thereby identifying and encouraging true human values within an intercultural perspective" (Sánchez Sorondo, 2005).

Educators should prepare students for the rapid evolution of technology, global communications, and the evolution of education itself. Kurzweil argues that the current

democratization of information will bring an influx of virtually mediated education at all levels, accessible from anywhere in the world (Kurzweil 2005, 249). Integrating cross-cultural collaboration technologies into design classrooms will ensure that design continues to play a formative role in this indefatigable networked global community.

Intercultural collaborative design education developments

Cross-cultural design collaboration is the effective exchange of ideas, information, decision-making, form-making, and critique to arrive at successful visual communication solutions. In industry, cross-cultural graphic design discussions focus primarily on interacting with target audiences, and often overlook the reality of the communication that occurs between design professionals. Meanwhile, traditional design pedagogy relies heavily on form-making; the concept of internationalism is an aspect rarely addressed in the formal curriculum (Blair-Early 2010, 210). Students lack preparation for the realism of a "connected" intercontinental workplace and need to develop skills to better understand cross-cultural problems, audiences, and colleagues.

Design educators must prepare students to communicate, interact, and thrive in this present-day global environment. "Along with the rapid expansion of a potentially international audience, designers are being asked to solve multifaceted problems that address issues of sustainability and globalism" (Blair-Early 2010, 211). A successful cross-cultural design experience can help young designers enter the profession with multicultural sensitivity and sensibility, along with collaborative experience. These qualities give young professionals a competitive advantage not only in the workplace, but also in terms of enhancing their sensitivity, self-awareness and their visual work.

There is a present need to expose design students to design problems beyond surface-oriented form and instead explore larger issues and ideas through their visual work (Blair-Early 2010, 213–215). However, several pitfalls exist within the structure of most traditional design curricula, including the fact that "As design programs become overloaded with courses focused on providing new technical skills, the ability to develop cross-disciplinary and cross-cultural experiences diminishes" (210). Blair-Early describes several cross-cultural and multidisciplinary collaborative design education projects that have taken place at University of Wisconsin-Milwaukee in recent years, though the paper does not cover any of these virtual exchanges in great detail. The paper briefly discusses "the role of social networking tools and participatory research in addressing cross-cultural and multicultural challenges" (208).

Buck-Coleman's "Sticks+Stones" project examines a cross-cultural exchange within American borders that took place between students located in the states of California, Utah, Maryland and Alabama—vastly different corners of the United States (Buck-Coleman 2010, 193). "Sticks+Stones" focuses on the ethical implications of "how personal beliefs of race, religion, socio-economic class and other differences impact visual messages" (191). The 2005 and 2006 collaborations took place through correspondence, but in 2006 the project culminated in a brief symposium at the Museum of Tolerance in Los Angeles, which gave students an opportunity not only to interact in person, but to provide feedback and engage in challenging discussions face-to-face (196).

Schadewitz's research examines exchanges over a three-year period between interaction design students in Korea, Austria, Hong Kong and Taiwan as they collaborated on various "design patterns," also relying on virtual communication to exchange ideas and visuals (Schadewitz 2007, 26). Moldenhauer, meanwhile, discusses the potential pitfalls and merits of introducing virtual collaboration technologies to

design classrooms in the first place (Moldenhauer 2010, 222). Virginia Commonwealth University, Qatar presents a different kind of cross-cultural design education model: in their particular example, American design pedagogy has been imported to Qatar's "Education City" in Doha, their capital. Yyelland and Paine describe "Pros and Cons of American Education" through the eyes of their predominantly Qatari students (Yyelland and Paine 2009, 127).

Research opportunity and intentions

At some point in their educational process, design students should have a cross-cultural communication and collaboration experience, regardless of whether they have an opportunity to study abroad, to learn from an instructor of a different culture, or to virtually interact. An English-language literature review revealed plentiful sources on collaboration, cross-cultural communication, or virtual communication technologies; there is little existing research that combines these topics together with productive, design-related outcomes (Schadewitz 2007, 2). Though there is some documentation of cross-cultural design education projects or courses, many of these involve cultures that already reside within the same community, or are temporarily collocated through study-abroad programs. Wang also notes that, while collaboration itself has been widely researched and documented, discussions of intercultural collaboration are less prevalent in general due to the difficulty in developing and leading successful projects (Wang 2011, 244).

In response, this investigation examines how a series of cross-cultural collaborations between design students in San Francisco and Dubai—mediated by virtual communication—can impact learning experiences, promote cross-cultural communication and understanding, explore similarities and differences, change ideas of representation, and address perceptions of "self" and "other." The ongoing research documented in this paper tests whether two geographically distinct design classrooms can improve cultural awareness and audience sensitivity beyond embedded cultural norms—using design thinking approaches and virtual communication tools.

Speculative project goals

In Spring and Fall 2012, students at Zayed University (ZU) in Dubai, UAE and University of San Francisco (USF) in California, USA, followed a design thinking and Human-Centered Design (HCD) methodology to engage in a series of projects that required students to work together in teams, exchange projects, and give critical feedback (IDEO 2012, 8). The two courses aimed to challenge students' assumptions of self and "other," to understand a range of audiences, and to respond with culturally sensitive design solutions. While each of the four projects had unique sets of learning outcomes tied to the objectives of each course (as defined by each department or program), the overall collaboration was founded on the following goals:

DESIGN

- Guide students through a series of team-oriented design projects, with the assumption that some might be hesitant to participate due to self-consciousness about language or anxiety about cultural differences.
- Ask students to generate visual work inspired by images and input from their partners, with the assumption that they might influence each other's visual design work.
- Encourage students to expand their visual language, explore new design concepts, and broach topics such as "similarity" and "difference."
- Explain how cross-cultural communication and collaboration are valuable professional skills for an international design market.

AUDIENCE

- Evaluate students' shifts in perception of audience, representation, and the "other" based on project completion. Encourage self-assessment, measured through written or visual coursework.
- Examine students' increase in local cultural understanding and how they apply "self" as a lens for reading another's cultural norms and as a way to widen awareness of what a persona—or audience—could be.

COMMUNICATION

- Discuss with students the ability to cooperate across distance using available technologies to effectively produce specific design assignments.
- Implement the use of constructive critical feedback as an important part of team interactions, with the assumptions that difficulty will arise due to the asynchronous communication technique, and that, as introductory design students, both groups will be new to critique.
- Encourage students to build collaborative working skills and practice openness to cross-cultural interactions, with the assumption that logistical issues of language, cultural translations, anxiety, and time difference will likely create communication challenges.

SOCIAL LEARNING

- Embolden students to discuss potentially polemical topics, such as religion or politics.
- Promote collaboration both as tool for cultural diplomacy and as relevant industry skill, with the assumption that students would likely have little previous knowledge of the other culture.
- Measure students' visual and written work in terms of what they learn from their partners' cities, cultures, and design styles.
- Encourage students to develop friendships—or at least empathy.

Methodology

Using a process of design thinking, the geographically distinct teams researched local culture, developed an understanding of international perspectives through their partners, and used virtual technologies to arrive at collaborative design solutions. Design thinking is a human-centered practice that follows a system of overlapping phases defined as inspiration, ideation, and implementation (Brown 2008, 88).

Researchers at the HPI-Stanford Design Thinking Research Program further describe the process as: define, understand, ideate, build, and test (Plattner 2011, xiv). Similarly, IDEO's "Human-Centered Design Toolkit" helps designers analyze an appropriate solution for each unique context by applying the phases: hear, create, and deliver (IDEO 2012, 8).

During both semesters, the 12-hour time difference between students required the use of asynchronous communication tools as a primary means for exchange and dialogue. Email and cloud-based collaborative technologies enabled participants to communicate in writing and exchange images and files with each other. Students in the geographically distinct classrooms were paired primarily based on complementary characteristics outlined in Digman's five-factor model of personality (Digman 1990, 433). Aside from evaluating their visual projects, important aspects of both exchanges were regular writing assignments to accompany each project phase.

In addition to providing instructors with a qualitative measure of each student's experience, students provided additional quantitative feedback regarding their learning outcomes and impressions of the course through completion of an optional online survey after the conclusion of the project(s). This section specifically discusses the approaches to project work; qualitative and quantitative analyses are detailed in the "Results" section of this paper.

Project overview

Spring 2012 began the ongoing international design education experiment between two introductory design courses located at University of San Francisco (San Francisco, California, USA) and Zayed University (Dubai, UAE). The first assignment of the semester asked students to photographically illustrate two contrasting concepts within their own cities (e.g. historic/modern, natural/man-made), in order to give the partners a relatable starting point from which to gradually expand their perspective on the other culture (Sikkema and Niyekawa 1987, 23). Using the oppositional concepts allowed students to critically examine cultural influences in their own city before attuning themselves to the other city. Through a written assignment, students shared the qualities and characteristics of their own cities with their partner, while simultaneously evaluating the city of their partner through an exchange of imagery.

Next, students shared their initial visual and anecdotal research to develop a series of posters about their perspectives of the similarities and/or differences between the two cities. Partners also collaborated on a poster "remix" project using critical texts (news articles, essays and prose), exploring themes such as the built and natural environments, immigration issues, and historic perspectives. Finally, students incorporated process work, design artifacts, and written reflections into a collaborative process book that recorded and described both classes' experiences and project outcomes.

In Spring 2012, the collaboration was the primary focus of the term, but in Fall 2012 the exchange served as a cross-cultural supplement to more typical coursework. This new group of students participated in a simplified version of the project in an effort to measure whether they would gain similar benefits and skills from a cross-cultural collaboration within a truncated time frame. Fall 2012 students participated in an analogous photography exchange, but with different prompts to drive discussions. Students similarly exchanged emails and images, and explored culture through simple visual narratives.

Guided collaborative design assignments: Spring 2012

In Spring 2012, 29 students engaged in 4 different guided design assignments and produced visual artifacts that they exchanged with their partners. In some cases, the partners modified the work and returned it to the original creator. In all cases, the students were asked to send each other constructive criticism regarding the projects they created and to write brief reflections on each project phase.

The project launch introduced students to a variety of concepts, processes, and steps important to the success of the collaboration. Class discussions encouraged students to consider both a global perspective and a local understanding of the idea of "city," using design as a tool for cross-cultural sharing. The visual exchange was initiated with a photo "scavenger hunt" and image trade. Teams were assigned different lists of design principles (e.g. rhythm & balance, scale, texture, transparency) to help capture and define their cities in visual terms. Each team also received a different oppositional word pairing (e.g. native/foreign, liberal/conservative, open/closed, professional/playful) and each student individually created definitions for those terms based on her own city. With these definitions in mind, each student shot at least 24 photos of the city to submit to her overseas partner.

Once they collected the requisite photos, students engaged in email introductions, sharing their photos and word-pair definitions via Dropbox, a cloud-based file-sharing service. Following the image exchange, students highlighted similarities and differences between the cities, sharing thoughts about their cumulative visual research within each class. Several sets of students noticed unexpected and unprompted similarities in the way they defined the word-pairs (and even in some of the images they captured), which helped to establish a shared understanding between partners. In the final phase of the photography project, students incorporated photography from their initial image exchange into a pair of posters exploring the two cities. Each student created a set of A3 posters to visualize the similarities or differences between San Francisco and Dubai while considering how research and dialogue could inform their design process.

For the Remix Poster project, students wrote personas (based upon different assigned audience demographics) and designed typographic posters in response to assigned texts, which were selected to highlight various cultural nuances and developments in the Arab and Western worlds. Students then swapped InDesign files with their overseas partners, and the partners had an opportunity to "remix" the initial designs by adding, subtracting, and editing a certain number of elements before passing the posters back to the original authors for one last round of design edits.

Finally, the students encapsulated their collaborative experience in the form of a collective and cooperative process book initiated by the American students, who sent files to their Emirati partners so they could also contribute their designs, insights and analyses.

Examining cross-cultural aspects of design media: Fall 2012

As opposed to the nearly semester-long design collaboration in Spring 2012, the Fall 2012 exchange was inserted into a more typical curriculum of classroom-oriented projects in order to provide a cross-cultural perspective on different forms of design in various media. The collaboration between 21 USF and ZU students attempted to prove that there would be similar merit in an intercultural exchange at a smaller scale.

The Fall 2012 photography exchange assigned a particular category of print-based design to each team, including identity/branding, posters, environmental/wayfinding, and publication/editorial design. Teams looked for examples of how the assigned

design categories manifested in their own cities, finding and documenting examples of particular cultural or social significance. In San Francisco, students created brief visual narratives (stories told in five images) concerning their particular area of design and later used the images for a poster project. In Dubai, students created a narrative storyboard based on the design category to understand how formal design principles relate to photographic images. Students were asked to consider the implicit meaning of images as understood by another culture, country, or individual.

Students then shared their complete, unedited sets of at least 20 photos with their partners, who, in turn, attempted to create new visual narratives constructed based on cultural assumptions, perceptions, and denotative/connotative visual information. Each student arranged or juxtaposed 5 of his/her partner's images, and sent these visual narratives back to the partner, accompanied by a brief written explanation of his/her "guess story." Following this exchange, most partners were able to discuss the interpretations with each other, providing feedback and cultural insights.

Once again, students incorporated their learning outcomes from the exchange into a final process book as a cross-cultural component of their semester-long research and projects. However, unlike Spring 2012, students worked on the books within their respective classes and did not co-design these chapters with their overseas partners.

Results

Qualitative analysis of student work

The first section of this analysis focuses on the outcomes of the Spring 2012 collaboration, followed by a comparison of Spring and Fall 2012 semesters.

"Safe" subjects

In the Spring 2012 collaboration, first impressions about each city varied greatly between classmates, and many students were embarrassed to admit they initially knew nothing about the other culture. Though they ultimately learned that the Burj Khalifa and Golden Gate Bridge are not the only noteworthy aspects of Dubai and San Francisco, most students initially struggled to define their cities beyond the obvious physical characteristics of architecture and environment. Perhaps they were drawn to architecture as a solution because it felt approachable and benign, and seemed relevant from a design standpoint.

Students were challenged to uncover ideas beyond the results of a simple Google search and encouraged to continue their one-on-one email conversations in order to share their perspectives and experiences. "Perhaps the most difficult skill in communicating across cultures involves standing back from yourself; becoming aware that you do not know everything, that a situation may not make sense, that your guesses may be wrong, and that the ambiguity in the situation may continue" (Adler and Gundersen 2008, 89). Prompted by the word-pair of "liberal" and "conservative" and inspired by her partner's interpretation, one USF student began to explore how the assumptions of definition could be challenged across cultures. Though, from her American perspective, these terms are typically imbued with specific and divisive meaning, she began to find new ways to contextually define the words' significance:

> One of Alia's photos for "liberal" is a shot of several women wearing burqas. They are considered an example of liberal because they are also carrying Western designer bags, have bright manicured nails, are adorned with western jewelry, and

> are wearing western attire beneath the burqas. This is extremely fascinating for me, because here in California, designer handbags and expensive jewelry seem more conservative than liberal ... (Natalie, USF Spring 2012)

The Spring 2012 photography topics were selected with an expectation that they might elicit discussions of politics, government, religion, and women's rights as differentiators to explore through design. Even after months of correspondence, however, most students remained hypersensitive to many of these topics, tactfully avoiding them even when prompted to "dig deeper." In future efforts, it may be more effective to assign students specific polemical topics to discuss via email or assign a synchronous Skype discussion for homework (though these types of interactions have proved difficult due to the time difference).

Similarities and differences

Students' visual responses overwhelmingly led to poster pairs that focused on cultural similarity rather than difference. This emphasis on similarity emerged *concurrently* with the idea that the cities were different from one another:

> Finding commonalities between Dubai and San Francisco was difficult, but my word pair (large & small) unfolded the commonality of elevated heights. I discovered that albeit different in nature, the two cities have their own great heights that result in expansive views. (Erika, USF Spring 2012)

Students found easy similarities between the cities in terms of their international fame, architecture, beaches, cultural diversity, and tourism. Still, when attempting to explore differences, discussions between students remained restrained in spite of their assigned word-pairs. Most topics interpreted and defined by the students as differences focused on weather, timezone, architecture, topography, environmental landscape (trees and hills vs. desert and sand), graffiti/public art, clothing, and educational structure:

> The differences between Dubai and San Francisco are mainly concerned with what is considered to be "native" in each of the cities, such as the gelato in San Francisco, and the harees—a type of food—in Dubai. (Rawdha K, ZU Spring 2012)
>
> Both cities are concerned with progress, consumer culture, development and tourism. Traffic seems to be a common issue for both cities, although I must say it looks much worse in Dubai! (Hannah, USF Spring 2012)

Adler writes that cross-cultural situations require participants to "assume difference until similarity is proven" in view of the fact that people from different countries see, interpret, evaluate, and act upon events differently (Adler and Gundersen 2008, 72). In course feedback, students mention feeling "surprised to learn" about similarities between the cities, but never venture to comprehensively explain initial thoughts or feelings of difference. It seems they are unwilling to articulate what might be perceived as unfounded or biased initial assumptions about the "other." At the same time, students from USF felt shy to ask cultural questions, perhaps from a desire to maintain positive relations with their partners and a fear of overstepping cultural boundaries or protocol.

> I would have liked to learn more about her clothing and traditions but we never really got there in our conversations and I did not want to ask it off the bat. I am so

> curious about how the girls in Dubai perceived our class [...] it would be really interesting to see the other side. (Sophie, USF Spring 2012)

The idea that students had an opportunity to help break down stereotypes and teach others about the similarities between the cities seemed to be a driving force behind a somewhat homogeneous approach:

> I was trying to communicate the idea that, underneath our burqas and/or hot pants (as the case may be), we are all ultimately people. We feel the same emotions and we share the same basic life experience. (Natalie, USF Spring 2012)

The challenge of deeper understanding

ZU students generally seemed to struggle with representing San Francisco on a deeper level. Visual responses and interpretations were based primarily on photography and often did not seek to derive deeper meaning from their partners. Perhaps both groups could have asked more of each other to arrive at posters that had equal meaning and soul; in most cases, simply encouraging students to critique each other's work via email was not productive in this regard.

For other students, the process of defining the word-pairs helped reveal deeper levels of understanding. In such cases, the students moved past polite conversation, revealing personal introspection and challenging cultural assumptions. These students not only began to analytically explore the city, but more importantly, develop ideas about its residents.

> Initially, I didn't understand how there could be a balance between traditional culture and modern American society but [...] The fact that Rawdha wears the Hijab and European designer clothes at the same time is the epitome of blending cultures in Dubai. (Clare, USF Spring 2012)
>
> Regarding culture and social aspects, San Francisco is way more liberal than Dubai is. Dubai is more conservative regarding religion, many things that are accepted in San Francisco are not accepted in the UAE generally. (Rabab, ZU Spring 2012)

Connecting through personas

The persona-development component of the Remix Poster assignment led to some of the most interesting cultural insights of the entire collaboration. Requiring students to write in detail about their audiences in the form of personas grounded the exchange on a personal level—focusing students on a tangible, shared humanity—which gave rise to discussions that did not emerge in earlier exchanges. Perhaps it is easier to engage in cultural critique in the third person, or to share opinions and preferences through the lens of a fictional character.

The personas represented an important moment in the students' design education: the project allowed them to consider audience in a different way, both locally and on the other side of the world. Through the lens of their various personas, they reconsidered whether their design choices were appropriate, communicative, and relevant. The personas and subsequent layout exchange also helped students educate each other on cultural intricacies, providing windows into their different backgrounds. This round of interactions also made them realize that not all individuals have counterparts in other cultures.

Insights during final book compilation

As students worked on their final process book, general discussions began to emerge in the classrooms and between partners about the overall merits of the project, with an overwhelming consensus about the unexpected value of the experience. Students asserted that personal relationships with their partners allowed for greater cultural understanding, and that the traditional research methods of internet searches and library visits left them unfulfilled and disconnected. Real-world collaborations allowed them to see the other city in a rare light, while helping them rigorously examine their own city and customs:

> I never would have learned as much if we had simply been assigned some research — by communicating one on one with Ebtesam I learned about Dubai from a unique, personal perspective." (Chloe, USF Spring 2012)
>
> ...by exchanging photos with an actual San Franciscan you get to see the city from their perspective which was something new to experience, rather than just Googling. (Rodha M., ZU Spring 2012)

Semester comparisons

Through design collaboration, students located in Dubai and San Francisco began to realize that personal relationships, gender relationships, and family life influence communication, interaction, and assumptions. For students in the UAE, the influence of religion, for example, plays a dominant role in defining the appropriate use of imagery and photography, particularly within social media. Female Emirati students in Dubai rarely share photographs of themselves on Facebook, blogs, or other social platforms. On the other hand, students in San Francisco freely and abundantly share images of themselves in almost all aspects of their digital lives, and were frequently confused by the "lack of faces" in photos they received from their Emirati partners. Challenges arose when the two student groups interacted solely through asynchronous virtual platforms. In this case, a perceived barrier was erected for Western students who tried to connect emotionally with their Arab partners without the aid of photographic representations.

In Spring 2012, most students' email conversations seemed to remain at a surface level due to their hesitancy to discuss challenging topics and tendency toward maintaining a safe, almost diplomatic distance from one another. Unlike the Spring 2012 collaboration, Fall 2012 participants began the collaboration by exchanging stories about themselves via email. This not only relieved some inhibitions, but also provided an opportunity for partners to ask each other some cultural questions earlier in their correspondence. Specific discussion prompts from faculty diminished the fear of overstepping perceived cultural boundaries and encouraged students to lower their guards enough to allow for a richer cultural exchange. The exercise also elicited lengthier email responses that involved cultural topics requiring further explanation, prompting students to learn about each other via anecdotes rather than short factual snippets (Sikkema and Niyekawa 1987, 51-52). As one student shared:

> My partner had a lot of great quotes in her emails to me, but my favorite was when I asked her why she didn't show her subject's face in any of her photos. She responded, "Here in UAE almost [all] families do not allow their daughters to put [...] images that show their faces in the internet because there are lots of compan[ies] or bad boys [who] can use them in unsuitable way[s]. In UAE the girls' reputation should not be harmed or hurt (we are expensive jewelries)." (Jean, USF, quoting her ZU partner Amna, Fall 2012)

Though the Fall 2012 students were provided with written briefs and guidelines outlining their photographic and visual narrative exchange, the two classes seemed to be somewhat confused about the nature and purpose of the collaboration. Most students eventually came to appreciate the rare opportunity for cross-cultural exchange, but others reported that it was "not [the] biggest learning opportunity in the course," (Anonymous USF student quote, Fall 2012) undoubtedly because it was much shorter in duration than the Spring 2012 exchange and the relationships between the students did not have as much time to develop. Without the opportunity to share design decisions using collaborative design techniques such as the Remix Poster project, the chance for students to communicate directly through the platform of design was absent from the collective Fall 2012 experience.

Although asynchronous virtual communication allowed students to connect at their own convenience and schedule, both courses were frustrated with the lag in responsiveness afforded by the time difference. The brevity of the Fall exchange amplified the negative response to asynchronous communication, culminating in an overall consensus that the interactions were sporadic and course-based, rather than genuine and relationship-based. The reliance on electronic media for communication—rather than face-to-face meetings —also impacted students' ability to effectively communicate and interpret meaning regarding their partners' culture (Adler and Gundersen 2008, 85). In the survey responses, one ZU student wrote:

> I would like to have partners that are eager to interact, engage and exchange information with. I would also like to have a project that allows us to exchange more work and information where we give each other feedback, ideas and opinions. My partners gave me the impression that they were not that excited about the project as I was (which kind of made me lose the enthusiasm as we moved along...). (Anonymous ZU student, Fall 2012)

Even with the challenge of maintaining group motivation and the difficulty in encouraging students to build authentic relationships, the Fall 2012 students recognized the value of the cross-cultural interaction stating that it demonstrated the benefit of exchanging ideas, meeting deadlines, practicing patience, and working in groups. Students felt that the exchange of visuals, narratives, and photographs gave them unique insight into the life of their partner, while simultaneously exposing them to the day-to-day lives of another culture. Self-evaluations of the cross-cultural exchange revealed that students believed their cultural awareness had increased and their sensitivity to audience had improved.

The Spring 2012 students reported higher satisfaction with the overall cross-cultural experience through their written reflections, class-critiques, and survey responses. The design thinking process that included collaborative research, team-based ideation, exchange of visual materials, and co-design all contributed to a rich, well-rounded cross-cultural collaboration. The ability for students to see their photography incorporated into a collage or read their written exchanges transformed into typography on a partner's poster increased their emotional connections to their partners. For the Spring semester students, cross-cultural collaboration and co-design tools resulted in a mutual appreciation for their partners' contributions to their learning experiences and their readiness for participation in a global community. Friendships formed between many of the students, with unprompted efforts to continue dialogues and collaboration outside the confines of the course structure:

> This project has changed my overall outlook on the world. I now have a larger realization that every different culture perceives visual information in different ways that may have similarities [...] but indeed have a lot of differences. It's been a very eye-opening project.... (Jessica, USF Spring 2012)
> It's an experience that I think is irreplaceable and necessary to grow as a designer. [...] I start thinking about the various ways my poster can be interpreted not just by classmates, but another culture, an outsider... (Alia, ZU Spring 2012)

Quantitative data analysis

Following both projects, 17 Spring semester students and 16 Fall semester students responded to a survey to rate the project and their learning outcomes. The results are represented in the following figures:

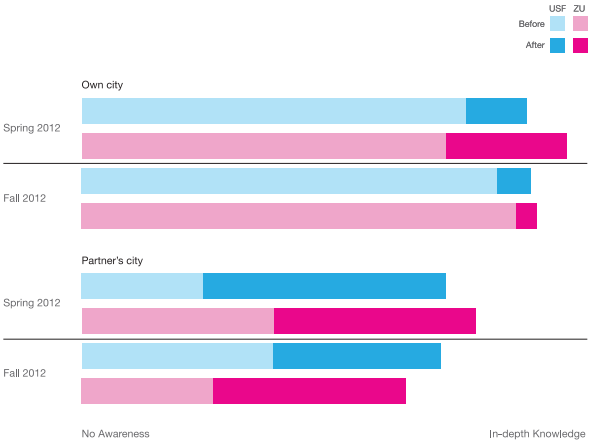

Figure 1. Evaluation of students' cultural knowledge before and after the project compares preexisting awareness of their own city and their partners' city to their level of knowledge

following the course.

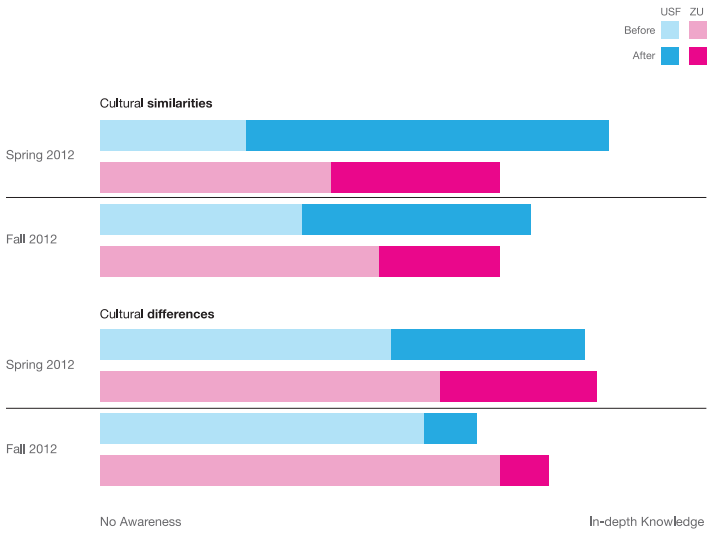

Figure 2. Evaluation of students' cultural knowledge before and after the project compares preexisting awareness of cultural similarities and differences to their level of knowledge following the course.

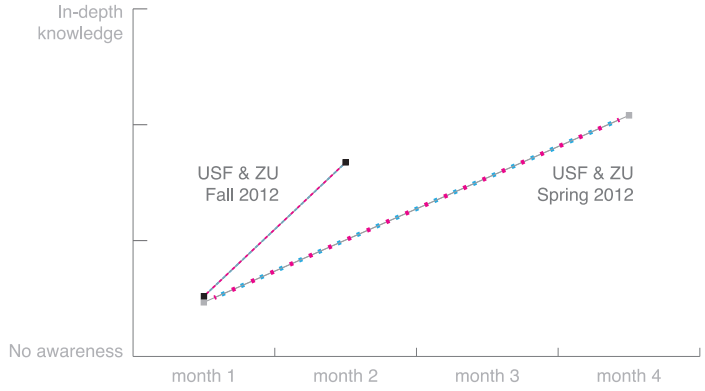

Figure 3. The average of students' perceived cultural knowledge (across all measured categories) before and after the project reveals that students at both universities placed themselves at almost the exact same starting point in terms of pre-project cultural knowledge. The Fall 2012 students at USF and ZU reported an identical perceived average knowledge gain, as did the USF and ZU students who worked together in Spring 2012. Though the Fall 2012 students did not work together as long as the Spring 2012 students and reported lower overall satisfaction with the project, they still reported a significant gain in cultural knowledge.

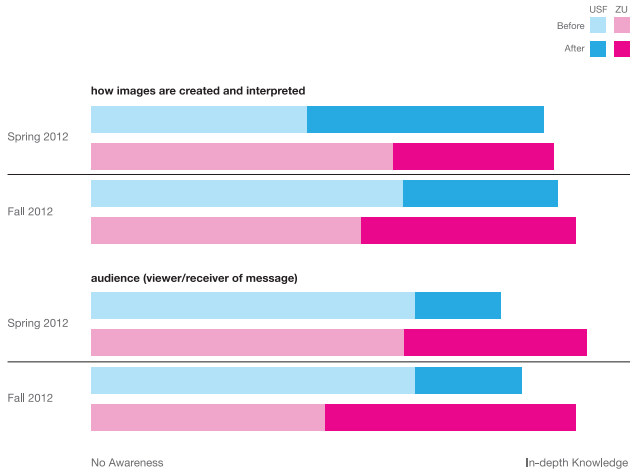

Figure 4. Evaluation of students' design knowledge before and after the project compares preexisting awareness of representation and audience to their level of knowledge following the course.

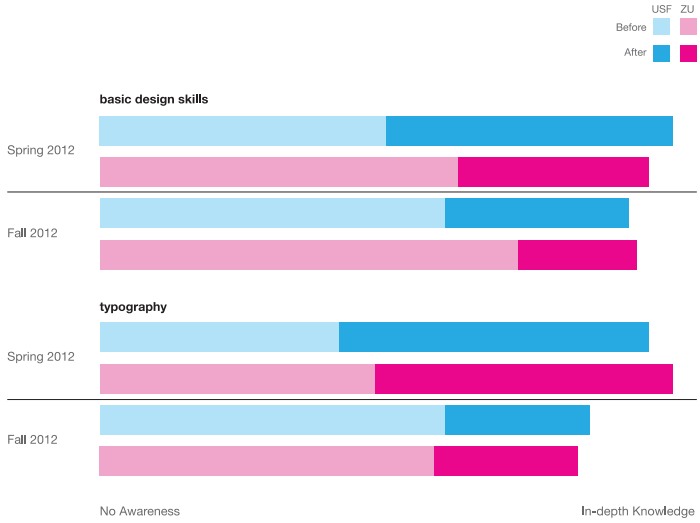

Figure 5. Evaluation of students' design knowledge before and after the project compares preexisting awareness of basic design skills and typography to their level of knowledge following the course.

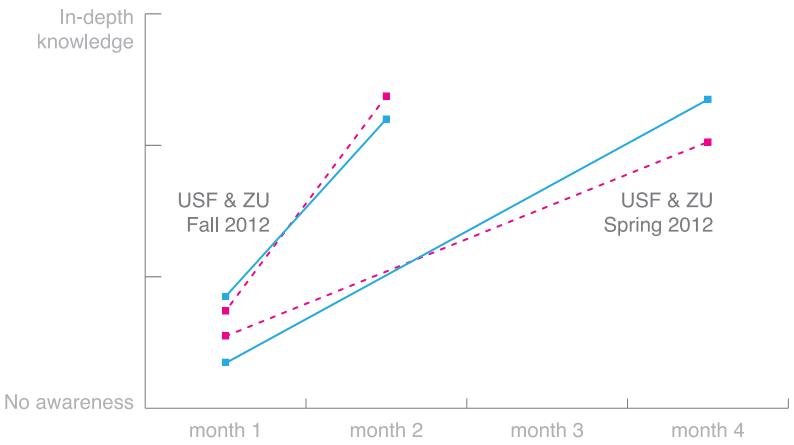

Figure 6. The average of students' perceived design knowledge (across all measured categories) before and after the project reveals that students at both universities placed themselves near the same starting and ending points in terms of design knowledge before and after the project. As with cultural knowledge, the Fall 2012 students at USF and ZU reported a similar perceived average knowledge gain, as did the USF and ZU students who worked together in Spring 2012. Though the Fall 2012 students did not work together as long as the Spring 2012 students and reported lower overall satisfaction with the project, they still reported a significant gain in design knowledge.

Conclusions

Both Dubai and San Francisco are examples of incredibly diverse cities, with highly international, multilingual populations representing a full spectrum of cultures and classes. The two cities offer an ideal environment for design teams to explore techniques for increased cultural awareness and audience sensitivity beyond embedded cultural norms. In the Spring and Fall 2012 semesters, geographically distinct teams used design to brave the challenge of cross-cultural communication without the benefits of body language, visual cues, tone of voice, and facial expression to ease communication barriers (Sikkema and Niyekawa 1987, 25–37). The extreme time difference not only challenged students' patience and commitment to the process, but also led to communication discrepancies. However, student evaluations revealed that the exchange still delivered valuable learning outcomes, including increased cultural awareness.

Communication between culturally homogenous designers can be a challenge in itself; the introduction of different languages and cultural backgrounds in cross-cultural communication escalates this complexity. Adler explains that cross-cultural misinterpretation commonly occurs based on four distinct areas that include "subconscious cultural 'blinders,' a lack of cultural self-awareness, projected similarity, and parochialism" (Adler and Gundersen 2008, 80). Cross-cultural communication techniques from the field of Management can provide practical approaches to early pitfalls or hesitations during student design exchanges. Educators can introduce some of Adler's ccommunication techniques by encouraging students to "assume difference"

until they have evidence of similarities; by placing emphasis on descriptions first before allowing students to interpret things for themselves; by challenging students to see through the eyes of their overseas collaborators (88).

Real-time correspondence could also increase spontaneity and help decrease the burden of maintaining an epistolary relationship, which may feel more permanent and rigid. At the same time, these technologies also bring a new set of questions, requirements and potential problems that must be addressed in preparing students for the assignment (Moldenhauer 2010, 233). Students might appreciate becoming acquainted in a looser, more carefree space, though time differences will always pose a challenge. Additionally, building stronger relationships between partners may help generate a more successful critique environment for both classes. A culminating experience that enables students to interact in person and engage in face-to-face discussions may increase the probability of long-term cross-cultural relationships.

In terms of critique, simply requiring students to evaluate each other's work is too open-ended. Students should be required to thoroughly articulate their concepts to each other, and need a framework for analyzing each other's work. During collaborations, it would be useful for students to have a rubric that provides concrete criteria to use in analyzing their partners' projects, and helps them reflect on whether or not they achieved specific goals. For this approach, it is vital that students understand that their comments will not affect their partners' grades.

In spite of myriad challenges, both expected and unforeseen, participants from both terms recognized the value of this collaboration. In most cases, even when they felt anxious about swapping files or participating in critiques, realizing their accountability to a partner abroad—in addition to professor and classmates—made students more attentive, focused and driven in their design work. At the semester's completion, the young designers felt better equipped to take on the challenges of a global profession with broadened perspectives, collaborative techniques, and co-creation tools.

Design students should enter the field with knowledge beyond the basic essentials: they should also possess an awareness of the world around them as the greater context of their work. In the midst of constant technological progression, teaching students to approach problems by thinking for themselves and using collaborative and interpersonal skills provides them with durable assets that will extend to their future design practice—and beyond.

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Design English collaboration and presentation: Developing international designers at a Japanese university

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Abstract: *This study reports on a long-term project to improve the English presentation skills of students in the Faculty of Design at a Japanese university. The first two years of a collaborative effort to pair Industrial Design majors with advanced students in the Department of International Culture to collaborate on a product or product concept and present their work in English will be described. Recent measures to improve English education in Japan include the introduction of English study in elementary school, and adopting communicative-based learning in high schools. At the university level, content-based English education, or English for Specific Purposes (ESP), has been implemented in some curricula to provide students with language ability and competence that will serve them in careers where English is a required skill set. A number of disciplines have attempted to use content-based teaching; unfortunately, little has successfully been done in design faculties at Japanese universities to prepare graduates to become international designers. This project recognizes that it is essential for design students to get specialized training in not only communicative English, but also the specialized vocabulary and presentation skills that will be required of them in careers in the design field.*

Keywords: English, presentation, globalization, multidisciplinary, Japan

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Global design and English competence

Much has been written about the importance of English skills for success in the global marketplace. Hejazi and Ma state, "Given that the largest economy in the world, the USA, and three of the G7 countries have English as an official language, then it would perhaps not be surprising that English-speaking countries may account for the largest share of economic activities relative to other languages" (Hejazi and Ma 2011, 154).

In the Design field, as well as a number of other industries and disciplines, English skills are imperative not only for individual success, but also for companies to compete and thrive. While industry is all too aware of these needs, there seems to be a disconnect at the educational level. In some countries where English is taught as a foreign language, English study focuses on the grammar translation method and exam preparation. As a result, practical, communicative English skills that may serve students in the global workplace are given short shrift. Not only does this approach to language study deprive students of important learning opportunities, but it can also have a negative impact on certain industries whose pool of talented workers is made smaller due to poor language skills. The design field is no exception to this phenomenon. In fact, it is unfortunate that a number of talented design students graduate from university lacking the English language skills to contribute to the international design field. In Japan, this is certainly the case. A change in the way English is approached needs to take place for Japanese English speakers to be successful in business. The emphasis on perfection, or exam-level English needs to be shifted toward a more practical use of language. Brian J. Hurn calls for the development of "a form of international English. . . [that] should consist of words and phrases which are in little danger of being misunderstood" (303). After examining some of the factors that contribute to poor vocational English preparation in Japan, and the impact that this has on students and their careers, a program designed to remedy this problem will be described.

English Study in Japan

Sakai and Kikuchi (2009), in a study on demotivating factors contributing to poor English learning experiences among Japanese university students, have described the following factors as being significant: "lack of a sense of control over what one is learning, . . . a sense of classes being overly exam-oriented, feelings of inferiority about one's English ability, and peers' negative attitude toward English learning" (59). The project described in this paper attempts to address all of the above factors with particular emphasis on the first two. The authors of that study go on to further show that, "the learner-level problem influenced demotivation the most, followed by the language level problem, and finally the learning situation level problem" (Sakai and Kikuchi 2009, 60). The university at which this project is being implemented has two faculties and six departments. Generally speaking, students in the design departments (Industrial Design, Art and Science, Space and Architecture) score lower on standardized English tests, and as a result get classified as lower-level students. Unfortunately, this method of classification does not take into consideration different learning styles and student needs. It also grossly underestimates the potential of a dynamic and creative segment of the student population. As Sakai and Kikuchi have noted, classifying students into lower levels has an adverse effect on motivation (60).

Practitioners in second language acquisition can attest to the importance that motivation plays in successful learning.

Motivation and language learning

A big obstacle to English language learning at the university level in Japan is motivation. Language learning motivation is a notoriously complex construct affected by many factors. One factor negatively impacting motivation in Japan is that students often find themselves with few opportunities to hear or speak English. Students with no intention of leaving Japan also frequently feel that good English skills are irrelevant to their future careers. In trying to motivate Japanese university students, in this particular case design majors, it helps to explore ways to change their perspectives. Ema Ushioda, in Dornyei (2001), has studied, "the evolving nature of goal orientation in learners' motivational experience" (111). Furthermore, Ushioda notes the influence of "clarity or priority of particular goals or future perspectives" (111) in motivational change. Ushioda goes on to cite an individual learner who "spoke about the instrumental value of her [language] skills following some work experience . . . and talked about some career perspectives that seemed to be shaping her motivation more" (111). It is critical for design students to undergo such a motivational shift in their language studies. Much has been written in second language literature about extrinsic and intrinsic motivation and its impact on language learning. In the case of Japanese university design majors, another component requires consideration. Vocabulary and communication skills required to create and describe products or concepts in English is necessary for success with design English. It is hoped that the collaboration project described in this report will instill in Design students who expect to become design professionals the belief that English is a skill that will be useful in their future careers.

English for Specific Purposes (ESP)

Belcher (2004) defines ESP as the "attempt to give learners access to the language they want and need to accomplish their own academic or occupational goals" (166). The collaboration project described in this paper attempts to do exactly that; it provides design students with the language they will need to reach professional goals. As a cautionary note, Belcher goes on to cite Spack (1988) when noting that "a common complaint is that many ESP instructors could not (or would not) engage in the type of specialized language use that they attempt to induct learners into, e.g., humanities majors teaching the language of science and technology" (165-6). Having design professors with extensive professional experience prior to taking university teaching positions on this project team renders the above complaint moot. The long-term nature of this project will allow both design and English instructors to respond to the subtly different specialized language needs of design students based on their product concept and the message they wish to convey in their presentation. Kassim and Ali (2009) studied the use of English for specific purposes in Malaysia, a country similar to Japan in that English is not the native language of the overwhelming majority of the population. Specifically, they investigated required use of English in the workplace and found that "informal work-related meetings and discussions, giving oral presentations" and "the presentation of new ideas and alternative strategies" (177) were all seen as very frequent or frequent situations in which English was required. The weekly lessons of

the collaboration project have been designed to specifically provide for learning experiences that allow students to practice all of the above uses of English.

Design collaboration

To remedy the aforementioned problems, a long-term project has been undertaken at a Japanese university to improve English education for students studying design. Many members of the Design faculty at the university come to academia from the private sector. Oftentimes they recognize the incompatibility between Design students' English proficiency and attitudes towards English and the English language skills that employers will be expecting of them if they embark on careers as professional designers. In an effort to correct this situation, a course was created in which Industrial Design majors were paired with advanced English students studying in a two-year English Diploma Course in the Department of International Culture. The over-arching goal of the collaboration project was to give Design students a chance to improve their communicative English while also giving them experience both presenting and using specialized vocabulary in English. The project consisted of two different courses, a Design seminar taught by an instructor from the Department of Industrial Design and an upper-level presentation course, separated into two sections, taught by two English instructors from the Department of International Culture. The courses followed different tracks for the first eight weeks of the semester before coming together in the ninth week for the final six weeks of the fifteen-week semester. Classes were ninety minutes each and met once a week. The first half of the Design seminar was devoted to having students develop a product, create a prototype and prepare a presentation in Japanese. During the first half of the Department of International Culture course students prepared and delivered a presentation in English to their teacher and classmates. The different tracks followed by the two courses in the first half of the semester ensured that all parties would be fully prepared and able to be productive once the collaboration began in earnest. The project was designed to give Industrial Design students practical experience using English to shepherd a product design through all the stages of a process leading to a final presentation. While the development of English presentation skills has been the primary focus of this project, a number of other important language skills can also be fostered as a result of this collaboration. Chou states, "cooperative learning emphasizes the importance of group dynamics, the creation of a motivating environment, group formation, and the benefits of group learning" (280). No doubt, individuals benefit by gaining valuable presentation experience, but they also gain a lot from working in groups. It is hoped that peers coming to this project from different backgrounds and with markedly different academic and professional goals can create a symbiotic working relationship.

Group Dynamics

Dornyei and Malderez (1997) state that, "Groups can be a substantial source of motivation to learn the L2. It has been recognized increasingly recently that group-based motives form a great proportion of the complex of L2 motivation" (67). Concerning success in the L2 classroom, the authors stress the importance of "what goes on inside and between people in the classroom" (Dornyei and Malderez 1997, 67). Creating teams of students from different fields of study added diversity to the groups and also allowed students to have a multidisciplinary learning experience that may most closely resemble a "real world" work environment. Students not only gained

language experience by learning how to use transactional language and discussion techniques, but they also were able to learn how to compromise, see things from a variety of perspectives, take a position on an issue and politely defend their ideas. The final item on this list, practice in defending a position, would serve students well when they gave their presentations at the end of the semester. Indeed, by making the final presentations open to the university community the project coordinators were virtually ensuring that students would be faced with penetrating questions and sometimes critical comments from design professors or professors in other disciplines.

Presentation and Q & A

Querol-Julian and Fortanet-Gomez (2012) describe the challenges encountered by non-native English presenters who find themselves standing in front of an audience (in some cases with many native English speakers), eager to find out more about the topic that was just presented. Just as presenters breathe a sigh of relief after delivering their presentation, they are faced with a new challenge. No matter how hard a presenter prepares, the Q & A will always be an unknown variable. Querol-Julian and Fortanet-Gomez state that, "During the presentation, the roles of presenter or speaker and audience or hearer are static, but they are dynamic, changing with every new contribution in the discussion session from the presenter as speaker and the discussant as audience, to the discussant as speaker and the presenter as addressee and audience" (272). As mentioned above in the section on English Study in Japan, feelings of inferiority can have a negative impact on the learning experience. Bearing this in mind, the instructors took measures to encourage students and build confidence. Students involved in this project were provided with an environment that allowed them to take risks without fear of failure. Furthermore, students were given a chance to rehearse their presentation in front of their classmates and supportive instructors before appearing on the big stage. In some instances, students were given support with mock question and answer sessions; however, more can be done to prepare a presenter to "defend the validity of his or her research [product] in the face of possible criticism by discussants" (Querol-Julian and Fortanet-Gomez 2012, 272). The experience of having to explain and defend a position and diplomatically handle criticism and differences of opinion is meant to model to some extent an actual workplace environment. Rehearsals and mock question and answer sessions, while undoubtedly useful, cannot be expected to prepare presenters for every possible eventuality they may face and primary responsibility will fall on the presenter to be able to adequately explain and defend his or her product. In any case, preparation has been, and will continue to be, supported through the collaborative efforts of teachers and students. The three stages of the collaboration will be described below, followed by examples of student work (Figures 4 and 5) and results of a brief survey (Table 1) conducted in the first year of the project.

Collaboration Stage 1

This project was first conceived in 2010 after observing Japanese Design majors in their university English courses over a number of years. After meetings and planning sessions between a Design professor and an English professor, a team was formed. The project officially started in April 2011. The number of students in the Industrial Design course (n=9) and the Department of International Culture (n=22) course differed; this difference in balance required some design students to work with a pair of International Culture majors while other design students were assigned to work with a group of three students studying International Culture. Before describing the schedule for the project, some background will be given on the Japanese university academic calendar and how the design curriculum and English courses were managed.

The academic year in Japan runs from April to March. As mentioned above, each semester consists of fifteen weeks plus a week for final exams. Classes meet ninety minutes each week. Each course provides twenty-two and one half contact hours each semester; therefore, teachers are remiss to give up valuable time from their syllabi. This is the case particularly in higher-level courses that require students to develop specialized knowledge and skills. Both English teachers and design teachers are well aware of this situation and strove to ensure that both design and English education were given adequate coverage. Design classes met on Tuesdays during second period (10:40am to 12:10pm) and then from the ninth week of the semester design students also started meeting with their counterparts in the other faculty on Tuesdays during third period (13:00pm to 14:30pm), while they continued their design studies in second period. Two reasons were responsible for this arrangement: 1. both courses could not be scheduled at the same time in the current curriculum; 2. sacrificing valuable time from design courses would have been detrimental to the design students' education. From an administrative and educational perspective, it was a lot easier and more practical to open the International Culture English Diploma Course to the Design majors (to provide additional class time), than it would have been to take time away from the Industrial Design seminars. In brief, additional class time, in the form of English collaboration, was added to the design students' schedules, while students continued to receive design education. The methods of course management when both faculties came together will be described below.

The first week of the collaboration (week nine of the Spring semester) was devoted to having Industrial Design students make an initial presentation of their product in Japanese. International Culture majors were responsible for completing a questionnaire evaluating each presentation and product and noting preferences as to which product they found most interesting and which designer they would most like to work with. Based partially on this information, Industrial Design students were matched up with their counterparts in the Department of International Culture to form teams of three or four (with one design student per team) for the rest of the semester. The following two weeks of class time were devoted to having teams work together to clarify and refine the product concept. Weeks four and five of the collaboration (weeks twelve and thirteen of the semester) focused on ensuring that product concepts were rendered into clear and natural English and that the presentation was polished and well-organized. On the penultimate week of the collaboration project each team was given a chance to do a practice English presentation in front of their teachers and peers and to receive feedback and advice. The final week was devoted to the final presentation by each team. This final presentation was publicized and open to the university

community at large. As discussed above, it was hoped that design professors and other attendees would ask probing questions which would force each team to be able to clearly and succinctly articulate their product concept and its value to their audience.

Observations of student participation in this project, as well as comments provided by students, both Design and International Culture, show that the experience was worthwhile and encouraged the instructors to continue the project. Table 1 shows the results of a survey of students from both departments taken after completion of the project in July 2011. Students responded to a number of statements regarding motivation to study English, confidence to use English, and a willingness to take part in a similar project in the future. Students responded on a scale from 1 to 5, with 5 being the most positive response. Data and commentary that are relevant to this report will be provided below.

Responders from both departments stated favorably that the program prompted them to study English (4.6/5 Design; 4.5/5 International Culture). Furthermore, both groups would like to be English speakers (4.4/5 Design; 4.8/5 International Culture). Both sets of responses are encouraging to the organizers of this program and demonstrate that some of the initial goals (awareness raising and increasing motivation) of the program have been accomplished. In determining whether or not to continue the program, and what benefits were received, responses where also positive. In response to the question: “Has this program been beneficial to you?” both groups, recipients of different types of benefits, saw merit in the program (4.7/5 Design; 4.6/5 International Culture). Students from both majors also would be interested in joining a program like this again (4.1/5 Design; 4.1/5 International Culture). One question on the survey that received the lowest scores was: “Do you feel hesitation in speaking English?”. Both groups responded similarly, even the advanced students (Design 3.6/5; International Culture 3.7/5). This response confirmed the assumptions of the organizers of the program that students need many opportunities to use practical English to build confidence. Furthermore, the process and support system conceived of for this project was intended to build student confidence. In the next stage of the project, further steps were introduced to give students more practice and support, so they would be less hesitant to speak English.

Figure 1. collaboration in English workshops and discussions

Collaboration Stage 2

Having achieved success in 2011, the project was continued and expanded for the 2012 academic year; a number of new components were added. In particular, two more design professors and an additional professor from the Department of International Culture joined the team. The additional team members would be instrumental in bringing fresh ideas and different perspectives to the project. The success of the project in its initial year and the addition of the design professors, which necessitated opening up another section of the design seminar, resulted in a more than doubling of the number of students from the Department of Industrial Design joining the project. The new teaching team members would be instrumental in ensuring adequate support for the greater number of students who had joined the program. The number of advanced English students stayed roughly the same in 2012, so that there was now a one-to-one ratio of Design student (n=23) and advanced English student (n=23). The semester schedule was set in a similar fashion as the previous year; however, the increase in the number of students, plus the loss of one work day due to a school closing because of bad weather, would mean the process would have to be sped up to make the presentation deadlines. To accomplish this, students were required to do more work independently outside of regularly scheduled class time while working one-on-one with a partner rather than in a group of three or four. Despite the added burden, the teams took on these tasks with enthusiasm and were able to successfully complete their work on time. A second scheduling challenge was caused by a special addition to the 2012 program: the attendance at the final presentation of guest designers from an international company near the university. The designers, young, dynamic professionals from France and Denmark respectively, attended the final presentations as audience members and subsequently participated in a panel discussion to provide advice to the presentation teams. This experience proved to be extremely valuable to the students who were able to meet potential models for their future selves, international designers close in age to themselves working in an English language environment. The presence of the guest designers also proved to be very useful for the instructors on the team as it provided them a benchmark for their students to aspire toward. Hearing the voices of international designers in this context provided a corpus of design language that will be used in future courses and also in the creation of a special design English textbook that will continue development in the third stage of this project in late 2012 and early 2013.

Figure 2. English presentation

Collaboration Stage 3

The third stage of this project has begun and includes another component to improve the English language skills in general, and the discussion and presentation skills in particular, of design majors at university. A long-term goal of the project is to write a design English textbook that can be used not only by students, but also other professionals in the design field who need assistance with English and presentation skills. Language professionals and design professionals will develop the text, so it will be sound in both language teaching methodology as well as content. The collaboration between the two faculties will also continue. Team members will have to find ways to deal with the increasing number of design students interested in the program. However, that is a welcome challenge because it serves as evidence of the success of the project. It reflects the fact that design majors in at least one Japanese university recognize the need to improve their English and their desire to use it in their careers.

Examples of student work

Examples of student work have been provided below to illustrate the progress students have made in their English skills as a result of this project. The text was edited by a number of collaborators (both Design and International Culture students), and various instructors overseeing the work provided feedback. To make collaboration and editing easier, students shared their materials in google documents and all parties had easy access to the data. Figure 3 shows some examples of edited text. In particular, students were given support to overcome first language interference that may be caused by direct, word-by-word, translation. To arrive at a final text, a number of factors where taken into consideration. Students were taught not to slavishly adhere to mirror translations of the Japanese text. In cases when this was observed, instruction was given in more natural English. Furthermore, students were taught the differences between written and spoken text. The communication of ideas was given precedence over any long, complex technical texts. Students were instructed to consider their audience and the goals of their presentation.

The theme of the design seminar addressed global food issues. Figures 4 and 5 are examples of two products students designed to help people from impoverished nations and people with obesity problems. The D-box (development box) is intended to support children in their education by recycling large cardboard boxes (often left over from aid and supply deliveries) into products to carry school goods, food, and for use as portable desks. The other product shown below was designed as a companion for people who eat alone. The purpose of the product is to monitor eating speed, offer companionship, and to encourage people to eat more slowly, which is a well-known method for controlling weight gain. The two product examples shown below deserve to have a much broader audience than Japan and Japanese speakers; they provide more affirmation of the importance of this collaboration. This project is one of the first steps in a long process of English language education reform being initiated at the university at which it took place. More English remediation for design majors before they enter this program will certainly produce better results. Nonetheless, the examples provided below can be considered good models that can be used by students who enter this program in the future.

Conclusion

While the catalyst for this design English presentation project was concern over the English language and presentation skills of design majors at a Japanese university, this project has evolved over the two years since its inception to encompass a larger scope. The authors of this study believe that this project can be used as a model by other design departments at other universities (in Japan and abroad) to prepare their graduates to make a greater contribution to international design. The steps taken to teach design presentation can be duplicated in other curricula, and in other fields. The stages of the project involved first training and teaching students specialized skills in their respective areas of study; in this case, Industrial Design and advanced English and International Culture. It then brought the diverse groups together to form teams; the teams each had a product or product concept and goals to refine it and present the results in English. Through discussions and workshops, students were able to create a presentation that they delivered first at a rehearsal and subsequently in front of a large audience composed of design professionals, instructors, and lay people. Students were able to learn discussion skills and also public speaking techniques, all in a context that is relevant to their area of study and their futures plans. Lessons learned and progress made by the authors of this study will be used to develop a textbook specifically geared toward English design collaboration and presentation further providing members of the design education community access to the ideas and materials related to this project.

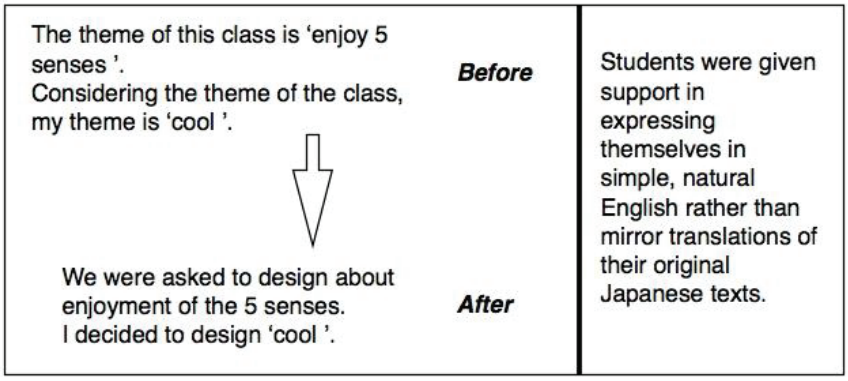

Figure 3. Language support and editing

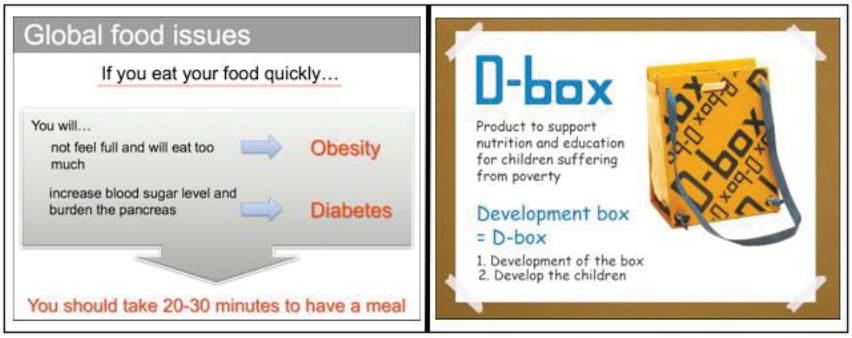

Figure 4. Student slides shows

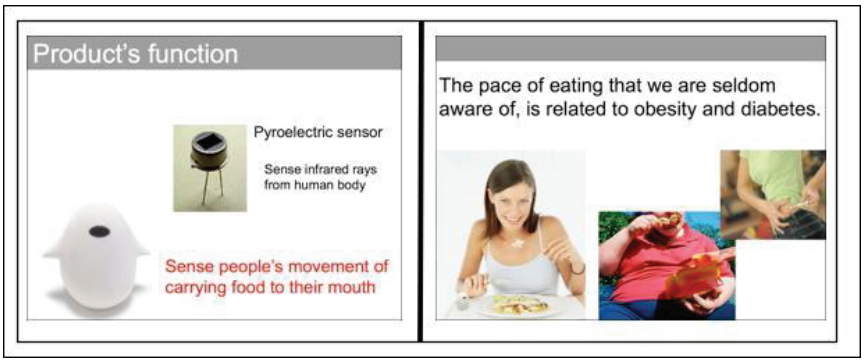

Figure 5. Student slides shows

Table 1. Post-program Design and International Culture student responses to a survey conducted in July 2011.

Scale: 1=Totally No; 2=No; 3=not sure; 4=Yes; 5=Totally Yes Design n=9; English Diploma Students n=13	**Design Majors**	**International Culture Majors**
Did this program prompt you to study English?	4.6	4.5
Do you feel less hesitation in speaking English?	3.6	3.7
Do you think you want to be an English speaker?	4.4	4.8
Do you have a greater concern for global issues since starting this project?	4.3	4.3
Has this program been beneficial to you?	4.7	4.6
Would you like to join a program like this again?	4.1	4.1

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A New Way To Improve Design Students' Creativity - Based on Thinking Style

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Abstract: *China is developing rapidly in many areas; currently over 50% of products (including household supplies, industrial products, some raw materials) in the world are 'made in China'. However, during the past 30 years of reformation and opening, there have been very few designers, educated in China, with a global reputation. To change current situation of 'made in china' to 'created in china', re-energizing Chinese design education is important. The research focus on higher education and explores new approaches to improve design students' creativity. Thinking styles are not dictate by physical condition. This indicates that we cannot judge a person's thinking style with the standards, high or low, good or bad. In the field of Education, providing a suitable match between teaching methods and thinking styles will facilitate effective development (Sternberg, 1997). It is proposed, therefore, that to improve students' creativity efficiently it is important to identify their thinking styles and identify and facilitate the corresponding teaching methods. This article presents research exploring an 'alternating teaching method' applied in Higher Education for improving design students' creativity. The research concerns thinking styles and the relationships between design process, creative process and education system.*

Keywords: creativity, thinking styles, legislative, executive

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Idea forming

Creativity is an integral and essential part of the landscape design process. Without creativity in design there is no potential for innovation, which is where creative ideas are actually implemented (Mumford and Gustafson, 1988; Amabile, 1996). There is no exact definition of creativity, a common misunderstanding equates creativity with originality. In point of fact, there are very few absolutely original ideas. The fact that creativity is based on knowledge of previous work in one's field is the justification for teaching the history and foundations of a given field as a resource for future research and creative work. Psychologists usually consider creativity as a part of cognitive process. Thus creativity is the ability to see connections and relationships where others have not and the critical part of enhancing creativity should be improving creative thinking.

In recent years, modules that aim to improve undergraduate design students' creative thinking have been encouraged in P.R.China (following "China" in this article equals to P.R.C). For example, Tsinghua University, Central Academy of Fine Art, Nanjing University of Arts and Nanjing Forestry University (NJFU) have employed a 'project-oriented teaching method' to achieve this aim (Ye, 2007). However, research shows that these students made little progress in creative thinking (Zhang & Li, 2008). Historically, in the field of creativity development, researchers have focused on people's physical condition and innate qualities, such as intelligence. Thinking styles, however, are formed through socialization and develop in relation to living environments. The theory of 'thinking styles' argues that the 'project-oriented teaching method' only matches people with a 'legislative' style (Sternberg, 1997). Therefore, this research project aims to develop an 'alternating teaching method' supportive of a range of thinking styles to promote students' creative thinking.

The 'alternating teaching method' is supposed to match design students with a range of thinking styles, as good matches between teaching methods and thinking styles will make people develop better (Sternberg, 1997). In terms of creative thinking, three kinds of thinking styles are identified into 'legislative', 'executive', and 'judicial'. Students with a legislative style like to create ideas whereas students with an executive style prefer to be given guidance as to what to do or how to do, and students with a judicial style combine the former two styles (Isaksen & Gaulin, 2005; Sternberg, 1997). 'Project', as a student-centred teaching method, advocates self-direction and open-ended inquiry (Fried-Booth, 2002), which Csikszentmihalyi (1996) has described as 'congenial' conditions for fostering students' creative thinking. However the performances of students with an executive thinking style lead them to stop progress without guidance, especially in a long-term design project. The 'alternating teaching method' will be achieved through solving this problem. People's thinking styles are formed through socialization with complex components (Sternberg, 1999) and therefore it cannot be changed easily. Thus the 'alternating teaching method' would be based on the 'project-oriented teaching method', to provide 'congenial' conditions for promoting creative thinking, but would also use an assisted teaching method to fit with legislative or executive thinking styles. As students with a 'judicial' style are between the two opposite styles, they will not be considered as a focus in this programme.

Detail designing

It is proposed that lectures would be integrated in 'project-oriented teaching method' as an assisted teaching method to form this 'alternating teaching method'.

People will think creatively when they decide what they want to do (Kaufman, 2007), this willingness to creative thinking is easy to encourage when introducing related information like 'a concrete definition of creative thinking' in an efficient way (Cropley, 2001). For lecture's great efficiency in delivering factual and conceptual understanding (Exley & Dennick, 2004), this willingness of students with either legislative or executive thinking style would be provoked. Moreover, lecture is the most efficient method for students with an executive thinking style (Sternberg, 1999) to give them guidance of how to achieve creative thinking to reduce their limits in a project. Combination of teaching methods is being advocated for the sake of different teaching aims (Gage & Berliner, 1975). The critical point of whether this 'alternating teaching method' would be efficient or not depends on how to apply different types of teaching methods- "project" "lecture" and "discussion" in an appropriate stage.

China's particular 'test-oriented education system' encourages students to cultivate an executive thinking style. In China, students have to take unified tests for entering the schools of next level, the contents of which are entirely from textbooks and have no aspect relating to creativity (Gu, 1990). The competition is quite intense in the 'university entrance test', as an account showed in 2008 that only 25 per cent of all students participating in this test were qualified to enter universities for higher education. Students will get higher marks in tests if they obey and follow exactly what teacher tells them. Thus, a large number of students with an executive thinking style have been fostered. The 'alternating teaching method' will be tested in chosen universities in China involving undergraduate design students by conducting a long-term design project（one year/two semesters）. Through observing and analysing teaching practices and studio sessions, it will be investigated how this 'alternating teaching method' makes efforts to enhancing creative thinking of students with either legislative or executive thinking styles. 'Instructions for Stylistic Self-Assessment' (Sternberg, 1999) (attachment1) will be chosen to distinguish students thinking styles.

The aim of this programme should be included with:

- To develop a teaching method, with learning conditions, to support design students with either legislative or executive thinking style.
- To make students with either legislative or executive thinking style improve their creative thinking.

Methodology

1. Literature review and case studies

Review related literature relating to thinking styles, creative thinking and creative thinking education. "Meta-analysis" (Neuman, 2006) has been employed to manage the findings and identify related themes and explanatory-multiple-case studies has also been conducted (Yin, 2003), where qualitative data are collected and analysed (Ganhan & Hannibal, 1999) to identify best practices in encouraging creative thinking in undergraduate design students.

Csikszenmihalyi (1996) has described the creative process as comprising five steps: preparation(immersion in a set of problematic issues that are interesting and arouse curiosity), incubation (ideas are churched around, below the level of consciousness, and unusual connections are made), insight (pieces of puzzle begin to fall into space), evaluation (deciding which insight is most valuable and worth pursuing) and

elaboration (turning the insight into something real). We can find from the description of key stages of the architecture design process of Royal Institute of British Architects (RIBA) Plan of Work that these key stages are much more similar with Csikszenmihalyi's creative process: the problem area (problem definition and understand problem) has the characteristic of step one 'preparation'; the concept area (concept design and concept development) has the characteristic of step two and three (incubation and insight); detailed design and evaluation is equal to the step four (evaluation) and production/manufacture is equal to step five (elaboration). What's more, one research conducted by Howard, Culley and Dekoninck (2008) has clearly explained the similarity between the creative process and engineering design. Thus the design project process can be designed into the following five stages: preparation stage, the stage of thinking (Discovery), the stage of insight (solution), the stage of assessment, as well as production stage. On the basis of the design project, at of the beginning of each stage, according to the students' different thinking styles using "lecture" teaching method to provide specific guidance and fully arouse students' desire to create, therefore, those "executive" students in specific implementation of the design project will have a clear goal and no longer feel confused. Students with 'legislative' style will also be able to make creative thinking preparation at the beginning of each stage of the design project so as to achieve the effective implementation of the preparation, which is students' creativity development objective. Further more, appropriate thinking training course (based on Lateral Thinking, De Bono, 1970) is set before particular steps which is meant to maximize students' interest in the project practice in creative thinking. Discussions are also integrated into certain stage to achieve a specific objective.

The prototype of module using the new teaching method is designed as below [Fig1]:

The project stages and time period	The alternating teaching method	Assignment
Preparation (Information collection) 2012.9-2012.12	1. Lecture: Introduction of creativity 1 Thinking training 1 2. Lecture: Introduction of project 1 3. Implementation	To determine the core of this design project
Thinking (Discovery) 2013.1-2013.3	1. Lecture: Introduction of creativity 2 Thinking training 2 2. Lecture: Introduction of project 2 3. Implementation	To generate ideas for design concept as many as possible
Insight (Solution) 2013.4-2013.7	1. Lecture: Thinking training 3 2.Discussion 1 3. Implementation	To develop design concepts
Assessment (Evaluation) 2013.8-2013.12	1. Lecture: Introduction of project 3 2.Discussion 2 3. Implementation	To determine the design concept
Production (Elaboration) 2013.12-2014.2	1. Lecture: Introduction of project 4 2. Discussion 3 3. Implementation	Detail design and mock-up

Figure 1. the Prototype of module using the 'alternating teaching method'

2. Survey research (Neuman, 2006)

To conduct this programme, collecting statistical information of professional design teachers and students in China's universities is necessary, which relates to whether the programme could be launched successfully. More over, information about these teachers and students' understandings and perceptions of creative thinking at the present stage has been collected which is significant for samples choosing in the following experiment stage. Questionnaire was designed based on the questionnaire of 'creativity in schools: a survey of teachers in Europe'(Cachia, Ferrari, 2010) and a few questions relating to Chinese local conditions were inserted as well according to the current situation of Chinese design education. The questionnaire was designed into three parts: 1.Basic information, including gender, age, etc. 2.Learning capability and character test (only for students). 3. Information about how Chinese teachers and students understand Creativity. Each questionnaire has its Number which helps to determine participants of the following experiment. Through this investigation, 6 teachers, whose understanding of creativity has a lot in common, have been chosen to join in the experiment, and 500 students have been chosen to take part in the next test for the experiment.

3. Experimental research (Neuman, 2006):

This part should be the most important part of this programme, the testing of the effectiveness of 'alternating teaching method' are managed through a few aspects shown as below:

A. SAMPLES CHOOSING

The samples are chosen according to the result of previous survey and 'Sternberg-Wagner Self-Assessment Inventory on the Legislative Style and Executive Style' [Appendix 1 Table 1]. 6 teachers and 120 students are from the Nanjing Forestry University, Nanjing University of Arts, and Central Academy of Fine Arts. These 120 students are chosen from over 2,000 students from nationwide joined in the previous survey and they are similar in capability of learning and personal character. These students are divided into 6 classes, each class has one teacher and 20 students. To be more detailed, there are two classes with legislative style students, two classes with executive style students and the other two classes with both legislative and executive students. Three classes (one with legislative students L1, one with executive students E1, and mixed one M1) will join in the module applying the 'alternating teaching method', and the other three classes (L2, E2, M2) will begin module still in current teaching method, and then provide data for comparison.

B. THE MODULE SETTING

To apply to the "alternating teaching method", the module has been designed as project-centred (see Fig1). This design project is named "Nanjing 2014 Youth Olympics Stadium Landscape Design". It began with the first stage: preparation. The six testing classes began this module at the same time (Sept. 2012) and applied different teaching method-the new one and the current one. As product assessments are probably the most appropriate assessments of creativity (Kaufman, 2004), different assignment was set at the end of each stage. The assignment at the end of the first stage was "to determine the core of this design project".Student Product Assessment Form (SPAF) (Reis & Renzulli, 1991) [Appendix 2] are employed for collecting quantitative information. Every class is divided into 5 groups with 4 students each to learn and finish the assignment together.

C. RESULTS COMPARISON

The results of the first stage are shown in tables below. It is clear to see that the average score of design product has risen up obviously by using the new teaching method in each class. The class L1 got the highest score in average, however, compared with L2 from table 2, the degree of rise (PL) is low. In contrary, the score of E2 is the lowest, but the data (PE)shows that the degree of rise between E2 and E1 is the highest which is up to 56%. For another, it reveals a situation from tables that the highest score (up to 10) and lowest score (4) turned up in the same class M1, which means that although the mixed styles may provoke best result, it may lead to the worst result if the collaboration is in bad condition.

Class(E)	Group	Score	Average score(S)
E1	Group 1	5	Se1=5.6
	Group 2	4	
	Group 3	5	
	Group 4	7	
	Group 5	7	
L1	Group 1	8	Sl1=8.2
	Group 2	8	
	Group 3	9	
	Group 4	9	
	Group 5	7	
M1	Group 1	4	Sm1=7.2
	Group 2	7	
	Group 3	7	
	Group 4	10	
	Group 5	8	

Table 1a. The result of 'SPAF' in classes taught using 'Alternating teaching method'

Class(E)	Group	Score	Average score(S)
E2	Group 1	3	Se2=3.6
	Group 2	5	
	Group 3	6	
	Group 4	2	
	Group 5	2	
L2	Group 1	7	Sl2=7.4
	Group 2	9	
	Group 3	8	
	Group 4	8	
	Group 5	5	
M2	Group 1	5	Sm2=5.8
	Group 2	3	
	Group 3	7	
	Group 4	6	
	Group 5	8	

Table 1b. The result of 'SPAF' in classes taught using current teaching method

Growth rate (P)	Percentage
P_E	56%
P_L	10%
P_M	29%

Table 2. The growth rate of 'SPAF' result after applying new teaching method

$$P=(S1-S2)/S2$$

D. Conclusion

In the following four stages, each stage will take a similar approach to evaluate the effectiveness of the teaching method and finally obtain the average results of the whole programme to evaluate the final efficiency of the 'alternating teaching method', and at the same time, provide opportunities to find new problems.

Evaluating:

1. Product assessments are probably the most appropriate assessments of creativity (Kaufman, 2004), and as the aim of this research programme, Student Product Assessment Form (SPAF) (Reis & Renzulli, 1991) (Appendix 2) will be employed for 'alternating teaching method'.

2. According to this assessment and 'Sternberg-Wagner Self-Assessment Inventory on the Legislative Style and Executive Style' a 'Teachers marking criteria' has also been developed, the prototype is shown in (Appendix 1 Table 2).

Conclusion

Creativity has been studied by psychologists, educators, neuroscientists, historians, sociologists, economists, engineers and scholars of all types and considered important in many fields. From the viewpoint of psychology, creativity has been studied as a part of cognitive process, which has developed many new approaches to improve people's creativity. Sternberg's theory of Thinking styles classifies people's thinking styles according to their usual ways of thinking which applies the knowledge of cognitive psychology. His theory suggests that good matches between people' thinking styles and the work they join in lead to success more easier, thus if you have to attend those works which is inconsistent with your thinking style, then you will have to try changing your thinking style to the appropriate one advisedly. Therefore, it is quite critical to identify personal thinking style and the work one deals with.

What has mentioned above is extremely necessary in Higher Education as most of learners are adult students with mature physical conditions which is hard to developed compared with that of children. There is no doubt that not every design student is of the 'legislative' style, especially in China. Many approaches concerning with improving students' creativity have been introduced in China's universities these years, however, little progress has been made. The primary reason was that these approaches have not been taught with appropriate teaching methods which could match with arrange of thinking styles, especially the 'executive' one. The data of the first stage of this programme has shown the positive result of using the 'alternating teaching method' in a course module, though there are still other various influencing elements in teaching and learning system. More problems and inspirations will be found while the programme is going through to the end and helpfully to achieve further refinement.

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Appendix 1

Table 1: Sternberg-Wagner Self-Assessment Inventory on the Legislative Style and Executive Style (Sternberg, 1999)
Scores criteria: 1= Not at all well 2= Not very well 3= Slightly well; 4= Somewhat well 5= Well; 6= Very well 7= Extremely well
Self-Assessment Inventory on the Legislative Style
1.When making decisions, I tend to rely on my own ideas and ways of doing things.
2. When faced with a problem, I use my own ideas and strategies to solve it
3. I like to play with my ideas and see how far they go
4. I like problems where I can try my own way of solving them.
5. When working on a task, I like to start with my own ideas.
6. Before starting a task, I like to figure out for myself how I will do my work
7. I feel happier about a job when I can decide for myself what and how to do it
8. I like situations where I can use my own ideas and ways of doing things.

Self-Assessment Inventory on the Executive Style
1. When discussing or writing down ideas, I follow formal rules of presentation.
2. I like projects that have a clear structure and a set plan and goal.
3. Before starting a task or project, I check to see what method or procedure should be used.
4. I like situations in which my role or the way I participate is clearly defined.
5. I enjoy working on things that I can do by following directions.
6. I am careful to use the proper method to solve any problem.
7. I like to figure out how to solve a problem following certain rules.
8. I like to follow definite rules or directions when solving a problem or doing a task.

Table 2: Teachers marking criteria for students' work (develop from the questions of Self-Assessment Inventory on Table 1), Total scores = 100%
(Note: the percentage distributed to each question of assessment depends on the degree of ideas expression)

1. Has the student shown evidence of reliance on their own ideas and ways of carrying out their design work? (30%)
Criteria: Ideas not seen in other student work or work of other designers before. /Using approaches not seen used before by other students or designers.
2. Has the student shown evidence of doing better in those problems being solved by his own way? (20%)
Criteria; Problem solved by his own way seen carried out completely and efficiently. /Problem solved by using directions seen carried out roughly.
3. Has the student shown evidence of the importance of his idea to the task? (10%)
Criteria: Task not seen achieved without student's idea. /The student's idea makes this task more successful.
4. Does the final work reflect student's general idea from the beginning to the end? (5%)
Criteria: The work has been achieved by the direction of student's idea.
5. Has the student shown evidence of using a special presentation to express his ideas? (10%)
Criteria: Presentation not seen used by other students or designers. /The approach of this presentation seems efficient in expression of ideas
6. Does the project show evidence of being solved by restructuring? (20%)
Criteria: Project not seen achieved following original structure, plan and goal. /The restructuring makes the project be achieved much easier.
7. Has the student show evidence of not being as what others expect to in a task? (5%)
Criteria: student's behaviour in the task seems different from what others expect. /The student does better when asked for being what others expect.

Appendix 2

Accordingly, each completed form should be assessed by experimenter and another two experts. They need to rate the first 8 factors separately, and rate the factor 9 together with discussion.

Student Product Assessment Form
Summary Sheet

Name(s) _____ Date _____

District _____ School _____

Teacher _____ Grade _____ Sex _____

Product (Title and/or Brief Description) _____

_____

Number of weeks students worked on product _____

Factors	Rating*	Not Applicable
1. Early Statement of Purpose	_____	_____
2. Problem Focusing	_____	_____
3. Level of Resources	_____	_____
4. Diversity of Resources	_____	_____
5. Appropriateness of Resources	_____	_____
6. Logic, Sequence and Transition	_____	_____
7. Action Orientation	_____	_____
8. Audience	_____	_____
9. Overall Assessment	_____	_____
A. Originality of the Idea	_____	_____
B. Achieved Objectives Stated in the Plan	_____	_____
C. Advanced Familiarity with the Subject	_____	_____
D. Quality Beyond Age/Grade Level	_____	_____
E. Care, Attention to Detail, etc.	_____	_____
F. Time, Effort, Energy	_____	_____
G. Original Contribution	_____	_____

Comments:

Person completing this form: _____

*Rating Scales:

Factors 1-8:
- 5-To a great extent
- 3-Somewhat
- 1-To a limited extent

Factors 9A-9G:
- 5=Outstanding
- 4=Above average
- 3=Average
- 2=Below average
- 1=Poor

Philosophy of design education

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Social Design

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Abstract: *This project aims at the collective definition of social design. The process of exploring this definition is considered a workshop that gets people involved and passionate. In this process there are various elements that represented tangible reference points and draw to defined public spaces in the city and central at the University of Applied Arts Vienna. Social Design is a well-established term and has various forms of interpretations. Though this project aims to understand more about these interpretations. To achieve this, individuals were animated to think about the term 'design' and involved in defining new paradigms. This was done with the help of various interactive, crowd sourcing methods, such as idea gathering in the city by interviewing pedestrians and cyclists, with a participatory exhibition, and an open source website addressing the virtual community ... The project is organised and conducted by a trans-diciplinary and multicultural group of students of the Joint-Master Programme Social Design at the University of Applied Arts Vienna and Konservatorium Wien University. They believe that problem solving is a collective process as suggested, by Mau (2004). Accordingly a solution orientated strategic model attracting interest, raising awareness, and motivate individuals to share their ideas was designed. The project started in Vienna and should be continued in other cities. It will further be presented and discussed in more depth with various keynotes and crowd-sources at a conference in Vienna in 2013.*

Keywords: Social Design, Participative Methods, Crowd Sourcing, Urban Design, Sustainability, Urban Strategy, Cities, Exhibition

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Introduction

Feeding the term 'Social design' into the Google search engine, will result in over 1 590,000,000 entries that provide the searcher with various interpretations. Despite this - or perhaps because of such innumerable considerations - the subject remains abstract. Hence, a process to find a definition for Social Design is pursued and explored in this paper.

Commonly featured terms in any brainstorm focusing on 'social design' might well include urbanism, sustainability, development, and cooperation; therefore, the many facades of Social Design should be evaluated in a trans-disciplinary and multi-cultural way. Through such an approach, the accumulated knowledge and diverse perspectives to the city should provoke a challenging, new set of ideas. The intention is to work with methods inspired from urban theories and sustainability strategies, for example, while synchronously giving the general public the opportunity to contribute their ideas.

In the quest for a definition of Social Design, the process and strategy in attaining that definition are as important as the product itself. In fact they are part of the product. In this spirit, various programs and mechanisms are set up that facilitate a process. Stimulating exchanges about the field of social design should provide an overview and open new perspectives. It is envisioned that the result takes the form of a collective summary proposing a holistic view of 'social design' that shapes our understanding.

The meaning of 'design'- design beyond the object

Many contemporary designers call into question conventional ideas of what design is, and what it should be about. In emerging genres of `social`, `critical` and `activist` design, for example, practitioners call into question semiotics of gender and class, ownership and authorship, power and welfare, consumption and real needs (Ericson and Mazé 2011, p.12).

Viktor Papanek (1972) made the claim that design had the task to serve society rather than exploit it (Whiteley 2006, p. 114; Papanek 1984, p. 252). This desire was expressed by him in his book, 'Design for the Real World – Human Ecology and Social Change', published in the first edition in 1972, and then the revised edition in 1984. This claim marked a turning point in the understanding of and approach to design and was the starting point of the responsible design movement. To make his point Papanek compared design with the medical profession. If we were to reduce medicine to the fields of plastic surgery and cosmetics (Papanek 1984, p. 234; Whitely 2006, p. 99) then the social claim and aspect of medicine would fall void. The same is true for design. Design is habitually dismissed for not having a social and human dimension when this is in fact not the case according to Papanek (Papanek 1984, p. 352; Whitely 2006, p. 99). Papanek proposed six design priorities: Design for the Third World (2009, p. 235-45), Design medias for teaching and learning for people with disabilities, Design for medicine, surgery, dentistry and hospital equipment, Design for experimental research, Design of systems for human life protection under extreme conditions, Design for fundamentally new concepts. Within these his proposition was to evaluate psychological aspects of design, such as the effects of colours and forms. A new design priority demanded the rethinking of processes.

Margolin and Margolin (2002, p. 24-30) were writing about design, with regards the needs of developing countries. According to them social design could be considered that what facilitates clean water, hygienic standards, food and education. They wanted

design to be understood in a wider sense, including mechanisms and models that respond to social and environmental needs … Similar to Papanek, Klaus Krippendorff (2006, p. 135), a professor of communications, cybernetics and systems theory, advocates that Design competence need to be given away, delegated to users, and encouraged everywhere. The argument was that everyone is a designer and that almost everything is, or has been, designed: the way we sit, the chair we sit in, the table in front of us, the display of the keys on keyboards, etc. In the aforementioned book, 'Design for the Real World', Papanek concludes design to be '[…] the conscious effort to impose meaningful order' (Papanek 1984, p.4). Thus, design is everything that can be formed and shaped, and therefore actions and places can be designed as much as objects.

Accepting this meaning of design and its omnipresent nature inevitably leads to the topic of responsible design. The question about the social responsibility of designers is by no means new. In the 60s for example a group of artists promoted a 'first things first' manifesto, rallying against a consumer culture, advocating an improvement of society, and identifying the important role of design for this purpose. In a society that is predominantly consumption-driven, designers have played an important role in designing new products as commodities.

Transforming and shaping men's tools and surroundings will ultimately change men. In this respect, designers have played a considerable role in shaping today´s consumption culture by providing their skill and talent.

Acknowledging this understanding and perspective of design, this process would need to be reversed. Social Design concerns itself with design that is human-centered, with the wider effects and influences of design in its broadest sense. Dunne and Raby (2011, p. 28-46) believe that critical design is needed that takes at its medium social, psychological, cultural and technical values. This point of view is rather difficult for designers, whose work is closely linked to the marketplace.

Established design strategies reinforce global capitalist desires and create desire for new products. Dissatisfaction is part of that kind of planning for both, designer and consumer. Instruments of power, diplomacy, governance and welfare are conceptualized by graphic, product and environmental designers, or at least by design strategists and planners (see Mazé and Llorens 2011, p. 115). But using a different approach in designing, like materialising unusual values in products can evoke a social critique and thoughtfulness. Focusing on the importance of design, it also needs to be acknowledged that there are limits to what design can do, how it can be applied and what might be achieved.

One cannot build life from refrigerators, politics, credit statements and crossword puzzles. That is impossible. Nor can one exist for any length of time without poetry, without colour, without love (Antoine de Saint-Exupery in Papanek 2005, p. 93).

Encapsulated in this quote is the idea that life does not turn around objects, but that life turns around life itself. The things that determine our lives and happiness are fine, nuanced and subtle. Respecting this design can be a magnificent tool to promote change, and can be a support agent, as well. It seems there is a need for solution oriented and sensitive design that both takes a holistic approach and is responsive to social and cultural issues. 'Design' should not refer to the shaping of consumable items, but instead refer to the creation of structures that aim for life quality in cities.

The strategy

Upon seeing the process as part of the product, there follows a conscious desire to make the process an open, developing and continuous one. Its aim is to gather various ideas, associations, interpretations, citations and the like related to the field of Social Design. There are various mechanisms put in place to maximize the reachable audience. These different channels stretch from virtual to real space, from the 'abstract space' of designers and the 'concrete space'

(Hegel 1998, p. 381-7; Lefebvre 1991, 49-50). The starting point was a student organised Social Design exhibition at the end of January 2013 that encouraged visitors to contribute to the exhibition's content by sharing their ideas on the walls. It continues in many other ways, for example online platforms to encourage debate, polling pedestrians in the city, and awareness campaigning in a playful fashion. By diversifying its means, participation should be maximized. This channelling method addresses people that like surfing online as much as it addresses people that are talkative and willing to chat to people on the street. People with different habits, preferences, positions, cultures and ages are reached; subsequently, the audience margin is maximized and the quantity and variety of received input increases.

Essentially the goal is not to convince other people of a certain position, but rather to raise awareness, challenge conventional perceptions and understandings, and encourage people to share their thoughts and opinions with the authors. The proposal designs a process with a result as a finished product, a sum of inputs guaranteeing a farsighted understanding for sensible work within the urban field.

The exhibition- 'Social Design _ _ _ _ _'

The starting point of the project was an exhibition that aimed to explore the boundaries and challenges of Social Design as both a discipline and an urban innovation. Organised and implemented by the Social Design students of the University of Applied Arts with the Konservatorium University Vienna, it took place for almost two weeks in January 2013. The exhibition approached the question of what social design is and should be in a flexible fashion. Rather than providing a supreme answer, it highlighted related fields, and encouraged contributions and thoughts from visitors.

The exhibition walls were covered with study notes forming the content of the display. These were the original work and note materials that the Social Design students produced during their classes, hanging on the walls and shared with everyone. These texts and graphics contained information of the different reference points to the field of social design, e.g. literature, politics, sustainability, etc. which were gathered through expertise lectures and workshops and individual or team research. This sharing of informal and, to some extent, intimate material supported the statement for an open process.

With a permanent marker the notes were then linked, connected to key subjects that were identified previously, and written in bold, black, capital letters on the walls. The black lines running along the walls, connecting the notes with each other and to bigger common key subjects, created a path along the exhibition walls that allowed the visitor to dive into the material at any point and follow any chosen path across disciplines and ideas. It created a sort of anti-map, a knowledge map giving input and guiding the audience through the city in an alternative, almost participatory, way.

Additionally, there were several holes in the wall (See Figure 1), begging the visitors' attention and peeking their curiosity to look through them. Seen through one of the

holes was an image contrived from a cube construction on the outside of the exhibition space. By glancing through the hole, the viewer entered an intimate sphere that nobody else could enter in that moment. This allowed a moment of refuge, even in much the same way that many people carve their safe, private moments from the ongoing city.

Figure 1. Look-through holes. Author: Dieter Lang

Figure 2. Inside-Panorama. Author: Dieter Lang

The exhibition was set up in the form of a smart installation (See Figure 2), an exhibition that can be dismantled and reinstalled repeatedly at any point. This procedure allows that an exhibition begun in Vienna can tour around from station to station, receive new input at different viewpoints, and grow accordingly. It redefines the idea of 'open'. This way of saving the content and allowing it to develop is a manner of preservation that underlines the infinite character of social evolution, of cities and, ultimately, of the process in our focus.

PARTICIPATION IN THE EXHIBITION

The exhibition content served not only as input, but also as orientation, inspiration and invitation to the visitors to contribute their own ideas. The exhibition was therefore designed in a way that encouraged participation:

Firstly, the incomplete title, 'Social Design _ _ _ ', communicated the open process that should encourage an attentive visitor to define for himselve/herselve the role of Social Design in the city and to share that with us. We urged all visitors to pick up a pen and contribute to the knowledge map.

Secondly, the 'in-progress' aesthetics (spaces between the already existing content), the hanging pens ready for use, and a toolkit that was dispensed upon entering, all encouraged the visitor to further participation. The toolkit consisted of a cup and a pen, where the cup was used to extract liquid from the extracting machines (see below) and the pens enabled the individuals to respond to social design by including their own perspectives and comments. The visitor was therefore given the opportunity to take part in shaping the exhibition. Ultimately, it generated an examination of the essence of social design through a broader team of stakeholders, emphasising the need to open up the boundaries of a discourse that is, as governed by the rules of habit, elitist. It also recognised the need to include visions, ideas and perspectives from outside the discipline.

Figure 3. Toolkit. Source: Author: Dieter Lang

The toolkit (see Figure 3) and the smart installation were the elements that focused on the open-end nature of the process and the value of personal contribution. The exhibition functioned as a set of lenses, prisms and mirrors, in terms of covering different angles and perspectives. It welcomed both agreement and disagreement, as well as points of views that had not yet been taken into account.

EXTRACTING MACHINES

Another element to the exhibition was the 'extracting machine' (See Figure 4). This machine consisted of pipes sourced and located at the different key subjects on the wall, winding their way to the middle of the exhibition room to culminate in a set of taps. Each of the pipes contained a different taste and colour juice. At the extraction point, the visitors, equipped with the cups of the toolkit, are able to mix their individual drink.

Since the different juices were linked to different key subjects, the visitors were effectively mixing their personal social design cocktail.

Thus, a visitor comprehending the meaning of the juice was allowed to make an individual choice about which prime aspects he considered key. For example, he could choose a legal base (juice) with a hint of literature.

The estimate of the importance of these different key aspects was a very subjective evaluation, and the visitor was encouraged to ponder the possibilities of Social Design by using the extracting machine. Moreover, the extracting machine communicated the notion of the value of actions, and the meanings associated with actions.

Figure 4. Extracting Machines. Author: Dieter Lang

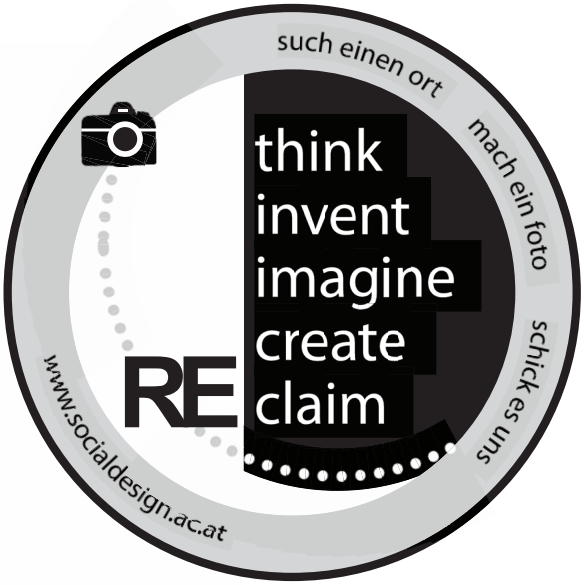

Figure 5. Sticker2Go. Author: Marta Gomez

STICKER2GO

To burst the boundaries of the exhibition space and allow Social Design to spill onto the streets and into the city, there was a unique sticker that the visitors were given upon exiting. The stickers (See Figure 5) served both as a souvenir by which to remember the exhibition and also as an idea-agent to be spread throughout the city. The sticker asked the visitor to identify places where `Social Design` takes place or where social design is needed.

Each sticker requested the visitor to place it somewhere within the city, to then make a picture and send it to the e-mail address provided. The stickers allow social self-determination and empower the residents of the city as members of the community to voice their opinion.

Moreover it declares an understanding of design where people are approached as part of a discourse. On one hand, the stickers work to raise awareness for issues concerning social design; on the other, the placing allows conclusions about what the citizens are interested in, what they desire, or what they think has to be changed. In this sense, the stickers are a valuable contribution to the project and - with respect to the channels of information - a relevant part of the strategy.

PEDESTRIAN INTERVIEWS

For the pedestrian interviews, a group of individuals went out to ask pedestrians on the street about their association with, and definitions of, Social Design. The pedestrian interviews should capture ideas and thoughts in real space, and put down roots in the city, as it is the only channel that collects information through direct, personal contact, asking the opinion of those that spend time in the city. The interview questions were put to people that find themselves both within the space and under the immediate influence of the city. Candidates were asked about public transport, parks, public spaces and other elements of a city.

For this process, and in order to receive free, uninfluenced answers, it was important that the questions framed in the dialogue not overly guide the response. Interviewers `were made very aware to avoid this obvious answer-trap. This analytical tool was applied as an `action research methodology` to research the values of the term `Social Design` and possibly needs and viewpoints. Innovative collaboration was facilitated, user participation increased, a platform for dialogues designed.

OPEN SOURCE WEBSITE

When placing so much value on the process, it is vital that the means of collecting the resultant input includes the world-wide-web. Both process and path influence the outcome. In light of contemporary socio-cultural movements, trends and changes that have occurred through technology in recent years, it is vital to include the web as one of the primary channels of communication and collection. This conduit involves a range of independent followers, anonymous users, stumblers and visitors.

The website takes an open source approach addressing the virtual community – anyone from anywhere – to contribute to the stream of ideas about social design. Unlike the Pedestrian Interviews, for example, the web opens the spectrum of participants by declaring void the issues of time and space. Therefore, it is important for the interactive homepage to function like a forum that is easily accessible and simple and facile to navigate. Like an open source code of a computer program, the source codes of social design are shared on this website.

As in the exhibition, it is expected that opposite viewpoints will clash on this platform; however, these inconsistencies are again welcome because they communicate the very nature of different, clashing opinions and expectations in a city.

The fact that the easiest way to copy a program is from one neighbour to another, the fact that a program has both a source code and object code which are distinct, and the fact that a program is used rather than read and enjoyed, combine to create a situation in which a person who enforces a copyright is harming society as a whole both materially and spiritually; in which a person should not do so regardless of whether the law enables him to (Stallmann 1985).

Conclusion

Social Design widens our understanding of design as expressive for a time, a culture and a society, and it asks for an open awareness about responsible design. In a pursuit of a definition of Social Design, this proposal presents this understanding. Rather than providing an answer, the proposal emphasizes the importance of the process in reaching a conclusion.

The format of the result of the process will range from writings, drawings, the pinning up of materials on walls, the recording of personal interviews, video/audio recordings, stickers, and exhibitions. But these are only the physical outputs. Throughout the process, there will be new understandings, revelations, insights and connections that are decisive for the understanding of social design in cities. A dialogue for urban, social and cultural creativity was initiated and planned to establish precedents in other cities, through Summer-Schools, exhibitions, performances and many more.

Stimulating dialogues should evoke reflection, encourage sharing of experience and knowledge. The query about the needs of ‘the real world’ should collectively create innovative ideas. The term Ujamaa means ‘we work together and empower each other’. The process should therefore be the Ujamaa experience (Papanek 2009, p. 11).

The accepted application to the Oslo conference inspired the students to travel to Oslo in a Caravan. Stopping in different cities on the way for interactive dialogues should maximise the participatory approach. In doing so there is already an intervention in the space. Therefore, to say it in the words of DeCerteau (1984, p. 97), they will pass by, in a 'style of tactile apprehension and kinaesthetic appropriation … their intertwined paths will give their shape to space.'

Urban creativity, as ways of living and everyday life, is considered as construction of culture and a political body. A city holds numerous cultures, professions, minds and dispositions. It is a place that people comprehend within the limits of their own perceptions and experiences.

A challenge exists in acknowledging this unrealised potential, where the described urban participants form a pool of unbridled energy that desperately needs to be tapped, then harnessed to good. In parallel, there is also this harmonic process to both collect various related factors to the city and receive various perspectives from it, including, among many, issues of sustainability, the governing economy and politics, and the role of our senses in comprehending the city. Connections and relations are drawn between such myriad aspects of thought and approach, resulting in a knowledge map that leaves the students in simultaneous awe and awareness that every new answer leads to a new question.

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Ecological Literacy in Design Education: A Foundation for Sustainable Design

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Abstract: *Responsible design in an era of scarcity and risk associated with environmental problems must be ecologically informed. Ecological literacy is necessary in order to both understand the nature of environmental problems and to respond effectively by designing sustainable ways of living. Embedding ecological literacy into design education is happening at the most progressive institutions – and yet for many others, sustainability education is still virtually absent from the curriculum. Progress is slow despite the fact that natural scientists warn that risks will escalate if we do not take dramatic action. Ecological literacy is a severe challenge as it disrupts educational cultures and challenges basic assumptions about what constitutes good design. While sustainability can seem profoundly difficult, ecological learning is the basis for sustainable design and thus it is a basic imperative in design education. Design education needs to expand its scope of inquiry to include a range of disciplines in order to address complex environmental problems. This paper will present an introduction to ecological literacy for design education, describe six ecological principles including associated concepts in systems design, and explain why critical thinking is necessary to make the work of transforming structurally unsustainable systems possible.*

Keywords: sustainability, philosophy, design education, knowledge, ecological literacy, epistemology, philosophy of design education, multidisciplinary design education

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Introduction

Whether or not we are interested in 'the environment' or identify with the concept of being 'an environmentalist' each of us is entirely dependent on the air we breathe, the food we eat and the environment we inhabit for life. Humankind is embedded within the natural world and dependent on ecological systems but we have designed a world that does not seem to recognize this basic interdependence. This is evidenced by the biodiversity crisis and climate change amongst a plethora of other severe and often irreparable environmental problems. In response to these dilemmas, sustainability educators developed the concept of ecological literacy (or ecoliteracy). Ecological literacy is a philosophical and educational programme that recognises humankind's essential relationship with the Earth and re-visions educational, social, political and economic priorities for the design of sustainable ways of living. It is no exaggeration to say that in a society with ever-increasing technological capacity for both beneficial and destructive industrial development, ecological literacy is an imperative not only for prosperity, but for long-term survival.

This paper will describe what ecological literacy is and why it is important for design education. Ecological learning is not simply a collection of facts to be added onto what we already know, but a kind of learning that requires an interrogation of philosophical and theoretical premises. For example, in light of the recognition of humankind's interdependence with ecological systems, what right does any individual have to make pollution that will destroy the well being of others? The paper will introduce the philosophy and ethics of ecological theory as relevant to design education. It will present six ecological principles and link these ideas to concepts in systems design. This paper will also describe why critical thinking is necessary to make the work of transforming structurally unsustainable systems possible.

To be clear, sustainability literacy is not developed in a token 'green week' fashion. Nor is it adequate for sustainable education to be an elective that staff and students can decide to ignore. Ecological literacy is a comprehensive programme of learning that requires its own curriculum and research culture in design education. An ecologically literate education is a basis for informed decision-making and responsible practice across design disciplines. This paper will review some of the difficulties involved with the work of building capacity for sustainability in design education. Ecological learning can be profoundly difficult due to the fact that it challenges basic epistemological assumptions, disrupts powerful vested interests, requires transdisciplinary collaborations beyond the scope of traditional design education and presents disturbing information many of us would rather ignore. For all these reasons, progress embedding ecological literacy in design education is slow. Unfortunately, the risks created by unsustainable development require much faster progress.

The Theory of Ecological Literacy

The ambitious aims of ecological literacy is to create the frame of mind that recognises relations and interdependency with the natural world and supports the development of new capacities to create sustainable way of living. David Orr coined the concept of 'ecological literacy' in 1992 in his seminal book *Ecological Literacy*. Orr proposed a need for education to impart an understanding of the interdependence between natural processes and human ways of living. Orr stresses that ecological understanding must become a pedagogic priority across all disciplinary traditions,

although he often focuses on design education. Ecological literacy demands a type of education that nurtures the capacity to think broadly, a skill has been "lost in an era of specialization" (1992, p. 87). In an industrially advanced society, understanding the ecological impacts of our actions is imperative for informed citizenship and the design of sustainable ways of living. Ecological literacy explores the "roots of our problems, not just the symptoms" (Orr 1992, p. 88) and help learners move from an attitude of "conqueror of the land community to plain member and citizen of it"(Aldo Leopold quoted in Orr 1992, p. 90). Acknowledging geophysical relationships is a foundational step toward transforming learning and cultural priorities.

Ecological literacy responds to crisis conditions in the Earth sciences and offers the potential for addressing environmental problems based on increased knowledge about ecological systems. Scientists warn that we are now exiting the relatively stable Holocene age in which civilization developed and entering a new geological epoch, that of the Anthropocene (Zalasiewciz, Williams, Haywood and Ellis 2011, p. 835). Humankind is responsible for altering the functioning of ecological systems with dramatic consequences. While science has given us power over nature, this technological innovation has not been accompanied with the foresight to use industrial capacities wisely: we will leave our descendents highly degraded ecological systems. Over the past forty years the Living Planet Index (an indicator of the state of biodiversity) has fallen by 30% in Northern Countries and 60% in the tropical world (WWF 2010, p.4,6). This higher number is largely due to the fact that richer nations both source resources and export wastes to the tropics. During this time there has been a doubling of demands on the natural systems. At a global level, the yearly ecological footprint of consumption takes 1.5 years of regenerative capacity or 'biocapacity' (WWF 2010, p.32) to replace. Thus biocapacity continues to shrink while consumption rates continue to grow. Even the most basic analysis indicates the danger of this situation. This information on the vital signs of the planet is included here as it is the basis background knowledge necessary for responsible design education. Even if we have no concern for the natural world, the destabilization of global ecological systems creates grave risks for humanity – including the possibility of human extinction (Ehrlich and Ehrlich 2013).

Ecological theorists suggest that humankind's current environmental problems result from the dominant epistemological tradition. We have inherited a highly reductive way of knowing, an intellectual tradition and a worldview characterized by atomism, mechanism, anthropocentrism, rationalism, individualism and a dualistic tradition pitting humanity versus the natural world. This radical discontinuity with nature constitutes an error in understanding, an epistemological error that is currently reproduced across disciplines and in design theory and practice, resulting in deeply unsustainable ways of living. Society's tendency towards fragmentation makes sustainability an impossible achievement through reductive modes of analysis and the ensuing focus on highly individualistic consumer choices. Ecological literacy addresses these fundamental philosophic errors. The hegemonic epistemology determines that humankind is incapable of perceiving systemic interconnections and ill-prepared to deal with the complexity presented by converging ecological, social and economic crises. It is not that we cannot deal with interconnectedness and interdependence, but that this reality is effectively hidden by the complexity of contemporary conditions and inadequate epistemological premises.

The notion that the dominant epistemological position is a poor reflection of reality was first proposed by Gregory Bateson in his seminal book *Steps to an Ecology of Mind*

(1972). Bateson claimed that the dominant map of reality is a poor reflection of reality itself; "most of us are governed by epistemologies we know to be wrong" (1972, p. 493). Sustainability educator Stephen Sterling, builds on Bateson's ideas, explaining that "the dominant Western epistemology, or knowledge system, is no longer adequate to cope with the world that it itself has partly created" (2003, p. 3). This idea has been described in various ways by cultural commentators in multiple fields (Bertalanffry 1969; Bateson 1972; Shiva 1988; Orr 1992; Capra 1997; Spretnak 1997; Sterling 2001; Plumwood 2002; Barabasi 2002; Meadows 2008; McGilchrist 2009). Epistemological error becomes a serious problem when it is embedded, by design, into the world we inhabit. Epistemological error in a technologically advanced society is lethal – since the technology we create will destroy the basis of existence. The basic epistemological fallacy is that humans are separate from the natural world. The theory of epistemological error suggests that humankind is undergoing a crisis of perception, based on misperception. This misperception is a basic failure to perceive relations and recognize humankind as embedded in the natural world. Ecological literacy supports a radical shift in perception to facilitate an understanding of interdependence. Designers can also strategically nurture ecological literacy by creating practices that reveal interrelations.

Maintaining the illusion of humankind's ontological separateness from the natural world is profoundly dysfunctional in an industrialised society. Ecological theory proposes a better form of reason where behaviour is consistent with claims we make in regards to survival prospects. This ecological rationality challenges the "contrived blindness to ecological relationships is the fundamental condition underlying our destructive and insensitive technologies" (Plumwood 2002, p.8). Ecofeminist Val Plumwood explains that the "machine of reason depends on what it destroys for its survival. Its rationality is ultimately suicidal" (2002, p.236). Denial of ecological relations is irrational in so far as it dismisses and denies the ecological context that makes its own life possible. New forms of knowledge aiming for wholeness and participation are contributing to an ecological paradigm, a whole systems ecological worldview that describes humankind's complex interdependency with the natural world.

Complex environmental problems can only be addressed through interdisciplinary collaborative processes. Participation is important for sustainable design because it counters the technocratic shortcomings of traditional design methods, it builds capacities for the implementation of solutions and because it creates a more informed basis for analysis complex problems. Participation creates the learning communities that are necessary for social change to become possible. Sustainability emerges from new technologies and new social practices. Engaged actors are key this social transformation. Participatory design (especially when informed by practices such as action research) can become a tool of emancipatory learning and facilitate the development of agency, making social change possible. This approach to design engages with people as subjects capable of informed decision-making, rather than passive objects to be manipulated into various consumer choices. Participatory processes are also recognized as a basis of better decision-making (as a wide variety of viewpoints create a richer picture of design problems).

Design education will need to expand the scope of its inquiry to facilitate cross-disciplinary knowledge sharing while also paying greater attention to the ecological consequence of design practice. Ecologist and environmental philosopher Aldo Leopold described an 'extension of ethics' to include the natural world. All ethics, according to

Leopold, are based on "a single premise: that we are members of a community of interdependent parts" (1949, p. 98). Industrial processes that result in dramatic unintended consequences complicate the concept of extended ethical boundaries. The power to disrupt ecosystems and the remoteness of these consequences makes contemporary ethics extraordinarily difficult. The problems become not only ethical but practical in terms of building knowledge systems such that we are aware of the potential consequences. Developing ethical standards in this context demands an engagement in transdisciplinary research in order to monitor the wide-reaching impacts of industrial development. Industrial ecologist John Ehrenfeld explains:

Ethics is responsibility, the idea of being accountable for one's actions, especially the act of avoiding harm knowingly. Modern technological life has diminished the ability to know the consequences of action taken by individuals or by collective social entities, because these consequences are often displaced in time and space, and as such have made responsibilities problematic. One result is the emergence of unintended consequences (2008, p. 60).

Unintended consequences result in a seeming loss of ethical ability to act responsibly because the consequences of our actions are remote. The proper response to unintended consequences is to attempt to understand their nature (rather than to deny their existence). Complexity and our basic inability to know all the potential consequences call for precaution as an operating principle (Enhrenfeld 2008, p. 186). Ecological ethics are a difficult task in a technologically powerful society where technology develops faster than the ethical frameworks and social institutions to ensure humankind uses innovation wisely. Design can play a significant role for the development of social practices to support sustainable ways of living (once it is ecologically informed).

Ecological Literacy in Design Education

The philosophical and practical challenges described above suggest that ecological literacy implies a radical rethink of many basic philosophical premises in design education. Design education must broaden its inquiry to build capacity to understand the social and ecological consequences of the objects, spaces and communication processes created by the designers. As a starting point, David Orr describes four prerequisites to ecological literacy:

- to know that "our health, well-being and ultimately survival depends on working with, not against, natural forces"
- an understanding of the scope and speed of the current crisis and a familiarity with "the vital signs of the planet and its ecosystems"
- a historical understanding of how we have become so destructive
- a practical and participatory approach; "the study of environmental problems is an exercise in despair unless it is regarded as only a preface to the study, design and implementation of solutions" (1992, pp.93-94)

These four building blocks of ecological literacy are only the beginning of a much longer learning curve in an intensive learning process required as a basis for sustainable design.

Making space within design education for these learning objectives can be best achieved with teaching practices such as experiential learning, critical pedagogy and transformative learning. These practices create possibilities for deep learning.

Educational theorist Stephen Sterling describes the learning necessary for sustainable education as 'third order learning', i.e. learning that emphasises capacity building, enactment and transformative practice (2001, p. 78). Once this kind of learning has been made possible, learners will develop greater awareness of ecological issues and potential solutions. These processes build capacities for learners to become able to influence industry to create genuinely sustainable solutions (and not simply quick fixes to avoid market risks or greenwash to deceive consumers). While there is no guarantee that ecological literacy will motivate learners to create sustainable options, without ecological awareness, there are simply no possibilities for sustainable alternatives. Designers who are oblivious to the geophysical conditions that make their own lives possible will be not be able to design effective sustainable solutions. Ecological literacy must be embedded into design education at all levels to attend to the dangerous blind spots created by traditions that ignore ecological realities. The next section will examine principles of ecology and systems design as an example of the kind of learning that will be integrated into an ecologically informed curriculum.

Ecological Principles for Design

Patterns and processes in natural systems provide models for the design of sustainable ways of living. Fritjof Capra explains that ecological literacy requires learners "to understand the principles of organization, common to all living systems, that ecosystems have evolved to sustain the web of life" (2003, p. 201). The 'Nature's Patterns and Processes' concept developed by Capra and the Center of Ecological Literacy (CEL) defines six principles in natural systems. Capra warns that; "it is no exaggeration to say that the survival of humanity will depend on our ability in the coming decades to understand these principles of ecology and live accordingly" (2005, p. 29). These patterns and processes of nature are: networks, nested systems, cycles, flows, development, and dynamic balance. In the following section, each of these principles will be linked to a concept in systems design. These concepts are: resilience, epistemological awareness, circular design, energy literacy, emergence and the ecological footprint. By linking each principle to an ecological design concept this section briefly explores how ecological principles can inform design education.

Networks

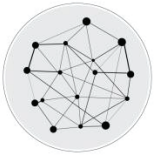

Figure 1. Networks. 'All living things in an ecosystem are interconnected through networks of relationship' (CEL website 2012). Image by EcoLabs: 2012.

Network science has provided new understanding of the structure, properties, patterns and organizing dynamics of systems. Ecosystems are characterized by robust networks with many interconnections. Highly interconnected complex networks are resilient to shocks and failure because there is a diversity of means for achieving

systemic goals. If one node is destroyed, other nodes and links can replace its function. Albert-Laszlo Barabasi explains:

Natural systems have a unique ability to survive in a wide range of conditions. Although internal failure can affect their behaviour, they often sustain their basic functions under very high error rates. This is in stark contrast to most products of human design, in which the breakdown of a single component often handicaps the whole device (2003, p.111).

Nature's designs are resilient, in sharp contrast to design in industrial systems that are often optimized for maximum efficiency and short-term profitability. Designing for resilience is fundamentally different than designing for efficiency. David Orr describes the basic design principles of resilience systems as consisting of small units dispersed in space, redundancy, diversity, decentralized control, quick feedback, self-reliance and appropriate scale (2002: 114-117). Designing for resilience is thus a core strategy of sustainable design.

Nested Systems

Figure 2. Nested Systems. 'Nature is made up of systems that are nested within systems. Each individual system is an integrated whole and - at the same time - part of larger systems' (CEL website 2012). Image by EcoLabs: 2012.

Nested systems refer to the relationship between systems. The concept is important because systemic dysfunction arises when the relationship between the nested layers breaks down. Ecological economists claim that the relationships between economic, social and ecological systems are currently dysfunctional because the economic system has not been designed as a subsystem of the larger ecological system in which it is embedded (Daly 1996). Due to this fundamental error, the economic system does respond appropriately to feedback from the ecological system. Humankind has thereby created conditions of deep unsustainability. The implications of dysfunction in nested systems can be dramatic: a subsystem will behave as a cancer or a parasitic growth that destroys the system in which it is embedded. Systems design requires an ability to distinguish between different types of premises for different levels of systems. Epistemological flexibility enables "conscious movement between different levels of abstraction" (Ison 2008:147). Sustainable design depends on such new capacities for systems thinking.

Cycles

Figure 3. Cycles. 'Members of an ecological community depend on the exchange of resources in continual cycles' (CEL website 2012). Image by EcoLabs: 2012.

Cycles are perhaps the most obvious pattern in nature (i.e. days, years, water cycle, carbon cycle, etc.). In nature's cycles there is no waste as all elements are endlessly re-used. These natural cycles are a stark contrast to the industrial production where 99% of materials extracted from the earth are 'waste' in just six months (Lovins, Lovins & Hawkins 1999:81). Our economy is dependent on a continuous flow of natural resources, extracted from the Earth and then moving through industrial processes, resulting in various types of pollution. Economic growth has material demands and the need for more resources and energy continues to grow as does pollution and the consequences of pollution (e.g. climate change, toxins in the food chain, water scarcity, etc.). Designers must learn how we can support the development and design of a circular economy in order to eliminate the concept of waste. The cradle-to-cradle method imitates "nature's highly effective cradle-to-cradle system of nutrient flow and metabolism in which the very concept of waste does not exist" (Braungart & McDonough 2002, p.103-104). The imitation of natural processes in biomimicry has significant potential here. The cyclical economy is a central aspect of sustainable design.

Flows

Figure 4. Flows. 'Each organism needs a continual flow of energy to stay alive. The constant flow of energy from the sun to Earth sustains life and drives most ecological cycles' (CEL website 2012). Image by EcoLabs: 2012.

Flows of energy and natural resources provide living systems with essential energy and materials. Flows, feedbacks, stocks and delays between cause and effect are central to understanding ecological processes and are basic concepts of systems thinking. The availability and flow of natural resources will become increasingly important for designers in an age of increasing resource scarcity. One of the most important flows is that of energy, and energy literacy will be increasingly important for designers. The flow of conventional fossil fuels is set to decline sharply due to the increasing scarcity of easy to access reserves (although unconventional fossil fuels are

now being extracted with even more severe ecological consequences than conventional fossil fuels). Meanwhile, global demand escalates as developing nations follow prodigiously wasteful western models of unsustainable development. While pathways to wean modern economies off of fossil fuels have been developed (e.g. *Zero Carbon Britain* by the Centre of Alternative Technologies), there are no current energy sources that can provide energy in such abundance and as cheaply as fossil fuels have in the past (Trainer 2007). The challenge of meeting energy needs with significantly less fossil fuels leads to the concept of 'energy descent'. Energy descent refers to "the continual decline in net energy supply supporting humanity" (Hopkins 2007, p.53) and this is a central idea in permaculture and the Transition movement (due to both the scarcity of easily accessible fossil fuel resources and climate change). Energy literacy is increasingly important in sustainable design education.

Development

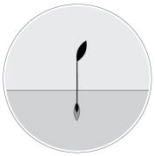

Figure 5. Development. 'All life - from individual organisms to species to ecosystems - changes over time. Individuals develop and learn, species adapt and evolve, and organisms in ecosystems coevolved' (CEL website 2012). Image by EcoLabs: 2012.

As complex living systems develop they exhibit self-organizing properties. Development is a learning process in which 'individuals and environments adapt to one another' (Capra 2005, p. 27). Emergence is a process of self-organization of complex adaptive dynamic systems that results in the creation of entirely new properties. Emergence appears as the result of relationships wherein the whole is greater than the parts. The phenomenon of emergence is significant for sustainability because it implies that systems will exhibit unpredictable behaviour. Emergent properties can have positive or negative implications, but a key insight is that the behaviour of complex systems is never completely predictable. Increasing contextual thinking is an emergent process of reflexive self-organisation and thus ecological literacy itself is an emergent phenomenon. The emergent order of reflective ecological consciousness supports new cognitive and social capacities that could potentially facilitate the creation of more resilient and sustainable futures. As individuals develop relational understanding of networks and complex levels of causality, our collective capacity to attend to sustainability challenges is enhanced. Ecological learning allows us to use these new capacities to respond to environmental problems. New cognitive capacities for systemic thought support the design of sustainable ways of living – but emergence will always remain unpredictable. For this reason, instrumental approaches to design and sustainability will have limited capacity to address environmental problems.

Dynamic Balance

Figure 6. Dynamic Balance. 'Ecological communities act as feedback loops, so that the community maintains a relatively steady state that also has continual fluctuations. This dynamic balance provides resiliency in the face of ecosystem change' (CEL 2012). Image by EcoLabs: 2012.

Dynamic balance is created as systems organise themselves in response to feedback from subsystems and meta-systems. Ecological systems maintain their processes through feedback loops that allow systems to self-regulate within tolerance limits (Capra 2005, p. 28). These limits can be described in various ways using ecological assessment tools such as the 'ecological footprint'. The ecological footprint is a metric that allows us to calculate human pressure on the planet by measuring how much "land and water area a human population requires to produce the resources it consumes and to absorb its carbon dioxide emissions, using prevailing technology" (Global Footprint Network 2011). Ecological accounting tools determine the area of productive land required for services and consumption patterns. Tolerance levels are determined by how much stress an ecological system is under due to resource extraction, pollution and other human activities. A key awareness is that if ecosystems are damaged beyond critical thresholds, dramatic change and even collapse can (and does) occur on various scales. The concept of 'planetary boundaries' is a framework developed by the Stockholm Resilience Centre that establishes boundary conditions and tolerance limits of various Earth systems. This research describes three planetary boundaries as having already been transgressed: climate change, rate of biodiversity loss and changes to the global nitrogen cycle (Rockstrom et al. 2009:1). While this work is receiving widespread critical attention within the scientific communities, it is still far from being integrated into the disciplines (such as design) that will be required to respond (by designing solutions). Ecological footprints and planetary boundaries are an important part of a design education curriculum.

The ecological principles described above (networks, nested systems, cycles, flows, development and dynamic balance) describe ecosystems dynamics. Each of these ideas was linked to a concept in systems design (resilience, epistemological awareness, circular design, energy literacy, emergence and ecological footprints). Nature's processes and patterns are a basis for ecologically informed design and have far-reaching implications. Patterns in the natural world are characterized by interconnectivity. This interconnectivity suggests that reductive modes of analysis will not work to make sustainability possible. Instead, sustainability must be viewed as a collective condition of a culture. Capra explains that 'sustainability is not an individual property, but a property of an entire network' (2005, p. 23). Ultimately, sustainability can only be achieved through systemic understanding and collaboration, since it is the collective impact on the ecological system that will determine future conditions. While

these ecological principles are a foundation for responsible design, transforming unsustainable systems requires not only ecological knowledge, but also critical skills to analyse the political problems that keep sustainable practices marginal. Transforming conditions of unsustainability requires practical ways of working to avoid reproducing current problems. The next section will briefly review the politics and practice of ecological design.

Criticality in Sustainable Education

Creating sustainable alternatives to current ways of living challenges hegemonic ideologies, cultural traditions, powerful corporate interests and public institutions. For this reason, critical thinking about issues of power and the political dimension of design is essential. Ecological design, situated within a unsustainable world, must be critically informed on the relationships between power and knowledge in order to address the interests that support 'business as usual' (or some slight variation thereof). While many new design approaches are systemic, most continue to lack a critical approach to issues of power. This lack of criticality results in a tendency for design to continue to prioritize profitable activities over those that are ecologically sustainable. Institutions and corporations maintain their legitimacy by publicizing green credentials, but are often far less likely to do the much harder work of building capacities to address environmental problems effectively. Ultimately, ecologically literate design must confront the cultural tradition and development frameworks that determine the systemic priorities of the design industry. A critical orientation to issues of sustainability in design is necessary to critique and transform design practice in the context of a deeply unsustainable culture.

The concept of 'sustainability' itself is inherently problematic and ideas on what can be called 'sustainable' are highly contested. Although sustainability can be measured using various environmental assessment processes, the lack of rigorous standards combined with the failure to adjust boundaries of concern wide enough to include the full impact of products, industrial systems and ways of living – results in rampant misuse of the term. Frameworks for making ecological assessment legally binding or holding corporations morally and legally accountable for ecological damage of industrial practices are either extraordinarily weak or non-existent. Thus sustainability continues to be an elusive goal. Whilst individual products proudly proclaim their green claims, the overall impact of consumer lifestyles continues to accelerate the degradation of natural systems. To those who notice the larger context and dynamics of escalating ecological crises, sustainability is a term is often associated with greenwash. Marketing a product or process as sustainable is easier than actually creating sustainable ways of living. Brands have an interest in portraying a green image and so the idea of 'sustainability' is generally used to reassure consumers that unsustainable consumption is morally acceptable, contrary to the consensus in the scientific community that current ways of living are causing climate change (IPCC 2007) and degrading other Earth systems (Rockström et al 2009). Many environmentalists claim that the economic model itself is a primary cause of unsustainable ways of living.

The problem of infinite economic growth within the context of planet with finite ecological resources is increasingly recognized as a root cause of ecological crisis conditions. In 2008 the UK Sustainable Development Commission published *Prosperity Without Growth*? a report that analysed how quantitative market growth threatens not only social well being and ecological sustainability but also economic prosperity. Author

Tim Jackson maintains that neither decoupling nor technological fixes can deliver sustainability in a market economy dedicated to quantitative growth due to the ever-increasing need for natural resources and energy. Economic growth demands the constant increase in the flow of ecological resources, as mechanical engineer Professor Roderick Smith warned in a noteworthy speech at the UK Royal Academy of Engineering:

…relatively modest annual percentage growth rates lead to surprisingly short doubling times. Thus, a 3% growth rate, which is typical of the rate of a developed economy, leads to a doubling time of just over 23 years. The 10% rates of rapidly developing economies double the size of the economy in just under 7 years. These figures come as a surprise to many people, but the real surprise is that each successive doubling period consumes as much resource as all the previous doubling periods combined. This little appreciated fact lies at the heart of why our current economic model is unsustainable. (2007, p.17)

Ecological economist Herman Daly describes the need for 'a system that permits qualitative development but not aggregate quantitative growth' (Daly 2008, p.1). Fritjof Capra and Hazel Henderson's report Q*ualitative Growth* explains the difference between good and bad growth:

…good growth is growth of more efficient production processes and services which fully internalise costs that involve renewable energies, zero emissions, continual recycling of natural resources and restoration of the Earth's ecosystems. (2009, p. 9)

Quantitative economic growth demands an ever-increasing flow of energy and natural resources, extracted from the Earth, moving through the economic system and generally returning to the ecological system as waste. This paper has already described the central role of flow of resources in our economic system and the associated problems with resource scarcity and pollution, such as the flow of carbon dioxide waste into the atmosphere causing climate change.

'Sustainability' has been associated with 'development' since the 1983 Brundtland Commission. This dual role for sustainability (meaning 'ecological care' and 'development' simultaneously) has been critiqued from its beginning. Wolfgang Sachs describes sustainable development as "conservation of development, not for the conservation of nature" (1999, p. 34). Similarly David Orton claims: 'with sustainable development there are no limits to growth. Greens and environmentalists who today still use this concept display ecological illiteracy' (Orton 1989, unpaginated). Sustaining or increasing levels of consumption on the diminishing resource base with more people wanting 'better' lifestyles (i.e. more consumption – requiring more resources) increases ecological harm (in the current development framework).

Researchers have proposed terms that reflect critical awareness of inherent shortcomings in the concept of sustainability. 'Just sustainability', 'sustainment' and 'scarcity' are three concepts that challenge the hegemony of 'sustainability'. 'Just sustainability' was coined by Julian Agyeman to prioritize justice and "ensure a better quality of life for all, now and into the future, in a just and equitable manner, whilst living within the limits of supporting ecosystems" (Agyeman et al. 2003, p. 5). Sustainment is a concept used by Tony Fry as an alternative to the "defuturing condition of unsustainability" (Fry 2009, p. 1). Fry writes, "myopically, the guiding forces of the status quo continue to sacrifice the future to sustain the excesses of the present" (Ibid, p. 2). A discourse on 'scarcity' has emerged reflecting, according to Jeremy Till; "a condition defined by insufficiency of resources" (2010, p. 1) and the

contradiction between unlimited human 'needs' and the limits of natural resources. This concept has its own set of problems as constructed scarcities can be made to seem 'natural' thereby justifying austerity measures and punishing the poor for the rampant consumption of the rich.

Despite the justified cynicism caused by the abuse of the word 'sustainability' it remains the dominant term used to describe meeting the needs of the present without compromising the ability of future generations to meet their own needs. Ecological literacy informs the debate on sustainability by revealing that ultimately sustainability is not a feature of a particular product but the condition of a culture relative to its gross impact on ecological systems. Since the cumulative impact of consumer lifestyles, or the ecological footprint of consumption in the UK is 4.71gha and 7.19gha in the United States (WWF 2012, p.144-145), nothing in our culture is sustainable. While the behaviour of certain individuals is below the threshold (i.e. they personally use fewer resources and create less population) the gross impact of the collective system is the indicator that matters (as it is the gross collective impact that cause total ecological harm). Ecological literacy emphasises the contextual and relational characteristics of ecological well being and learning as central to the pursuit of sustainability. Learning to recognize the impact that our ways of living have on the Earth is a basic imperative for intellectual coherence and long-term survival.

Conclusion

Sustainability requires disruptive ways of thinking that confront institutional practices and systems that are harmful to the environment. This paper has described how ecological literacy challenges traditions and educational cultures. Perhaps the greatest problem preventing wide spread ecological learning is the difficulty in acknowledging facts about the impact of humankind's industrial systems on the other living species and ecosystems (as well as our own future and the future of our descendents). Educational institutions avoid these difficult issues by avoiding ecological education. Thus the work of advancing new values that prioritise environmental and social sustainability in education remains a formidable challenge. As environmental problems continue to become more severe, institutions that ignore risks in order to cling onto ecologically destructive models of development and unsustainable design practices undermine their own legitimacy. Fortunately, embedding ecological literacy into design education is happening at the most progressive institutions.

When ecological literate, design becomes a powerful tool for the work of addressing contemporary social and environmental and economic problems.

The various design disciplines all have important roles to play in the design of sustainable futures. This paper provides a brief overview of what ecological literacy means for design education. Despite the best intentions of many designers and educators, sustainability remains an allusive goal and ecological literacy remains margin in design education, design practice and in society at large. This situation seriously impedes efforts to effectively address environmental problems. The struggle to embed ecological literacy into professional design practice is situated at universities. Orr stresses the role of the university: "no institutions in modern society are better situated and none more obliged to facilitate the transition to a sustainable future than colleges and universities" (2002, p. 96). Educational theorist Chet Bower claims that the first challenge for universities is to change entrenched positions that "control the forms of knowledge (including the legitimizing ideology and epistemology)… to recognize the

scale and accelerating nature of the ecological crisis" (2005, p. 203). Educational establishments have a responsibility to ensure that students graduate with an understanding of the consequences of contemporary ways of living and the skills to do something about it. Designers are now responsible for the design of future sustainable ways of living; this task will only be possible when supported by ecological literacy.

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Visual Grammar: A Literature Review

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Abstract: *Based on a database query and a manual search of Nordic literature about visual grammar, this article provides an overview analysis of six Norwegian contributions. The question in mind during this analysis concerns how the current academic theory of visual grammar is presented, and in particular, its purpose, the way it is systematized, its degree of theoretical discussion and its view of knowledge. In different ways, these contributions have an art- and/or design educational purpose. From this overview analysis, three elected topics were discussed: The degree of systematic and schematic representation, the discussion of the origin and construction of visual grammar, and the context defined norms regarding the use of visual language. This discussion is meant to pave the way for the subsequent development of an academic textbook where visual grammar would be presented in a contextual perspective.*

Keywords: Academic textbook analysis, visual grammar, art- and design education, Art and Crafts, visual literacy, visual genre, primary- and secondary school

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Introduction

More or less, visual grammar is part of any design process, regardless of the designer's awareness of this knowledge. There are many theories about visual grammar, where authors have discussed the various ways how one can form abstract and concrete meanings through the compilation of dot, line-, light-, colour- and volume characteristics. In the Norwegian Knowledge Promotion Reform, *Kunnskapsløftet* (2006), within the compulsory Art and Crafts subject, the study of visual communication obtained status as one of five main topics. The knowledge of visual grammar constitutes a substantial part of this content. At the same time, *Kunnskapsløftet* has challenging wording regarding the clarification of competence targets connected to visual grammar: "(…) the student should be able to use contrasts between diagonal, horizontal and vertical directions in simple compositions (…)" (Kunnskapsdepartementet 2006, English translation).

The content of visual grammar is demanding because of its abstract character. The tacit design principles that underlie much of the practical activities require a systematic and verbal form to reach the unskilled pupil. A theoretical and systematic representation is required. But it is uncertain what the established extent of this theoretical platform was when the Norwegian curriculum was implemented in 2006. The question about this clarification has also led to an increased need for new professional literature within the Nordic art and design educational-field. Correspondingly, this is also the challenge within higher education in Norway. Through educational programs, the student meets strong requirements having language disclosure for practical subjects. The student should be able to make clear evaluation criterion where knowledge of visual "language rules" constitute a substantial part of the subject content (Lutnes 2011; Utdanningsdirektoratet 2011). Based on the teacher's work in the Norwegian primary and secondary school, a development of Nordic terminology is essential for professional practice (Schwach and Brandt 2005; Schwach, Brandt and Dalseng 2012).

Through a small pilot study, I have analysed "active" literature on visual grammar for higher education within the field of art and design education. The purpose of this article is to analyse the content of existing literature, which addresses the subject of Art and Crafts within teaching university colleges in Norway. The intention of such an analysis is to make room for subsequent development of an academic book where visual grammar is presented in context. This analysis gathers information about how academic theory of visual grammar is presented in Art and Crafts educational literature. The systematic verbalization of this subject matter has both an art and design academic content and, at the same time, a distinct educational objective.

Research Method and Sources of Knowledge

In order to map the existing academic literature on visual grammar within Nordic student literature, a database search comprised part of this article's research sources. The available databases and the design of relevant search terms have helped refine the scope. Given the fairly broad search terms, I have attempted to identify books with an educational approach.

It is challenging to define good keywords for the theme, as there are many terms used for visual grammar. These theories have different names, even though much of the content is similar. The databases used were Idunn, Google Scholar, Bibsys and Norart. The restricted access to the large database is the weak point in this pilot study.

With various combinations of words translated into Norwegian, Danish and Swedish, the search words for this database query were: form/shape, or visual grammar, or design, or composition theory/learning, or visual tool, or visual design, or imagery, or design element, or design principles or formal aesthetics. The search was limited to a time frame of 20 years. For literature dated later than 1992 I defined as "inactive". The time limit was relatively random and thus excluded older literature that, despite having a long life, could still be "active" literature in the relevant scientific community. In total, the search in the various databases showed that only a small number of publications addressed the topic of visual grammar in an educational perspective. Each search resulted in low detection rate and it was not until the time limitation was increased to 30 years that the detection rate also increased. The low detection rate led to a second manual search, where all educational institutions specializing in the Art and Crafts in Norway were questioned about their curriculum on the topic visual grammar/composition theory or design elements and principles. 8 of 14 institutions responded to the question.

From the database query and the manual search, six Norwegian contributions could be defined as active literature on the topic visual grammar (four books, a compendium and an article). Based on Søren Kjørup´s pragmatic and situational understanding of knowledge the forthcoming text focuses primarily on the contribution's purpose, the systematics and the degree of theoretical discussion.

Norwegian Contributions on Visual Grammar

The low detection rate in the database query may indicate that the topic of visual grammar in a Nordic art and crafts educational context has a limited scope, but it probably also shows that the field lacks the established concepts of the subject, and that the concept formation is unstable.

The database search that provided the highest results dealt with the theory of image analysis, both from semiotic and iconographic perspectives. This literature "makes use" of visual grammar, but without being questioned or discussed as an independent theory. Several of the teacher training institutions expressed that within the limited available literature on the topic visual grammar, they refer to theory of iconographic image analysis, mainly the book *Når bilder formidler* (When pictures convey) by Gunnar Danbolt and Siri Meyer (1988). Visual grammar works here as a tool to analyse other people's (the artists) expressions and it is not presented as knowledge acquisition needed in the performer's role. In these books the content of an artist's work constitutes the basic structure, and the visual grammar involved depends on the artwork presented. Meyer and Danbolt's book on image analysis makes use of visual grammar, but does not explain it explicitly. The visual grammar that is presented through image analysis perspective fell outside the field specific literature that this pilot study examines.

Other sources that also deal with visual grammar are different books about photography. These book titles both show photo-technical issues and knowledge of different compositional principles. Also, the literature on graphic design, layout and media design examines visual grammar, where sales motives and market needs characterize text and image illustrations. Image creation under both these categories relate to specific professions and the audiences for whom the professionals work.

From the manual search on teacher training literature, one textbook written for upper secondary school was also in use (Elvestad, Løvstad and Strømme 2006). Since

this pilot study refers to an academic teacher-training context, this textbook is not included, even though it has interesting aspects concerning the topic of visual grammar.

As mentioned, this pilot study revealed six contributions corresponding to the delimitations of the study. The first is an article *Mennesket og tingen* (*The man and the thing*) written by Gisbert Dunker (2011), which refers to a second contribution, the compendium *Form og bilde* (*Shape and image*)by Axel Mørch (1994). The third book is written by Christian Leborg (2004), and finally the books *Om stygt og pent* (*About ugly and pretty*) (1994) by Odd Brochmann, *Grunnbok i bildeskaping* (*Basic book on image creation*) (2003), by Aggi A. Folgerø Johannessen and *Blikk for bilder: En liten billed grammatikk (A look at pictures: A small picture grammar),* by Gunnar Danbolt.

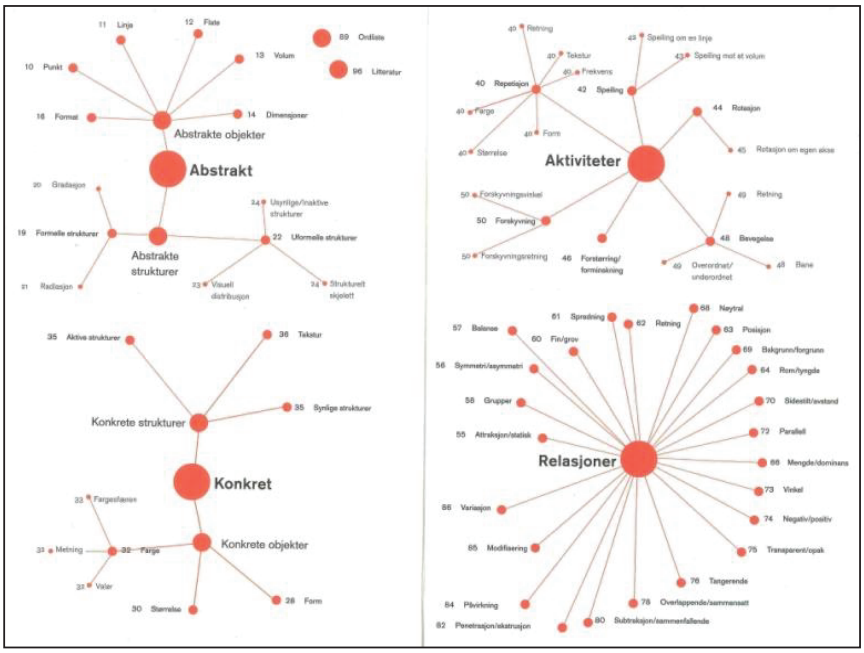
Dunker's article discusses the three-dimensional shape, while my literature search was meant to include theories about the two-dimensional format. Dunker refers to Axel Mørch´s theory, "(…) a system that characterizes and classifies the main constituents of the image" (English translation). Dunker describes Mørch´s concept "form element" and "aesthetic functions", and the contribution serves as a revitalization of a theory that has left traces in the Norwegian Art and Crafts educational context. The manual search reveals that Mørch still is a part of the curriculum in five of the teacher training institutions. Thus, Mørch´s compendium, *Shape and image,* could be defined as "active" literature on visual grammar.

Christian Leborg´s book *Visual Grammar* mainly problematises the two-dimensional shape, but through a descriptive and neutral approach, the theoretical exposition also becomes relevant to the study of the three-dimensional shape. The distinction between a two- and a three-dimensional shape is overlapping and, therefore, only works partially as a demarcation. In Danbolt's book there is one chapter named *A small picture grammar*, where a "picture" is defined as two-dimensional shape. Brochmann's book primarily represents the visual grammar associated with three-dimensional objects, but also shares terminology used about two-dimensional shapes. Dividing between two- and three-dimensional expressions is thus less significant for the delimitation.

Christian Leborg: Visuell grammatikk (Visual grammar)

The book *Visual Grammar* (2004) is both addressed to performers and teachers within the field of visual communication. The book classifies visual language grammar systematically, and acts as an aid to the verbalization of what the visual object is, or can make (Leborg 2004, p. 4). With a very limited amount of text and a rich number of schematic illustrations, Leborg manages to define the fundamentals of form-elements as well as the relationships between them. The basic elements are roughly divided into two main categories: 1) Abstract objects and structures and 2) Concrete objects and structures. To depict the relationship between the basic elements names such as 3) Activities and 4) Relationships were given. Categories number one and two can be explained as visual language's building blocks, while categories three and four act as the building principle.

Figure 1, Christian Leborg (2004) Visuell grammatikk (Visual Grammar): Abstract and concrete objects and structures; Activities; Relationships



The book's very general character and the neutral descriptive approach to visual grammar invite a broad audience. The book describes visual grammatical issues without touching on normative aesthetics. Leborg *describes* various shapes: "geometric", "organic" and "random"; and different activities: "mirroring", "rotation" and "repetition". Leborg yields no image examples in which he discusses how, for instance, repetition functions in one image composition as a positive or negative reinforcement. Leborg communicates a neutral, almost relativistic sight of knowledge.

Gisbert Dunker: Mennesket og tingen (The man and the thing)

Dunker´s article *The man and the thing* (part 2, About things as a man's document, English translation) (2011) systematises grammar into two systems, one through Axel Mørch´s schematic representation, and the other references an unpublished oral note about"(…) the form's organization and context" with Paul Gowland. Through a phenomenological approach, Dunker discusses various aspects of the issues of shapes. The article problematises form concepts, and is tangential to Leborg's main categories 1) and 2). But parts of the text also thematise the design principles, through the terms of "power" and "communication". The article does not try to systematise or categorize visual grammar, but with the help of good photo illustrations, the writer contemplates flat and spatial shapes, composed shape, the power of shape, shape signal, the recognition, communication, play, seriousness and about clear and ambiguous shapes. Even though the article is not characterized by classification and overview from an

educational point of view, it is interesting how the author vaguely takes position and discusses the use of visual grammar, where certain aesthetic standards apply to "the good" shape. As a distinction from Leborg, Dunker claims that *it is* important to discuss whether a shape is clear or ambiguous, if it is "finished" or not, and if the shape communicates clearly or ambiguously. Dunker's article can be characterised as representative for a vague objective knowledge understanding.

Odd Brochmann: Om stygt og pent (About ugly and beauty)

Even though the book *About ugly and beauty* (1994) was first printed in1953, it was still included in this analysis. The 4th edition of the book was published in 1994, and was also translated into several languages. The high issue number of the book communicates its position in the field of art, design and architecture. Brochmann discusses visual grammar in an unpretentious manner. The book, *About ugly and beauty,* is a compelling portrayal of Brochmann´s normative aesthetics conveyed through everyday "form problems", relating to material culture and visual environment. In contrast to the somewhat normative language tone in the beginning of the book, Brochmann conveys, in Chapter 5, that the norms of order and disorder, pleasure and pain, ugly and pretty in a man's encounter with visual culture are first and foremost dependent on cultural conditions. From this he defines the concept "style", where he explains how people from different times value varying qualities, from the abstract, the organic or the functional expression of form (Brochmann 1994, p. 79). Different styles characterize different eras. In addition to practicing visual grammar in different ways, depending upon the style choice and time flow, Brochmann argues that certain grammatical laws are "eternal" and can be explained through nature's eternal voice and influence. Brochmann's book contains a variety of hand-drawn illustrations, which systematize visual grammar. At the same time, Brochmann manages to comment on the good and bad practices of these design elements and design principles, through a contextual perspective. He shows, for example, various interior problems. The illustrations of the interior cases convey how visual disorder obtains a noisy function, while grouping as an organizing principle creates a feeling of pleasure. Of the six Norwegian contributions, Brochmann is the only one that also visualizes examples in "bad" visual language usage, something that strengthens and makes the message clearer. Brochmann's book conveys a contextual concept of knowledge, where some aesthetic "laws" delimitate situations, and the style-phenomenon is used to define them.

Aggi A. Folgerø Johannessen: Grunnbok i bildeskaping (Elementary book of image creation)

The book, *Elementary book of image creation* (2003), consists of assignment texts for children, where the purpose is, "(…) to teach the students to free the line, and to explore and acknowledge the room" (English translation). Johannessen addresses the book for teaching students, and others teaching art. The book does not provide an introduction to visual grammar as a systematic theory, but presents many of the design principles sporadically. One of the chapters has the title *Composition* with subtitles about the golden ratio, diagonals and horizon lines. Another chapter is about proportions, two chapters thematise colour theory, and one presents the representation of room and volume. Otherwise, the book provides an introduction to various image-techniques. An image analysis of famous works of art can be found throughout the book in order to emphasize the overall theme. The book has an unclear

structure, and this is partly due to the fact that the subject matter is difficult to grasp. The book communicates a clear expectation that the student is the receiver of the content, that the language is personal, that the content is practical and that all together this communicates a strong engagement. The author's voice comes close to the reader. Regarding the audience of the book, the students in higher education, the content is somewhat arbitrary and lacks a critical discussion of the theoretical knowledge. The writer does not problematise the existence of the design principles, whether this knowledge can be explained as a social construction, a natural science phenomenon or a total relativistic construction. Nevertheless, the text communicates, underlying, a normative aesthetic perspective, and that these norms have a natural anchoring (Johannessen 2003, s. 36-41).

Axel Mørch: Form og bilde (Shape and image)

Through a number of years the compendium *Shape and image* (1994) has been compulsory reading in several studies, offered at Telemark University College (HiT). Mørch himself has been an academic employee at HiT. Together with Oslo and Akershus University College (HiOA), HiT is one of the largest institutions in Norway, with higher education in the field of art and crafts education. Even though Mørch´s contribution is from a relatively older date, his work remains vital since specialists still refer to his literature (Dunker 2011, and various master theses at HiT). Mørch systematised visual grammar in a schematic model (Figure 2). He visualized the concepts "aesthetical element" and "aesthetical functions", and also related to the logical structure and division between design elements and design principles. At the same time, Mørch discusses the origin of design elements and principles ("formalestetikk", Norwegian translation), as a theoretical concept. Mørch illustrations made comments on concepts such as harmony, contrast and proportionality. Through these illustrations, Mørch values the different form compositions and he expressed a value-laden opinion about beauty. As opposed to Leborg, Mørch emphasized exemplary use of visual grammar, and explained how design elements and principles are rooted in universal "laws" of nature. It is especially interesting how Mørch depicts the origin of design elements and design principles, in the first part of the compendium, he argues that the educational context must strive for "(…) an objectivity in the assessment and analysis of the form-relations." (English translation)With references to futurism, expressionism and surrealism, the thought of holistic aesthetics ("helhetlig estetikk", Norwegian translation), Gestalt psychology and perceptual organization, Mørch shows how different academic environments have confirmed an objective (universal "law") understanding of visual grammar (Mørch 1994, p. 2-6).

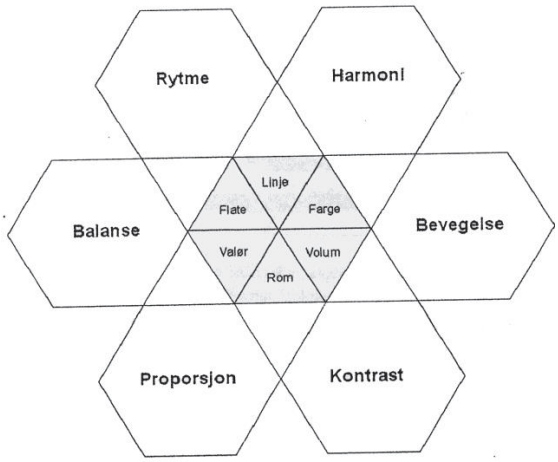


Figure 2, Axel Mørch (1994) Shape and image: Aesthetical functions and aesthetical elements

Gunnar Danbolt: Blikk for bilder (A look at Pictures)

The chapter, *A small picture grammar,* within Danbolt´s book A look at pictures (2002), visualizes 10 relations found through the systematic analyses of the fine arts, limited to two dimensional pictures. The visual angle, lightning, modelling, texture, room/space, the character of a surface, movement, balance, colour and composition constitutes the content. The author discusses how visual tools are systematically repeated during the creation of art-works throughout history. These visual tools are thoroughly explained with support from art history examples. This presentation reveals different art history styles, and Danbolt shows how these styles are constructed by different visual rules. Even though these visual references and genres are narrowly limited to fine arts history, the combination of systematized visual grammar and the use of it make an exquisite explanation. Like Mørch, Danbolt also emphasized exemplary use of visual grammar, but explained how visual elements and principles are rooted in socially constructed "laws" of art.

Deliberation on Visual Grammar as an Academic Textbook

From the analysis above, the following text will discuss different relevant themes for the development of an academic book in this area. The forthcoming chapter is organized into three parts: Systematic and schematic representation, the origin and construction of visual grammar, and context defined norms regarding visual language use.

Both Leborg and Mørch systematized the theory of visual grammar in categories supported by schematic illustrations. These models represent a systematic overview, and involve the development of a visual grammar terminology. Leborg's systematising is characterized by a far greater scope and nuance than the "rough categorization", developed by Mørch. However, Leborg´s terminologies sometimes complicate the content of visual grammar. He uses, for example, visual reproductions instead of visual

signs or two-dimensional expressions. He does not apply the term composition, but instead activities and relationships. Leborg's terms are precise, but at the same time, it is sometimes difficult to grasp them because of their unfamiliarity. Also, Leborg´s first attempt at systematizing the theory in a visual manner is too wide and, as a result, extensive and diffuse (see Figure 1). This model could be strengthened by reducing the amount of main-categories and terms through a schematic rough division of the content. In such a way, the model could communicate the logic structure of Leborg´s theorises. As a difference from Mørch, Leborg divided between "abstract" and "concrete" objects and structures. The differentiation describes how the abstract object, like the point, is an ideal form and that a representation cannot be done physically. If one draws a point, he creates not a point but a surface or a volume (Leborg 2004, p. 9). The latter exemplifies the precision and accuracy of Leborg´s definitions. But explaining the complicated division between abstract and concrete objects and structures in a visual model has its weaknesses. The abstract/concrete division could be replaced by an explanatory verbal text, which provides more accuracy and nuances concerning its demanding content. To summarize: Leborg explores figures and terms in depth, and it is precisely this in-depth approach that gives credibility and accuracy to the theory. By the development of more accessible terms and a more logic, simplified schematic model overview, one could constitute the basic structure of a new visual grammar academic book. A first draft of an alternative visual model is presented in Figure 3.

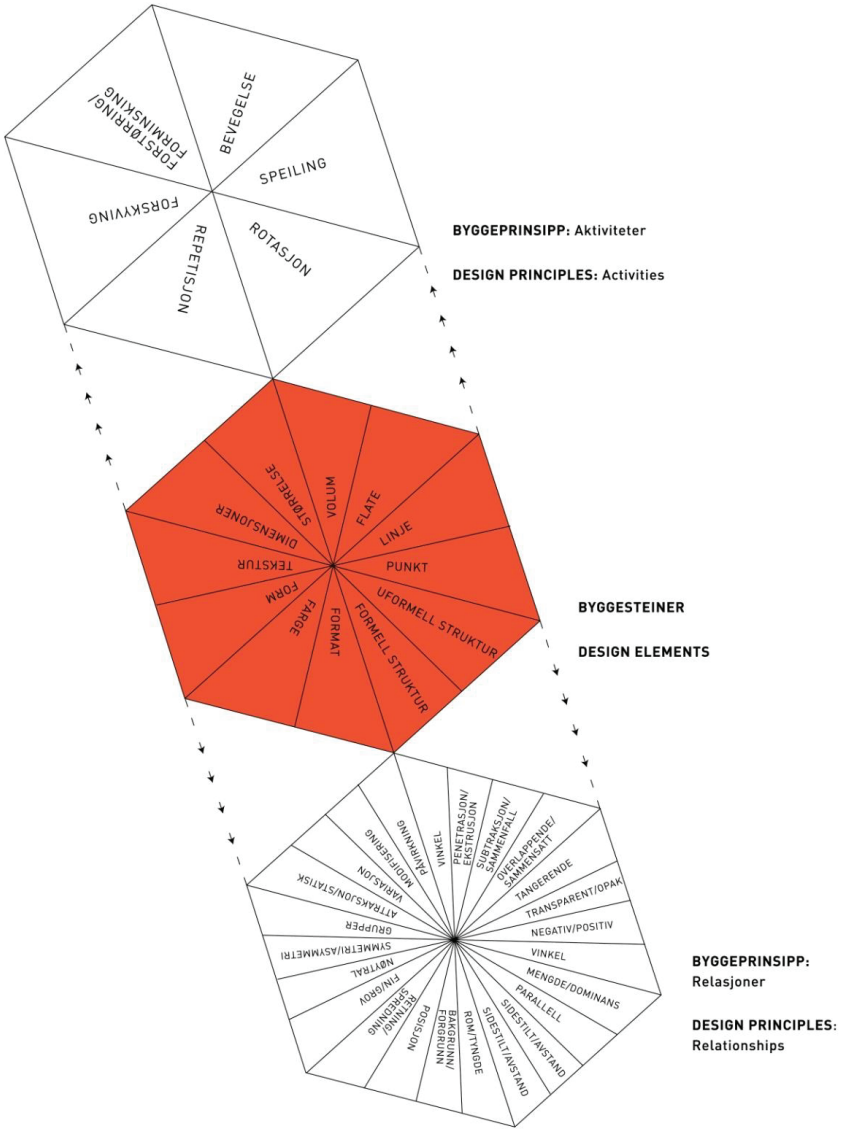


Figure 3. Alternative model, developing Nordic terminology on visual grammar, inspired by Mørch and Leborg.

Another aspect where most of the six contributions are insufficient is an introductory discussion of visual grammar in a social and historical perspective. Mørch is partially doing it, and introduces the theory of *Shape and image* by unravelling the phenomenon "Visual order". He discusses how different studies of art history and Gestalt's psychology could explain visual order as a result of the objective "nature law" understanding of aesthetics ("det estetisk visuelle plan", Norwegian translation) (Mørch 1994, p. 1). But Mørch does not deliberate on how the "nature law" understanding could be one of several discourses explaining the construction of a visual grammar.

To analyse the concept of visual grammar as a social construction that is based on a pragmatic and situational understanding of knowledge (Kjørup 1996, p. 26), the approach emphasizes how visual grammar, formally and informally, has become established as *truth* within a limited social context. Despite a narrow exemplifying of visual culture, only related to fine arts history, Danbolt´s contribution communicates a somewhat situational understanding of visual grammar. The knowledge construction is not a part of Danbolt´s discussion, but the art historic style perspective is situational in itself.

There are many historical analysis of art and design education that can nuance Danbolt's and Mørch's theorisations, as characterized by a social constructionist interpretation horizon. Jorunn Spord Borgen (1995), Karen Brænne (2005; 2009), Jan Michl (1996), Helene Illeris (2002) and Arthur Efland (1996) explain the origin of the autonomous design principles (formalestetikk, Norwegian translation) as a result of a modern design thinking, formulated through contributions from the German Staatliches Bauhaus (Spiller 1961 a and b; Kandinsky 1979). Brænne moreover discusses how this understanding can be explained both as the result of a modernist idiom, and also as a result of a perception psychology, rooted in natural science, according to Mørch (1994). The perception psychological perspective focuses "aesthetic considerations" as a result of certain organizing tendencies in the brain. It excludes the valuation of certain aesthetic expressions that could be explained by an inexplicable aesthetic autonomy, often linked to a genius-dimension (Brænne 2009, p. 121). The modernist horizon is more subjectively grounded than the "objective nature-scientific" explanation.

Also Efland distinguishes between a romantic and a rational understanding of modernity. To the rational, Efland identifies "Elements of Design", where the significant form is the objective and systematic experimentation method. Then Efland relates this rational understanding to the ideas of futurism and functionalism. The romantic understanding of modernity Efland defines as "The Creative Self-Expression", also characterized by visual "language rules", but which are informal and unexpressed (Efland 1996; Brænne 2009).

Through contextualization of the concept visual grammar, the philosophy of Art and Crafts education is also debated. By such a philosophical framework the intended academic book can generate the student's ability to critical position an academic content, and to understand how knowledge always has been in flux.

Brochmann´s book, especially chapter 5, "(…) which deals with the perception of beauty and ugly, and what the word style means (…)", contain interesting aspects concerning design principles and visual "genre". Being able to "practice" visual grammar is an essential part of an art and crafts teacher's professional competence. With reference to Leborg' s visual grammar, this theory could work as a verbalizing tool explaining what visual objects *mean*, and to a certain degree their function. But the

exposition does not discuss how certain design principles can strengthen or weaken a visual expression, depending upon context and visual "genre". When a student designs a poster for a child circus, with a colourful, lush and savage expression, it is probable that other design principles will be applied then when designing a poster for a classical concert. To verbalize and illustrate how design principles are determined by different contexts, an academic book should contain a normative approach within defined genres. A discussion of quality is underlying, and points to a current and important topic in secondary and primary school, the challenge of evaluation. Both the theory of visual grammar and a discussion of "good" and "bad" visual language use has particular relevance in the teaching situation. Although such normative representations may seem naive and simplified, I find them to be an honest, presupposed style and context specific account. The clarification gives the students the opportunity to understand what criteria their work should accommodate. And from this, developing their own assessment skills, related to pupils' achievements. To question visual language use is to realize visual grammar.

Closing remarks

In addition to an increased focus on assessment in the Norwegian school system, the art- and design area is in the process of developing an academic discipline, named the Making Discipline (Dunin-Woyseth 2001). A consequence of this development is an increased interest in investigating the character of systematic language or literacy, understood both verbally and visually (Nielsen 2008).The number of completed doctoral degrees, publication-channels and international conferences confirm that the research field of Nordic art- and design education is growing. However, the extent of how the increased research activity and the development of a systematic language will infiltrate and influence the daily life of education and practical activities have been hardly explored. There is always a risk that an academic field moves away from the ground level to deal with theoretical aspects with limited relevance concerning practical tasks. At the same time the participants of a ground level, mainly involved in a practical core activity, could be in danger of ignoring research results. Research publications may seem inaccessible because of their academic form, and most of the art and crafts professionals are deeply employed in practical problem solving. To develop an academic book on the topic of visual grammar and Nordic design terminology, it is possible to increase the frequency of contact between practice and research. The analysis of the six contributions is a modest start to mapping the literature that already addresses the theme. From these six publications, it is obvious that further clarification and deepening of visual grammar can enhance art- and design educational practice.

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An exploration of design thinking across educational domains.

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Abstract: *To teach design effectively foundational design thinking needs to be understood. Treating the design process as a mysterious mental talent provides little scope for teaching the subject. This study explores the origin of designs and how experience impacts the sophistication of design ideas across educational domains. Secondary and tertiary students were given a common architectural brief and students' outcomes were compared and contrasted to seek commonalities or differences in their approaches to solving design problems. Additionally, interviews were conducted with participants and a panel of design experts to further explore the students' design practices. The results provide insight into design cognition from multiple viewpoints. We argue that designs come from various forms of copying; metaphors, analogies and icons are used as preconceptions by which a design problem is understood. Moreover, experience had a direct link to expertise which is evident across educational domains.*

Keywords: design, cognitive process, secondary education, motivation.

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Introduction

Learning to design is like learning to speak. Anybody can do it, but it can be enhanced by an understanding of the mental processes that allow us to generate form. It would be difficult to find any design educator who went out of their way to disable or disengage students. The by-product of informed practice is arguably our ultimate goal; better designers (Cross 1990). But in order to grow design minds we must understand how they work. Not just at the end of the spectrum but progressively, from the novice right through to the visionary (Dreyfus 2003a; b). With the growth in literature around design thinking it would seem that no matter where your students are within this spectrum there is scaffolding to assist your teaching practice. However, educators are faced with a stumbling block that has been lingering since the late 1960's: polarised views on the nature of the design process itself. The two main views derive from: (i) a phenomenological approach where design is seen as a way of constructing knowledge, and (ii) a scientific approach based on optimization theory where design is a process to reach an artefact (Simon 1969).

The first approach acknowledges that design differs from other forms of problem solving due to the parallel problem/solution relationship undertaken by the designer (Cross & Dorst 1998; Cross & Dorst 2001). Design problems, described as ill-defined problems (Cross 2001a), require an approach that is based on the production of partial solution conjectures to aid problem solving. An inter-dependent relationship between problem and practice is regarded as an integral part of design development. The second approach, known as Design Theory or Design Science, is an iterative process that is cyclic in nature and follows a prescribed formula to reach an end product. The cycle includes prototyping, testing, analysing and refining, and is intended to improve the quality and functionality of an outcome; feed in information and out comes a design (Cross 2001b; Cross, Naughton & Walker 1981).

It is commonly claimed that this method fell out of favour in the 1970s because the iterative process failed to account for the generation of form and could not objectively solve 'wicked' problems (Rittel 1972). Wicked problems are those problems that require a partial solution in order to be solved. Despite being discredited, iterative processes still prevail in teaching practice and curriculum development, especially at secondary school level and can result in a disincentive for students to engage (Wells 2010).

This study has been driven by the concern that design educators and those developing curricula are divided in their understanding of the nature of design thinking and how it should be best supported by design practice. It is of particular concern that stages of design education could be hindered if institutes such as secondary schools and universities have not established common ground about something as fundamental as where design ideas come from and how to develop design thinking. Without such collaboration institutes could be unwittingly working in opposition.

This paper presents the results of a comparative study between secondary and tertiary design students who underwent a common design project. Qualitative data was also gathered from participant interviews. The use of a common architectural brief provided insight into the practices of design students across educational domains and enabled the exploration of how experience influences design solutions.

A model of expertise

Despite the breadth of literature available on design expertise much of this research investigates design students engaged in tertiary study or noted expert designers (Cross 1990; Cross & Clayburn Cross 1998; Dorst & Reymen 2004). We saw this as an opportunity to compare students at the beginning of their formal design education to those about to complete an undergraduate degree. The available research is extensive enough to assist design educators in making judgments about their students' levels of expertise by being able to recognise traits associated with novice, through to expert, designers. Several studies have made a significant contribution to the field of expertise in design (e.g. Atman & Chimka 1999; Dorst & Reymen 2004). Dreyfus (Dreyfus 2003a; b) proposes a model where acquired expertise can be scaled from novice to visionary, a model endorsed by Dorst and Reymens (2004). This model is skill based and "distinguishes seven distinct levels of expertise, corresponding with seven ways of perceiving, interpreting, structuring and solving problems" (Dorst & Reymen 2004, p. 3). Dorst and Reymen (2004, p.1) note that there is still little known about "how to stimulate design expertise development". Our analysis of expertise is based on the Dreyfus model (Dreyfus 2003a; b) with secondary students hypothesised as 'novice' and tertiary students as 'competent' and 'proficient'.

Methods

The use of a common design brief was integral to our study. We wanted to have authentic, visual evidence to exemplify ideas and expertise. Students worked through this brief using the typical practices, pedagogy and assessment of their respective teachers and institutes. Both secondary and tertiary participants were aware that they were following a common brief but cross pollination was not permitted. Samples of the completed design projects were collected and analysed; five from secondary students and four from tertiary students. Using Broadbent's (1973) classifications to seek the origin of the generation of form each initial concept was placed in and across Broadbent's (1973) four categories using a table and point scoring system. Each design sample was allocated five points that were awarded to specific categories depending on the evidence present. Categories have been labelled as such; P= pragmatic, I = iconic, A = analogic, C = canonic.

A series of interviews were then set up with the participants and all of the design samples. It was important that participants were able to speak to their work and compare it to other samples. Secondary students were interviewed together and one tertiary participant was interviewed. An interview with a panel of experts who spanned educational domains and industry was also conducted. The expert participants all had sound understanding of design research, education, theory and practice. The interviews were informal and discussion based and while the questioning was similar for secondary and tertiary groups the resultant discussions followed different trajectories. Student participants were asked to comment first on their own work, specifically successful attributes of their outcome and what they would change given the chance to re-do the project. They were then asked to comment on the work of students from the other educational domain, identify similarities and discuss the design brief and any other specific challenges they encountered. There was additional discussion with the tertiary participant about the progression the participant had made from secondary to tertiary level, and how she foresees gaining employment as a designer. The expert panel discussed the samples, nature of their own design practices and design

education, and the progression design students may make from study until professional practice. Participants were given the option of contributing additional comments at the end of each interview. Each participant has been allocated a code to differentiate individual responses throughout the interviews. The letter represents the interview group, S = secondary T= tertiary and E = Expert. As there is only one participant the tertiary student has not been given a number. The coding was allocated randomly and has no additional meaning other than differentiation.

Results and discussion

The generation of form

The ability to classify each sample using Broadbent's categories is suggestive that architectural form is derived from a pre-conceived notion. The interview data only reinforces this with participants not only being able to account for the origin of their ideas but also the way these ideas are developed. The use of the partial solution-conjecture to solve design problems as suggested by Cross (1990, 2001a; N. Cross & Dorst, 1998, 2001) was apparent in all participants, along with the rejection of an iterative design method as a representation of true design practice. The unanimous rejection of the idea that design is practiced by a prescribed iterative process (N. Cross, 2001a; Rittel, 1972; Roberts, 1982) is important as it questions many current design education practices.

Expertise across educational domains

Participants sat comfortably within the model proposed by Dreyfus (Dreyfus 2003a; b), the interview data supported our conclusions. The secondary students were driven by an overall focus to 'make it work'. This being said, there was evidence that some participants had elevated themselves form 'novice' to 'advanced beginner'. However, the inability to fully communicate and resolve their ideas prevented them for working at a 'competent' level. Solving design problems came at a high cognitive cost as they had very little tacit knowledge to apply to the situation, hence their need for rules and data from experts and stakeholders.

The tertiary participants were operating in a different way. With less of a cognitive cost they were able to approach the brief from a conceptual standpoint. They were able find guiding principles and tap into relevant research and practices to inform their design ideas. They were involved emotionally in their concepts and participants appeared to have delved beneath the surface of the design brief. Some of the tertiary participants may have been working at a 'proficient' level, but without having interviewed them, we cannot be certain.

Interview data

The interviews have provided rich unedited commentary from multiple perspectives. As the aim of this study was an exploration of design minds at different stages we feel it is important to include as much of this commentary as possible; we have let our participants do the talking throughout this section.

Critique of samples

Secondary participants used functionality and their ability to meet the objective specifications of the given brief to describe the strengths of their final design. The depth at which they could discuss this was impressive. It suggests where secondary

students place importance when it comes to solving design problems. This passion for functionality was a strong reoccurring theme throughout the interview. Participants all spoke of their outcome as being interesting or successful because they believed the form was different or innovative. However, most were unable to elaborate on how design principles or philosophies may have guided the development of their form. They were aware that their drive for functionality had been at the cost of subjective aspects such as aesthetics and form and spoke of their ignorance in relation to the treatment of and use of three dimensional spaces.

> My building has a double wall cavity and that houses the wind turbines. This means that you don't really see them because I didn't really like the look of the wind turbines on the outside. The wind is funnelled through and that can be used for ventilation for the inside as well, and I can collect rain water and I've got solar panels all over the roof. I think my courtyard is quite good because it's sheltered on the inside from all the wind and everything. (S1)

When asked to describe the success of her design, the tertiary participant's answers differed substantially from the secondary responses. She believed her success was in her ability to respond to the overarching concept of the brief; sustainable architecture. Her design process was underpinned by her understanding of what sustainability was in a wider sense and where it could be taken.

> Well I think I looked at light, and I really like the way the wind catchers actually well, catches wind. Also providing light, it's like multifunctional, like one thing offering a whole lot of things that matter at the roof top and also the form. I think being quite simple is nice, other people doing the same brief are using quite high technology stuff that may work one way or another, but sustainability doesn't have to be like, using high tech machines to generate it because we have such a long history of building simple stuff but still being able to live comfortably. (T)

Secondary participants noted research and design process as the major similarities across the design samples. Presentation was seen as the major difference. While they were not intimidated by the tertiary samples they were surprised at the level of creativity and the evident sources of inspiration contained within the tertiary design work.

> I didn't they'd be so creative. (S3)
> Yeah I thought it would be simple as form. (S4)
> No I didn't think it would be simple form, I just didn't think they'd be so like, kind of different but normal. Like, you can see where they got their inspiration from. (S3)
> You can see where they have come from. (S1)

When asked to describe changes or refinements to the final outcome the tertiary participant spoke at length about how she believed in her guiding concept of light and creating a space to influence the behaviour of workers. She did not, however, feel like she had fully resolved all of the practical problems associated with her concept. Unlike the secondary participants, the tertiary participant was comfortable with submitting the final outcome without having solved the more functional aspects of the common brief because she believed her concept was strong enough. She was also able to identify a significant difference between the secondary and tertiary solutions; the secondary solutions had failed to integrate functional aspects such as turbines and

water collection with the form of their buildings. The participant also noted something the secondary samples openly admitted; the lack of guiding principles in relation to the development of their form. The overall outcomes and presentation of ideas came as no surprise to the tertiary participant and she spent some time musing over her own secondary school design experiences. She identified her greatest challenged was working with a realistic approach and solving structural issues. She was also challenged by the nature of the brief; architecture at an extreme altitude.

The expert participants were impressed with the quality and variety of design thinking and solutions present within the samples. The discussion of the samples themselves along with being able to identify student risk taking caused much excitement. There was specific reference to how the secondary students in their self-aware ignorance and naivety were desperate to gain as much functional data as possible and thus generated high level questions that the tertiary students had potentially overlooked.

> It was a few weeks that you introduced this project to your students you came to me with a list of questions, really long list and it was so impressive, the questions they were asking were so much better than my own students, it was unbelievable. A lot of them are very down to earth, 'do we need a fire escape?' and things like that. I don't think any of my students would add a fire escape. (E3)

The experts regarded the brief as challenging and exciting and were impressed with the tenacity at which all students had attempted to solve testing design-problems. They encouraged students being presented with such big issues, especially in relation to the relevance of such problems to the world of design. Like the tertiary participant sustainable architecture or sustainable design was not seen as a 'doom and gloom' subject but an exciting opportunity.

> To me I'm excited by it because it's rarely I see a brief given to school students that really challenges them beyond a house on a ground level. There are some real nitty environmental challenges here which to me are all about making the designer think about sustainability and the footprint they leave on the earth. You know looking at the wind and the rain and we sometimes think that kids can't cope. They can design but making them think about the design and why they're doing it is hard, so I like the fact that you've challenged these kids. (E1)

SOLVING DESIGN PROBLEMS: THINKING AND PRACTICE

This section sparked impassioned responses by the secondary participants, particularly in regard to drawing and personal versus prescribed design practices.

> Well I didn't really start off with a solid design at first. I changed the design at least five times before I came up with the mushroom and after getting the feedback (from a stakeholder at university) I realised it's not really much of a building, it's more of a fantasy, I need to squash it down into a building that could work hopefully, and it just took a long time to actually figure out what it was and to find a different and innovative shape. (S2)

Commonalities surfaced after they were asked to be more explicit about how they generated their initial ideas. Secondary participants were very clear about the amount of time spent solving design problems in their minds rather than on paper. It was not until they had come to some kind of resolution point did they then transfer these

partially solved solutions to paper to develop further. Strict and rigid design tasks based on an iterative design process, they claimed, can actually harm design work.

> Sometimes your first outcome can be your best. When you start developing it you're going more towards the specifications, but you're going away from the whole brief in some ways and you've lost the whole creative part. (S4)
> That's real annoying if you think of something mean as your first idea and you think of like six other crap other ones. (S3)

A re-occurring and dominant theme was the importance of being able to transfer mental images to paper and participants' frustrations when not able to do so. When asked to elaborate on confidence and quality of drawing students admitted that it was a stumbling block and without direct instruction and visual success it pigeon holed their ideas.

> The drawing course helped me a lot because after doing it I did notice that my drawing had improved with free objects and stuff, before that it was just pants. It was horrible but after that course I could actually look at my drawings and not be ashamed. (S2)

The tertiary participant stressed the ability to access and use inspirational material along with site analysis in order to generate form and develop ideas. Through investigation she was able to source guiding principles for her work. The use of quick sketching to capture design ideas and constant feedback and communication with tutors helped her to refine her work.

> I do sketches first because it's quicker. I can just think and draw. I sketch and then I talked to Alfred and we find more. I think inspiration from existing work and from internet is really important because sometimes you look at something and just go "oh" or "you can do it like this" where you never know if you don't see it. So when I get stuck on the computer or anywhere I ask for like books or resources then you can always sort of find some more information, inspiration. We just keep on talking, communicating. (T)

The expert participants were bothered by the presentation of some of the samples, particularly the secondary samples. The architects were especially disheartened to see the rigid and iterative process the secondary students were required to produce, and felt it did not complement authentic design practice. One participant was appalled at the suggestion there may be a standard operating procedure employed in order to create design solutions in general.

> It's interesting what you say about concepts where you've got to have three or four different concepts because if it's one that you're really passionate about that should be it. But maybe it's almost that pre-concept and it's that balance between what you were saying about the kids that were happy to do the research but couldn't jump into putting something on paper. The research needs to inform, almost like a pre-concept and then maybe it's something to do with that. (E5)

Confidence was identified as being crucial to success. Expert participants spoke at length about how lack of confidence can cripple a designer and how it could be nurtured within design education. Confidence, they believed, can enable a designer to take risks and to stay true to ideas, and therefore having a large bearing on the nature of the outcomes produced. Creativity and creative thinking was discussed as sitting

alongside confidence. Participants were passionate about the encouraging students to feel like they are in a learning environment that celebrates and honours creative thinking. They expressed remorse that creative thinking seemed to get squashed in the secondary system and spoke about building resilience into design students to avoid this from happening.

Design education: development of expertise

Secondary participants were asked how they could have been assisted to extend their initial generation and the development of their form. Potentially helpful tools included things such as visits to architectural sites, practice, practical and functional data, and to work in parallel with the tertiary students. They noted that experience in both objective and subjective areas has a bearing on the degree of sophistication to which design problems are solved.

> Probably a bit more research into buildings or maybe even going out and seeing some buildings like rather than you're researching things that you know, like kind of, you're typing in words that you kind of already know and you've already seen. So if maybe we went out or to some exhibition or something like that and saw different examples of architectural buildings and might have a different idea of what to do. (S4)

Secondary participants spoke of the need for inspiration coupled with a place to exercise their own original and creative thought. Feedback featured strongly, with participants stressing that this project was far better as it had links outside the classroom and contained real stakeholders, and that quality feedback from classmates, educators and stakeholders makes a positive difference. Overall participants were in agreement that collaboration would be a positive thing for both secondary and tertiary students. There was mention of feeling uncertain initially but now participants were glad they had been given this opportunity.

> I think it's interesting that alongside the university people, because it was a bit more of a challenge to see how well my work would compare with them, because they've got all this greater amount of instruction from their specialised lecturers who have experience in field work and have all this somehow infinite knowledge, and I really wanted to see how well my work would compare with their work. But of course their work is slightly better because it's all computer graphics and presented really awesomely with lighting conditions and stuff. (S2)

The tertiary participant's experience of design at secondary school greatly differed from her experience at University. Differences included the nature of the teacher given design brief, the kind of communication offered by educators and the way in which design thinking and solutions were presented. The tertiary participant felt secondary school had not prepared her for architecture school and noted she did not fully understand what she was getting herself into when enrolling in the course. The ability to stand up to critique came through loud and clear as a way to both extend and prepare secondary students for architecture school. The participant also made mention of exposing secondary school students to architecture and architectural practice. She could clearly see how tertiary education had extended her as a designer. She suggested that additional experiences such as site visits and exposure to more 'stuff' may allow for further extension of design expertise. As with the secondary participants, the common brief did spark curiosity from the tertiary participant, though not quite as

much due to her ability to recall her personal design experiences. The participant also agreed that collaboration between secondary and tertiary was a good idea and thought that collaboration between tertiary and industry could help students find employment.

> I heard in some other places maybe Europe I don't know or China for instance to co-operate with universities during summer or even during the year. You can go there say once a week and then do something. If you're good then they can contract you after you graduation which is good, saving you time to look for a job. And also with that experience within university years you think much more like a real architect instead of just thinking concepts and ideas, you think about how to build it and how to make it happen. (T)

Four key areas were identified by the experts: (1) explicitly encouraging creative thinking, (2) bringing student interests into the classroom, (3) building on existing knowledge and (4) growing passion. The concept of perception and learning to see arose from one participant who had been listening to how life experiences help to inform design practice and links to the development of passion. All participants agreed an important facet of design teaching should be perception; that is, learning to see and to observe and being able to channel that inspiration. The ability to communicate ideas was discussed at length. Participants noted that design students should be given the opportunity to practice being able to present with confidence and competently use different modes and media to do so. As in the tertiary interview, the ability to stand up to critique was seen as a vital attribute for a skilled designer to possess.

> That's what I want to jump in, it's that observational factor. Who teaches these kids to actually look at things? We don't teach our students how to observe. We jump in too quickly I think, "here is the brief" but have we actually opened their eyes to new ways of looking and thinking first? (E1)

Expert participants were asked to discuss their views on collaboration in general, but also between secondary and tertiary domains, and tertiary and professional practice. They, like all other interview participants, saw collaboration as a positive step for design education in New Zealand and the wider design community. They did note that it was not going to be an overnight reality as there are rigidly established cultures involved in education.

Limitations

This study has some limitations: the small sample size, lack of quantitative data, the gender breakdown of the secondary participants and the sample size of the tertiary interview participants may limit the generality of our findings. However, as an exploratory paper, we believe that it has been successful. Despite the study's limitations there are a number of commonalities throughout the responses of the participants. These findings have been articulated without coercion, often with great conviction and reiterate a good deal of current design literature on the nature of design thinking and problem solving. We believe the findings from this study are too important to ignore, especially in regard to design education. More research needs to be done to scaffold these findings but the first step has been made, and the time is surely nigh for such professional dialogue.

Conclusion

So what can we do then to grow our designers and develop their expertise? We will have to adjust the way in which we educate them. It has been illuminating to see things spoken by fifteen-year-old school students reiterated by sixty-year-old professionals, and how these responses link with design literature.

Confidence, perception, collaboration and experience seem to encapsulate the thoughts of the participants. They suggest that design classrooms should celebrate creative design thinking and nurture confidence. These ideas are promoted explicitly by Spendlove (2007a; b), Wells (2010) and Cross (1997). Confidence could be greatly aided by students being able to see that their ideas have worth and possessing the ability to communicate these ideas. Students need to be taught how to draw and experience success in drawing, especially in relation to the transferring of mental images into physical representations. They should be taught how to articulate their ideas and defend their thinking in an encouraging yet critical environment.

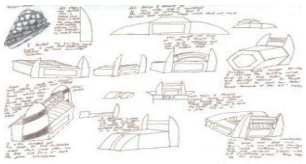
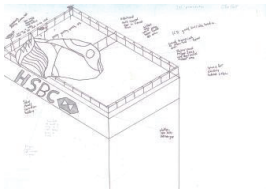
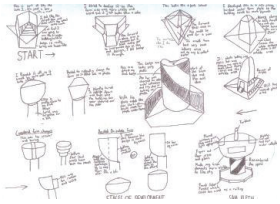
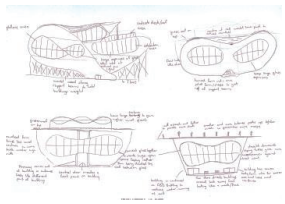
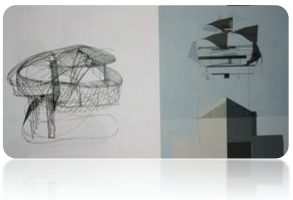
Exposure to a wide range of experiences is crucial. This can be done in several ways: getting students out of the classroom and interacting with design in the real world, taking them to exhibitions, inviting designers into classrooms and running workshops with students, and tapping into authentic stakeholder feedback. If students design based on tacit knowledge and experience it stands to reason that design education should broaden their understandings. Design briefs should be varied, challenging and delve into real issues such as environmental sustainability. Students should be able to see the relevance of what they are learning. Projects should allow for the explicit use of student passion and interests. By doing this students already have buy in and the ability to use some tacit knowledge (Cross 2003; Schon 1983).

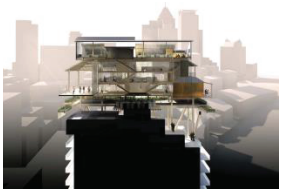
Students need to be taught to truly perceive; to notice and question the world around them and use this when designing. Teaching traditional drawing can be a good way of doing this as it forces students to slow down and really look at things. Without unlocking the fear of drawing students are limited in their ability to record and fully develop ideas (Cross 2001a). Students should feel confident in their drawing and have their eyes opened before attempting to solve design problems.

It is alarming to think that some students may enrol into courses without an accurate picture of what that course entails and that some talented students may not be accepted into courses because their portfolio does not contain the thinking universities are looking for. If secondary school educators were more aware of what tertiary institutes were looking for in their undergraduates, they could better prepare students wishing to pursue design. Conversely, if tertiary educators were aware of the kind of projects being delivered, and the level of design thinking happening at secondary level, they would have a better understanding of students' strengths and weaknesses. This kind of productive communication could lead to the extension of design expertise in general and actively assist in the development of student to practitioner.

Personal experiences of education appear to be something that we keep with us always, so it makes sense to ensure educators are doing their utmost to make such experiences rewarding and positive. Our hope is that this study may generate professional dialogue and inspire changes to pedagogical practice enabling design educators to grow great designers and aid them in keeping their students' colours bright. At the very least it should make educators reflect on how we assist students in solving design problems.

Table 1. Design samples across Broadbent's categories of form generation.

Student	Design sample	P	I	A	C	Explanatory notes
S		3	-	1	1	Functionality has commanded most design decisions. Form derived directly from tropic shell. Interior space has been sectioned using strict symmetry.
S		2	-	3	-	Form derived from concept of bio mimicry (fungi). Functionality takes a slight back seat to concept of form but still dominant in development.
S		3	1	-	1	Initial form derived from participants understanding of a house shape and then developed with rigorous attention to functionality. Interior space and overall uses mathematical systems.
S		1	-	3	1	Initial form derived from shape of a surfboard. Form has guided and helped to develop the integration of functional aspects. Interior spaces have been laid out using mathematical systems.
T		-	-	3	2	Form derived from Mobius loop (a mathematical concept). This concept drove development

Student	Design sample	P	I	A	C	Explanatory notes
T		1	1	3	-	Form inspired by Pakistan winder catchers and concept of traditional, low tech sustainability. Functional aspects apparent but not fully as important or fully resolved.
T		-	1	1	3	Form and concept derived from New Zealand villa. Concept was to modernise a cultural icon, done in part by mathematic systems in regard to the treatment of space.
T		-	-	2	3	Form derived from and development guided by the mechanisms of a clock. Mathematic rules used when dealing with mechanism analogy.

S= secondary samples, T = tertiary samples.
P= pragmatic, I= iconic, A= analogic, C= canonic.

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Changing Attitudes Towards Art and Design: Activating Expectations and Design Change

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Abstract: *From fashion to furniture, magazines to medical equipment, airplanes to auditoriums, design infiltrates and influences every aspect of contemporary life. But if the benefits of good design are to continue to enhance our lives practically and aesthetically then we must change our views on education for sustainable design in order to meet the greatest challenges of the 21st century. In the transdisciplinary understanding of art and design education today, sustainability issues and approaches are viewed as a complicated series of relationships, some of which go back to the early twentieth century. Art and design is a radically diversified field concerned with as many processes as concepts. This paper will endeavour to understand some of the trends, developments and responses within art and design practice in recent years, it will assess how our conceptions of art and design are relevant to the problems surrounding global debate on the future of the planet and whether art and design can play a meaningful role in the future in terms of education for sustainable development (ESD). Modern lifestyles and material cultures made possible by design are now so deeply implicated in un-sustainability that a re-writing seems inevitable not only of design history but aspects of art history too.*

Keywords: Change Making, Descriptive/Empirical/Validity/Design/Art

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Introduction

From fashion to furniture, magazines to medical equipment and aeroplanes to auditoriums, design infiltrates and influences every aspect of contemporary life. But if the benefits of good design are to continue to enhance our lives practically and aesthetically then we must change our views on education for sustainable design in order to meet the greatest challenges of the 21st century. In the transdisciplinary understanding of art and design education today, sustainability issues and approaches are viewed as a complicated series of relationships, some of which go back to the early twentieth century. Art and design is a radically diversified field concerned with as many processes as concepts.

This piece will endeavour to understand some of the trends, developments and responses within art and design practice in recent years, it will assess how our conceptions of art and design are relevant to the problems surrounding global debate on the future of the planet and whether art and design can play a meaningful role in the future in terms of education for sustainable development (ESD). To clarify, for the purpose of this paper the term ESD refers to the practice of using education as a method of encouraging sustainability and embedding it as a core principle of design practice.

Modern lifestyles and material cultures made possible by design are now so deeply implicated in un-sustainability that a re-writing seems inevitable not only of design history but aspects of art history too. Conversely, a revitalised, critical history could play a major role in providing an intellectual framework for new, re-directive art and design practices, as it is apparent that the old political, cultural and material lifestyle debates no longer apply.

Art and design educators

How has the teaching of art and design been influenced by increased awareness of the issues surrounding sustainability? How are students responding to the deluge of information regarding our future on the planet and the growing concerns of politicians, educators, academics and business people?

For art and design educators, endeavouring to produce new creative thinkers with the ‘old theoretical tools’ has become extremely difficult and in many instances wholly inappropriate. Now the thrust must come from developing new thinking tools, which are adaptive (not Fordist- Henry Ford (1)) and link to all disciplines.

Much of western art and design has evolved over recent decades through engagement with matters like class, gender and the postcolonial. In turn, critical art and design histories have contributed to new ways of understanding the world around us. Sustainability education has helped check some undesirable trends by constructive engagement with sustainability issues. This has paved the way for developments in which higher educational learning can best harness new thinking and embrace change within the context of the art and design curriculum.

Design historians are well aware of the role design has played in making the modern world. Design histories have used and perpetuated ways of thinking that have fed directly into current, unsustainable design practice, including notions of progress, newness, and obsolescence, 'iconic design', and the star-designer or 'starchitect’ (term used to refer to star designers and architects)
(http://famousarchitect.blogspot.com/2008/01/36-starchitect-definition.html)

'How to read this blog……' NOTES ON BECOMING A FAMOUS ARCHITECT
Liberaing Minds Since August 2007

Figure 1. 'How to read this blog…'Source: Notes on becoming a famous architect website (http://famousarchitect.blogspot.co.uk)

Historians of design and art need to consider the implications of their value-systems, for they have a deep influence on practice. Climate change, resource depletion, and pollution will lead to major changes in modern lifestyles in the near future, this will greatly impact on art and design (material and production). Thus artists/designers/students and those that write about art and design, have a major ethical and professional stake in the transition and the direction this will take. We find ourselves gripped by a global economy unable to maintain the rate of lending, and we are regularly reminded that we are over the 'tipping point'. The consumer culture we have become so accustomed to, finds itself under threat due to the reduction of disposable income and a massive decrease in production. So, as designers of consumer goods, products and services re-evaluation would seem the most appropriate form of action. The notion of 'self-policing' (making informed decisions regarding the use of materials, and concept structures within design) has, in effect, led the design community to question not only the role of the designer, but also design as a whole.

Perhaps what is needed is a new, more critical, ethical and cultural art and design commentary that would play a major role in providing an intellectual framework for a new, re-directive, transformative culture of art and design educational practices. A cool transparency that could have the potential to ensure that artists and designers who leave the higher educational establishments still have validity in these times of crisis.

Unorthodox thinking

The designer Tad Toulis (of 'Product Studio', Seattle, USA) has championed an argument urging the practice of design to be re-evaluated to ensure its survival. Posted on the Core77 website Toulis composed an article entitled UGLY: How Unorthodox Thinking Will Save Design: (http://www.core77.com/blog/featured_items/ugly_how_unorthodox_thinking_will_save_design_by_tad_toulis_11563.asp). He suggests that with the correct approach and consideration, the issues design faces today can result in creative outcomes set to define a new era. For example, the proliferation of contemporary furniture designers who play with the 'aesthetics of the unorthodox'.

'High design's recent fascination with the aesthetics of the unorthodox has given rise to some of the freshest design proposals of recent memor'. (Toulis 2008)

Maarten Baas 'Clay Furniture'.

Figure 2. Maarten Baas.Clay Furniture. Source: Core 77 Website. (http://www.core77.com/blog/featured_items/ugly_how_unorthodox_thinking_will_save_design_by_tad_toulis_11563.asp).

These radical designs are poised defiantly against the backdrop of modernity, where functionality and rationality once took pride of place amongst the 'checklist of design'.

However these newer works labour within an entirely different manifesto. It is to describe the fresh and unorthodox approach to aesthetics and new design thinking that Toulis has coined the term 'UGLY', not in the sense that it is aesthetically removed from beauty (though some will argue that it is), rather that it has re-evaluated the marriage between aesthetics, functionality and rationality. These works are used as 'lessons' in acceptance, in a profession that Toulis believes has become bogged down and stifled through artistic indoctrination and old notions. The ideas and emphasis within How Unorthodox Thinking Will Save Design is that our design achievements, with hindsight, have brought us to a situation that no one would argue is perfect.

The pursuit of 'consumer culture' has (within its own parameters) been successful and the evolution of 'pretty' objects has worked to serve the purpose of capitalism, manifested in fashionably desired goods. In this context the creation of these goods could be deemed a success. We must acknowledge at this point that consumer goods remain the driving force behind our economies. However, as a design model, this is hardly compatible with the sustainability that needs to be imminent in design. Ideally, design and sustainability should in essence, be one and the same thing. The notion of continuing within the same 'criteria guidelines' which have been laid down up until now isn't the method best suited for issues which, in many ways, result from our prior efforts. The consumer culture market is a direct result of the relentless conveyor belt of product creation. As artists, designers and consumers we must all realise our involvement and take responsibility.

What critical strengths and weaknesses, within art and design sustainability-related curriculum can we use or discard? Western art and design history is littered with examples of great insight into the future of our planet. The industrial revolution of the 19th century witnessed a plethora of ground-breaking design across many disciplines, including the work of Henry Ford (bio thinking), William Morris and John Ruskin. During the fifties, many designs carried a post-war, minimalist, 'less is more' feel illustrated by the work of designers such as Harry Bertoia and Ernest Race: (http://www.designmuseum.org/designinbritain/ernest-race)

Fundamentally this is unintentional sustainable design. The post-war designs of the fifties were relatively sustainable, but not for the benefit of the environment. It was essential to 'save and make do' during the war as a lack of available materials and the technology to mass produce forced designers to minimise materials and make simple forms that could be flat-packed and reassembled easily.

Environmental concerns became more political in the sixties and the seventies impacting on industrial/product design and general art, installation and site-specific landscape work (location work). Victor Papanek's Design for a Real World (published in 1971) is an example of these trends. He suggested that ecological awareness by designers and the processes used in design were important; he also made designers consider their responsibilities instead of designing for commercial interests. (http://www.treehugger.com/files/2005/01/victor_papanek.php).

Ernest Race 'Antelope Chair'.

Figure 3. Ernest Race. Antelope Chair © Race Furniture. Source: Design Museum Website. (http://www.designmuseum.org/designinbritain/ernest-race)

A sudden rise in the price of oil, the rise of the green movement, Friends of the Earth and the popularity of 'minimal art' but also 'performance and happenings' all contributed to increased awareness of environmental issues in the early seventies. Deepening concern about decreasing levels of the world's natural resources led to designing products/art that consumed a reduced amount of energy but focused on a high level of ocular delight. We need to revisit and refocus our effort on affecting change in ESD by looking for opportunity in art and design both past, present and future for embedding sustainability in curriculum, teaching and learning.

The conceptual/minimal nature of much of art practice during the sixties and seventies, early video-film production etc. (particularly experimental work), was very important to the development of computer art, techniques, programmes, and software that we now take for granted within art and design practice. We have experienced an unprecedented explosion in 'computational culture'. What is unclear is the extent to

which our computer dependency is necessary or in fact desirable and whether or not it is adding to a more sustainable practice. Are we 'better-networked' and better able to exchange rapidly prototyped thoughts and objects through the medium of the Internet? Are we, through the power of algorithms, 'democratising the design process'? In the visual domains of rule-based systems, dynamic graphic and algorithmic art are new aesthetic vernaculars being forged and are they more sustainable?

They are if our levels of energy is consistent, our new government scientific adviser David Mackay says we will experience power cuts as early as 2016! If we consider this 'forged' aesthetic as a restricting progression as much as it is broadening the possibilities, we have an interesting conundrum. Much of the push to a new 'intersectional' (inter-discipline thinking) approach to design thinking and sustainable curriculum development, is driven by a need to maximise possible informational exchanges, rapid prototyping ideas and thus spreading the uptake of sustainable thinking knowledge and material use etc.). Nonetheless, to strip the issue down to the most simple of comparisons, can you design more effectively with a pencil or a PC? This is a highly subjective question and in the case of craftsmanship, the introduction of technology is a relevant debate. However, through use of the computer, inspiration is readily available and even boundless. In many ways, the computer, via the Internet, allows the designer to call upon varying sources, enriching the design process. It is the 'flow' that empowers the art and design process.

Through computational culture, rapid prototyping is now a real possibility, with sites such as www.zapfab.com, www.firstcut.com and www.shapeways.com. Through sites like these, the barriers of production and suitability within the marketplace have been lifted or broken down. One of the developments we are keen to take forward at the Plymouth University is the creation of small networks which students can 'plug into' (using prototype machines to create work, linked to CNC, cutting devices) after their educational experience. This will allow a sharing of resource/material/expertise in small designer communities, organising and co-creating, certainly an economic sustainable solution, to shared making.

The technological education available to anyone with a computer has resulted in the consumer becoming as technologically savvy as the designers themselves. The power to mediate the experience is being broken down through the understanding of technologies. For example, it is possible to hack the iphone in order to enhance the performance, as the consumer deems necessary.

There are interesting warnings about how the designer's relevance is now in question as we live in a culture that has already turned its back on record labels and network television in support of itunes and YouTube and Spotify. These new elements (hacking/mash ups) within arts practice are about choice and relevance as much as they are about new technological development. For example, the British artist David Hockney chooses to draw with iphone and use a pencil (2). In relation to ESD, some 'open source' networks are very useful, providing the free exchange of materials, ideas and a virtual object market place. We actively encourage our students to use these networks as the conversations are informed and highly valued and small networks grow out of shared objectives and a sharing of knowledge and equipment.

It is not difficult to predict a bleak outcome for design if we fail to re-evaluate what we have - up until now - considered common practice. Yet, the reality of implementing change is that numerous obstacles are encountered. What is clear though is that a rigorous system of re-educating must first be adopted throughout the design practice. In some quarters of the design community there is a developing methodology that

encourages, openness and willingness to adopt views usually supported by other disciplines. Through doing so, it emphasizes the need to move in and out of these multiple disciplines, ensuring that our views are liberated from 'single mindedness'. In many ways the approach appears embracive, positive and, more importantly, fresh. What we have to decide is whether art and design that rejects mindless consumerism can be embraced, by an overall consensus, to a level that still allows freedom and not just doctrine. Whilst many individuals realize that much of what they purchase is not essential for their survival or even basic human comfort, but is based on impulse, novelty, a momentary desire, they also realize that there is a hidden price that nature and future generations will have to pay.

Hertzian Tales

In 2005, Antony Dunne (a partner in the design practice Dunne & Raby) argued that the technological advances we hold to be so revolutionary within western society today only scratch the surface of possibility. Focusing on the social gains that can be realized through electronic objects, and re-evaluating our experiences through subversive design, can, Dunne explains, lead us to a holistic design experience needed in order to mirror our current culture.

Dunne's Hertzian Tales were developed between 1994 and 1997 it was first published through the Royal College of Art in 1999. They consist of two main parts: six essays exploring design approaches for developing the aesthetic and critical possibilities of electronic product outside a commercial context (chapters 1-6), and five conceptual design proposals expressed as objects, videos, and images, by-products of an investigation into a synthesis between practice and theory, where neither practice nor theory leads (Dunne 2008, p.37)

One of the elements within Hertzian Tales, is that as consumers we value the electronic object on the basis of its interactive, user-friendliness. It is difficult to identify a machine that was not designed in order to ease our mediated experience. Am I a man or a machine? There is no ambiguity in the traditional relationship between man and machine: the worker is always, in a way, a stranger to the machine he operates, and alienated by it. But at least he retains the precious status of alienated man. The new technologies, with their new machines, new images and interactive screens, do not alienate me. Rather, they form an integrated circuit with me. (Baudrillard, 1988 cited in Dunne 2005, p. 21)

We can argue that this represents the more sanguine point of view. However, we must also take into consideration the notion of mediated progression through thinking in relation to non-decision making. If you apply this sociological theory of control, the electronic object in some respect embodies the false hope granted by the political ruling powers, in order to control free will through a blanket of farcical possibility.

Camcorders have many built-in features that encourage generic usage; a warning light flashes whenever there is a risk of "spoiling" a picture, as if to remind the user that he or she is about to become creative and should immediately return to the norm. (Dunne 2005, p.22)

This highlights how mediated we are in terms of thinking we're being creative! The recent glut of affordable, easy to use digital camera technology has created a situation where many amateur photographers allow the camera to dictate a creative agenda. The consumer has relinquished control on the assumption that the equipment is more knowledgeable about the subject than the artist. You could argue that high street retailers supply cameras with the primary goal of interactivity, rather than creativity.

In contrast, there are many examples of creative exploration using limited technological aid. This may seem to contradict what has been previously stated, but within art and design practice, both 'opportunities' are given validity. For example, some photographers choose to work with 'primitive equipment' and antiquated photographic techniques in order to produce purposely 'flawed' or 'retrospective' results.

The design practice (www.droog.com) (Bootleg Objects) cleverly exploits the emotional draw of nostalgia successfully combining the advantages of contemporary technology with aesthetic design. Clearly appropriated from well-known classics, the look of the furniture and domestic items is reassuringly familiar but the internal mechanics have been completely re-evaluated and deconstructed. The result is a collection of entirely new objects. However, they remind us of rationality, and the application of form through the iconic aesthetics. But we are asked to consider these objects with a sensibility that contradicts the aesthetic, not remaining focused primarily on the packaging and the appropriation.

Why should I invent new forms if reality already offers so many fantastic images, so many special solutions. As a designer I only have to discover them and to restructure them into new stories. (Bey, 2006 cited in Schouwenberg, 2006, p36)

It is the play on existing images, which helps to bring us back to a state in which we recognize, empathise and understand. It is the ambiguity of contemporary product-design that can leave some feeling disconnected. Familiarity or a sense of 'nostalgia' can help us overcome these feelings of alienation and confusion by connecting us to a process, or processes that are supportable (reused from existing objects). This need to make visual or sensory connections with the past is partly responsible for our readiness to embrace innovative interactive technology as a substitute for traditional forms of communication. In his book Designing Interactions (www.designinginteractions.com), Terry Winograd of Stanford University, explains why the domestic computer has been so successfully assimilated by contemporary society.

The desktop and the mouse have really dominated the way we interact with computers, pretty much the last twenty years. We think of it as sitting down, interacting by doing things with our hands, primarily typing, because that's a very efficient way to get large quantities of text in, and also by pointing, dragging, moving, and drawing, and so on. Winograd (2007 cited in Moggridge, p: 460)

This form of interaction works rationally and functionally. The core elements within the design are helping the user by making the most of what we as humans already consider strong interactive skills, our passive sight and our proactive and dominant interaction - touch. Through these basic principles the computer, complete with interaction, grants the user an experience. On the other hand, this experience is restricted to pre-constructed outcomes, denying certain senses thus restricting the experience.

The 'art' of design

Some of the works discussed in Hertzian Tales explore the interpretation and role of aesthetics and how they help to create 'experience'. At the UK Royal College of Art (RCA) in the early 1980's, the Department of Industrial Design began numerous innovative projects on the premise of representation and interpretation, rather than interaction or functionality. Designs that were taking place throughout this period moved away from the practical solutions demanded by the manufacturing sector. The similarity between the work which came out of the Industrial Design Course at the RCA

in the 1980's, and today's celebrated, 'high-end designer furniture', is that we are asked to experience the design from a more holistic perspective. The intersecting combinations represent the world we live in today where nothing is black and white, rather a confused but engaged, shade of grey. In the light of this a handful of designers choose to methodically construct their work in the order, 'comment and then question'. In the 53rd issue of 'Icon' magazine German born London based designer, Julia Lohmann, was presented on the front cover. Lohmann's view towards design, and how it manifests itself within society, is compelling. The Lasting Void was one of numerous stools designed for 'Galerie Kreo' in Paris. The object was constructed by pouring plaster into the cavity of a calf (the calf having died of natural causes). The cast that was left demonstrated the "void" found within the pre-butchered carcass on its way to becoming a consumer product. The article's appeal encompasses the debate, which is captured through the words of Christine McGuirk.

'She is one of only a handful of designers today whose work comes with a social critique of any depth' (McGuirk 2007, p.56).

Social and psychological ethics and morals are put into focus in a way, which clearly makes some feel uncomfortable. Within design, issues being addressed don't tend to be so brutally pronounced. A large proportion of design issues and designs which tackle them, such as sustainability and economic regression, don't contain the aesthetics that relay such poignant recognizable images. The Lasting Void has very little function, but to transport the user back to the starting point. It has to be said that there is nothing new in the ideas expressed by Lohmann, embodiment, positive, negative spaces, but it is just this reworking on old ideas and setting them in new contexts (art ideas into design) which is of interest, because it makes comment and is issue directed.

The interest is in the ambiguous relationship between art and design and the work clearly incorporates design philosophy and sculpture. It is also apparent from this marriage of ideas, that the connection between art and design generates a new experience, and the basic function works through sensibility in the correct context. Do we need to continually critique our approach in this way? Maybe not, but it highlights that it is the availability and issue based nature of the work that breaks down barriers in some respects. Bruno Munari explains, in Design as Art, that it is the positioning of design, which makes it the perfect tool for conveying your message.

The Designer of today re-establishes the long-lost contact between art and the public, between living people and art as a living thing. Instead of pictures for the drawing room, electric gadgets for the kitchen. (Munari 2008, p.25)

It is interesting how, as designers/artists, we work within a supplementary process. Interaction between the design and the user/audience on some levels it is almost always key within the design process (3). The final product has a duty to incorporate an element of consumer needs whether designing a light or a garden spade. The success of the product rests primarily on how suitable the designs blend into our lives. However, concerning art, the process of creation works autonomously, or at least some of art production does. The work of Gamper, Lohmann, Tjep, Mike and Maaike to name but a few, fail to rely on consumer participation in a classical manner. What you get from Mike and Maaike's 'Juxtaposed: Religion' shelf: http://www.gnr8.biz/product_info.php?products_id=339 (Generate LE, 2009) isn't a conventional shelf that enables you to hold your own book collection, but a message of equality, acceptance and celebration, focusing on an issue such as religion using the language of design? The subjects/issues being tackled give the objects the function. To remove function from design opens the design up for interrogation, and rightly so. But

once you start to examine the 'issue' you realise that the function of the piece is to interact with it not only on a functional level but an intellectual level as well, adding value, adding surprise. Do we have to restrict/abandon the way of making to truly fulfil the ambitions of education for sustainability?

The central claim made about modern art - the one on which all others depend - is that it is an autonomous field of practice. Art, the argument goes, strives to stand apart from the interests that are everywhere manifested in the rest of the world. To the degree that it succeeds, it is a zone of free practice. Both at the level of the individual art work and that of the total field (modern art itself) it can achieve independence. (Adamson 2007, p.9)

To a certain extent this may be true. However, art has, throughout its early history, been exploited in order to serve the needs of others (sustainable income for artists and designers, or powerful images for those in power!) There are many examples of art being expressed in such strong, forceful and poetic terms as to change periods of history in a radical and affirming way, I would argue this has always been 'sustainable' as we know the term now. In some ways the early twentieth century 'micro movements' (Dada, Surrealism, Arte Pouvre, Fluxus generated through word of mouth and specialist interest mixed with public exhibition, have given us much of what and why we value in the power creativity set.
(http://sdrc.lib.uiowa.edu/atca/subjugated/one_2.htm)

It is also worth mentioning how when politics disrupts what Adamson calls, 'autonomous field of practice' (Adamson, 2007, p 88) perhaps more interesting things have happened. His views, it has to be remembered, are predicated by, an American fine art training, during the early seventies, the days of Greenberg et al.

As a design profession and educationalists we must re-evaluate to understand what purpose we wish to fill. We perhaps need to radicalise our education to regain our sense of experimentation and fun. Realising that the products we create, contribute to powerful economies, gives us a unique position. Consequently, our students need to have the ambition to change these relationships and have the confidence to pursue a different agenda. The sad part of this reality is that due to the demands of markets, a vast quantity of design plays upon the weaknesses of the consumer. To design in this way undermines the profession. This does not mean that all designs must go deeper than face value, as there are many forms of design, which meet the needs of the consumer instead of their desires. In 'Humble Masterpieces: 100 Everyday Marvels of Design', compiled by Paola Antonelli (2006) we see outstanding design which has revolutionised how we live. So we realise that not all design is to be condemned and in fact the more socially useful and socially inclusive the design the better it functions.

We have to question in art and design teaching the function and indeed the rationality of the design strategy. The Smell Blind Date, Lasting Void, Droogs Bootleg Objects, Four Boxes and One Radio and Juxtaposed: Religion Shelf (www.droog.com/products) all question the role of design and whether designed objects must meet some form of strict criteria. What these designs do is recognize the need to think on a bigger scale, to question the past, the present and the future. Much of this is what students need to know first-hand, as experience and as a new first principle.

The introduction of the concept behind the design doesn't have to result in the object's removal from function or beauty, or even both. However, in the cases of the designs mentioned it has been the removal of one of these elements, which forces the message to exert itself as the purpose of the object. It is important to stress at this

point that conceptual designs like these only work because their function is to question. They are in essence validated due to the concept, thus the removal of the obvious function can be justified. As for the Smell Blind Date, the purpose of the design is to question the exclusion of certain senses. This is important because the vast majority of designs don't work in this way. As Martino Gamper states, his work has adopted the language of art, but he remains a creator of furniture. (Gamper 2008) (http://www.gampermartino.com/) The question of whether he is more of an artist or a designer is in every sense futile. What we know, is that the work he produces comes from the simple desire to create. Both art and design succeed when they provide us with symbols that re-categorize things and people in ways we find useful. It is this usefulness, not a connection to a world beyond all categories that we actually seek when we generate both theories and art/design works. Notice that we do in fact stop our seeking when we achieve this kind of satisfaction.

Conclusion

Can we change our views on education for sustainable design to meet the greatest challenge of the 21st century? The problems surrounding global debate on the future of the planet are complicated, that's for sure, can art and design play a meaningful role in the future, let's hope so, but in terms of education for sustainable development (ESD) surely it needs to.

Some artists and designers have the skill for making new connections, pulling together strands from different fields and integrating them into new ways of looking at the world (4). These men and women should be more in demand by global strategy departments, governments and producers, who prize the ability to tackle complex problems through synthesis and expert assumptions. Much of the work we do with our students at the University of Plymouth is about creative thinking, being able to approach complexity with an open mind and an ability to utilize the skills of others.

Whilst the media often presents a stream of negative stories relating to unsustainable trends, it is good to remember that change throws up opportunities as well as challenges. If we shed the blinkers for a moment and see the world differently there are many positive shifts. These include the mainstreaming of design in business and the public sector, better understanding by designers of the problems facing the developing world and design companies taking on the initiatives of socially inclusive projects. A good example of this is The Green Heart Partnership, an initiative between Arts Council England, East and the eleven local authorities of Hertfordshire that aims to achieve growth and partnership between the arts and environment sectors. The project is aiming to effect social change through policy development and realise creatively led capital development through informed joined-up decision making designs for the Hertsmere shelters?). Through initiatives like this we are being offered an opportunity to drastically expand the frontiers of design, while embracing the concepts and issues surrounding the challenges of the 21st century. www.greenheartpartnership.com

Students of higher education within the creative arts and the educators of those students need to hone their ideas and creativity and focus on:

- Constructive engagement, which uses design as a social catalyst and brings divergent cultures towards engagement.
- Cool transparency, which employs openness and co-design techniques.

- Rapid proto-type ideas, which can be created quickly and are easy failures (failures which are not costly and can be speedily corrected).
- Organise and co-create, that is, engage with networks through smart use of technologies, nurture meaningful dialogues and finally, share assets across networks and knowledge that has use for all, even at a higher level.

The recent economic recession combined with a rise in media coverage relating to eco issues has intensified public awareness of the pitfalls of consumer culture. Increasing numbers of people are beginning to make informed decisions about the necessity of their purchases. Designers who decide to work within a set of strict moral and ethical boundaries are in a great position to attract a more mainstream audience than would previously have been feasible.

Increased interest by growing numbers of consumers, combined with a more prominent position of ethically-designed goods, could lead to a movement away from mass-marketed, disposable goods, and a return to an appreciation of high quality goods that are long-lasting, useful, beautiful and socially responsible. So the future is up for grabs, the trick will be to spend less time thinking about what we do now, and more time on what is changing out there in the world and responding to it with invention. As Charles Eames famously stated, 'Design depends largely on constraints' (Eames, 2000, p 175).

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Notes

1: Many design historians are use Henry Ford as an example for conveyor belt production, thence Fordism versus Taylorism, many forget he was a particularly insightful thinker and developed many highly principled ideas for early bio-thinking; in terms of fuel and production techniques.

2: David Hockney, the British artist much famed for his graphics, paintings, theatre designs and not forgetting his campaigning for the right to smoke! He has always valued new technologies and their usefulness to the creative act, from faxes, to Polaroid's, to the i-phone. He has also contributed greatly to the understanding of how paintings were constructed through the 16th and 17th centuries.

3: In some respects the emphasis in design is shifting to behaviour as narrative experience stimulated by design of new functions and these link to the more complicated pleasures of literature and film, rather than the sculptural, a more traditional reference for design.

4: This is debatable but if you believe, as I do that art (the creative act) is fundamentally about freedom then, to make connections and gain better/new understanding of ourselves is and has been, will continue to be, a part of the 'art exchange' experience.

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Branded: the sister arts of rhetoric and design

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Abstract: *As a professor of rhetoric at an art and design college in the United States, I am keenly interested in philosophies of design education and their relationships to philosophies of rhetorical education. Clearly teachers of rhetoric and of design have much to learn from one another, yet we rarely interact. One way in which design and rhetoric should be informing one another is through the related concepts of branding, familiar to designers; and ethos, well-known to rhetoricians. I know from faculty colleagues in design how important branding is in design curricula. Students learn the value, as Richard Buchanan puts it, of designing a product whose voice people are willing to bring into their lives. Branding has obvious connections to rhetorical ethos, and in the general education classroom I have used Artistotle's tripartite concept of ethos as the audience's perception of the speaker's phronesis (prudence), arête (virtue), and eunoia (goodwill) to deepen our discussions of both ethos and branding, particularly focusing on the ethical dimensions of both. This paper offers a survey of literature on rhetorical ethos, practical classroom strategies for teaching ethos to designers, and commentary on the possible productive relationship between teaching rhetorical ethos alongside branding.*

Keywords: ethos, rhetoric and design

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Introduction

As a rhetorician working at an art and design college in the United States, I am keenly interested in the philosophies of design education and the ways in which design and rhetoric relate. The art of rhetoric has been defined variously throughout the centuries: Classical definitions included Aristotle's "the faculty of discovering in any particular case all of the available means of persuasion" and Quintilian's "the art of speaking well"; more modern theorists have defined it as "a form of reasoning about probabilities, based on assumptions people share as members of a community"[1] and "an action human beings perform when they use symbols for the purpose of communicating with one another . . . a perspective humans take that involves focusing on symbolic processes."[2] For my purposes here, I will use Corbett and Connors' definition: "the art or the discipline that deals with the use of discourse. . . to inform or persuade or motivate an audience."[3] In the general category of discourse I—along with most rhetoricians—would include *visual*, and well as spoken and written discourse. Naturally, then, I believe that rhetoric and design are strongly allied disciplines. From my perspective as a rhetorician at an art and design college, I see on a daily basis how much rhetoricians and designers have to learn from one another. Yet, siloed as most of us in higher education are these days, we rarely speak to one another or read one another's work.

Certainly some scholars in the field(s) have noted this opportunity for collaboration. For example, Richard Buchanan has observed that "The skillful practice of design involves a skillful practice of rhetoric, not only in formulating the thought or plan of a product, through all of the activities of verbal invention and persuasion that go on between designers, managers, and so forth, but also in persuasively presenting and declaring that thought in products."[4] And in their *Rhetoric and the Arts of Design,* David S. Kaufer and Brian S. Butler argue for the continued vitality of the classical art of rhetoric by means of its status as a *productive* design art, arguing that as "rhetoric has tried to prove itself in the modern academy, it has had to reshape itself to look more like an organized body of analytical knowledge and less like a form of productive knowledge." But, they argue, its essential nature—like that of design—is productive.[5] So whereas Buchanan is arguing for a new conception of design, Kaufer and Butler are arguing for a new conception of rhetoric. In addition, work by scholars in the emerging field of persuasive technology also indicates the potential for rich collaborations between designers of technology and those engaged in rhetoric from an academic or business perspective; B.J. Fogg's *Persuasive Technology: Using Computers to Change What We Think and Do* is one such example.[6] But these kinds of synthetic analyses have been too few and far between and have exerted too little influence on design education—at least in the United States. (My impression is that the influence has been

[1] Erica Lindemann, *A rhetoric for writing teachers,* 3rd ed. (New York: Oxford UP, 1995), 40-41.
[2] Sonja Foss, Karen A. Foss, and Robert Trapp, *Contemporary perspectives on rhetoric*, 2nd ed. (Prospect Heights, IL: Waveland Press, 1985), 14.
[3] Edward P.J. Corbett, and Robert J. Connors, *Classical rhetoric for the modern student*, 4th ed. (New York: Oxford UP), 1999, 1.
[4] Richard Buchanan. "Declaration by design: rhetoric, argument, and demonstration in design practice." *Design Issues* 2.1 (1985), 22.
[5] David S. Kaufer and Brian S. Butler. *Rhetoric and the arts of design.* (Mahwah, NJ: Erlbaum, 1996), xvi.
[6] B.J. Fogg, Persuasive technology: using computers to change what we think and do. (Amsterdam: Morgan Kaufmann, 2003).

more notable in European higher education.) But in any case, rhetoricians and designs have not collaborated with one another as much as Buchanan and a few others have urged them to. Part of that is our natural tendency to stay within disciplinary boundaries. Yet the disciplines of rhetoric and design are—by their very natures—*inter*disciplinary. We must do better. My concern is largely practical—i.e., to get rhetoricians and designers talking more. This desire is partly what brings me, a rhetorician, to a design conference.

Before going further, then, it will be helpful to describe a bit about my situation: I have a doctoral degree in rhetoric, and much of my research has focused on historical women's rhetoric—particularly the rhetorical strategies that women in the nineteenth-century United States used to gain the right to vote. But because I work at a college of art and design, my work has much more to do with considering the intersections between the world of words and the world of images, which of course are myriad, and which of course intersect with the world of design. The majority of our students are enrolled in the design disciplines—interior design, industrial/product design, furniture design, fashion design, and graphic design, to name a number of the most popular.

Largely in response to this student population, we reformulated one of our general education courses that used to focus solely on writing and have refocused it on the study and analysis of Visual Rhetoric. We are convinced that this class, dedicated to the art, practice, and study of human *visual* communication—from posters, to interiors, to films, to architecture, and so on—is vital to the education of our students. So I'm here today to focus my discussion on this course, and one crucial concept from this course that has a great deal of productive overlap with a concept from design—namely the allied concepts of branding and ethos.

Because I think collaboration works better when the task is clear and the conversation specific, I will organize my discussion in this way—on these concepts that have particularly resonance with one another. That's not to say, of course, that other productive overlaps don't exist between the two disciplines (if one may even call such vast areas as "design" and "rhetoric" *disciplines)*; these two concepts merely offer one particularly fruitful intersection. The concept of branding is familiar to most designers, and the concept of *ethos* is well-covered territory for rhetoricians. I know from my design colleagues of the importance of branding in the design curricula. Students learn the necessity, as Richard Buchanan has put it, of designing a product whose voice people are willing to bring into their lives.[7]

In my talk today, then, I will (1) provide an overview of the rhetorical concept of ethos, (2) explain some classroom activities by which I teach this concept, and (3) suggest ways in which teaching this concept has productive overlap with the concept of branding.

ETHOS

Rhetorical *ethos* might be broadly defined as "character as it emerges in language," with the provision that "language" may include visual discourse as well as written and oral.[8] In other words, one may understand *ethos* as the character of the sender (e.g., writer, speaker, designer, corporation, etc) as portrayed—consciously or unconsciously—via the rhetorical text, whether it's a speech, or a written article, or a

[7] Richard Buchanan, "Keynote address" *Interaction Design Association.* 9-12 February 2011. Boulder, CO. Web. 25 October 2012.
[8] Baumlin, James. "Ethos." *Encyclopedia of rhetoric,* ed. Thomas O. Sloane.)New York: Oxford UP, 2001), 263.

film documentary, or an advertisement that combines verbal and visual discourse. *Ethos* has often been understood as one of three kinds of persuasive strategies, alongside making appeals to audience's emotions (so-called "pathetic appeals") and constructing logical arguments.

A brief survey of definitions of the concept of *ethos* from the Classical Greeks on indicates the richness and debate *ethos* has inspired. Of course, for obvious reasons when looking at this concept as defined for the ancient Greeks, we confine ourselves to the discussion of oral texts given by male speakers. For example, Lysias (c. 445-380 BC), who was renowned for, among other things, his talents as a speechwriter, would make his client's character "appear trustworthy by referring to the circumstances of his life and of his parentage, and often again by describing his past actions and purposes. And when the facts fail to provide him with such material, he creates his own moral tone, making his characters seem by their speech to be trustworthy and honest" (*Lysias* 19.3-4). And in his *De Oratore* (55 BC), Roman orator Cicero held that the "attributes useful in an advocate are a mild tone, a countenance expressive or modesty, gentle language, and the faculty of seeming to be dealing reluctantly and under compulsion with something you are really anxious to prove."[9] And for the Roman Quintilian, an orator had *himself* to feel *sincerely* the emotions he wished his auditors to—no mere "appearance" the feelings would do.

The concept continued to undergo redefinition, as it still does, particularly as attitudes toward the idea of a distinct *self* have changed. Particularly in the twentieth century, the idea of a definable *self*—apart from various cultural, linguistic, and psychic forces that inevitably and largely unconsciously shape it—has been critiqued. One of the twentieth century's most important rhetoricians, Kenneth Burke, redefined the concept of ethos, in light of new theories of group psychology. In *The Rhetoric of Motives,* he writes: "You persuade a man only insofar as you can talk his language by speech, gesture, tonality, order, image, attitude, idea *identifying* your ways with his.[10] In Burke's theory, a shared identification between author and audience is strengthened by a real or imaginary threatening Other, against whom the author-audience "community" is aligned. It is, James Baumlin argues, an "implicitly violent practice of self-identification by means of scapegoating (the speaking self defined, once again, in its difference from the threatening other)."[11]

More recently rhetoricians have defined ethos in a way to emphasize its potential for more positive and ethical use. For example, S. Michael Halloran puts forth vision of ethos that succeeds only to the degree that an author is "willing and able to make his world open to the other," and which risks "self and world by a rigorous and open articulation of them in the presence of the other.[12] This vision of ethos assumes not that the author/sender/designer will try to assert his authority of others, impressing them with his character and skills, but that he and the audience will be equal co-partners in the discourse exchange.

Halloran's and others' articulations of rhetorical ethos reveal the ways in which discourse—including oral, written and visual texts—can be the means of not only "'composing ourselves,' but of making our 'world open to the other'—opening a space, as it were, for the copresence of self and other as 'we keep trying to enter their world

[9] Baumlin, "Ethos," 269.
[10] Kenneth Burke, *The rhetoric of motives. (*Berkeley, University of California Press, 1969), 55.
[11] Baumlin, "Ethos," 276.
[12] Baumlin, "Ethos," 276.

or bring them into ours.'"[13] This meaning of *ethos* as an open "space" is consistent with one the word's meanings in Greek, which is a "dwelling place"—both our way of dwelling and the place of our dwelling. It also refers to our habits and our inner mentality. A vision of this place as a shared space with room for ourselves and those we might term Other is an idealist vision perhaps, but certainly one that is all too welcome, in a world in which, as Michael Miller notes in 2005 *New York Times* editorial, our public discourse is crowded not so much with skillful debates in which one side seeks to sway the listeners, but with crass contest in which each side has already made up its mind and tries only to browbeat the other into the rightness of his position.[14] An appreciation of rhetoric's civilizing, humanizing power would seem welcome. The word, after all, shares its Greek root with the word "ethics," and study of ethos naturally engages ethical conversations as well as strategic ones.

Historical background, such as that presented above, is useful in the rhetoric classroom. It is useful for students to recognize that the strategies of persuasion that surround them—on television, online, in shopping malls, and so on—are direct descendents of the rhetorical strategies that have been operant for millennia. It is also useful to point out the ways in which discussions of persuasion naturally give rise to discussions of *ethical* persuasion. I find, however, that when it comes to introducing the concept in class and helping students to use it as an analytical took, I rely most heavily on the conception of ethos that Aristotle (384-322 BC) put forth in his *Rhetoric.* His concept remains among the most enduring; it is frequently cited—and more frequently imitated without attribution (a testament to the degree to which his theories are inextricable parts of much contemporary pedagogy)—in modern textbooks of rhetoric and composition. His articulation of the concept is helpful in the classroom largely because of its clarity and accessibility.

In his second book of the *Rhetoric,* Aristotle speaks of ethos as the speaker's need to make his own character appear right in order to gain the audience's trust and confidence and, most important, their assent to his argument. Aristotle defines three components that comprise *ethos,* noting that there are three reasons why speakers themselves are persuasive: practical wisdom [*phronesis*], and virtue [*aretê*] and goodwill [*eunoia*] (*Rhetoric*, II). The most persuasive speakers are those who demonstrate these qualities to the satisfaction of their audiences. This tripartite formulation provides a very helpful framework to help students analyze the various ways in which persuasive texts make this ethical appeal. The concept offers obvious questions for students to ask in order to get closer to the texts (whether they be verbal or visual) and their strategies.

[13] Baumlin, "Ethos," 276.
[14] Michael Miller. "Persuasion's lost. " *New York Times* 3 June 2005.

ETHOS IN THE CLASSROOM

In our Visual Rhetoric course, students learn about how visual texts—anything from an advertisement, to a piece of furniture, to a building, to an interior space—use symbolic language to influence those who interact with the texts, variously termed "users" or "audiences," depending on the discipline. For example, I can usually get students' attention by showing them this advertisement from a 2008 ad campaign for BMW's used cars, which uses the provocative caption "You know you're not the first. But do you really care?" (See Fig. 1).

Figure 1: 2008 BMW ad. Source: Drucker.

I also invite them to analyze the visual communication of a designed interior such as Google's front offices. (See Fig. 2). Additionally, the class might look at film documentaries, webpages, and illustrations.

One of the goals of the course is for students to become familiar with some concepts and terminology from the art of rhetoric. One of the concerns that we have as general education faculty is that our students in the various art and design disciplines are doing work that is similar in concept, but that they are missing out, potentially, on fruitful interdisciplinary collaborations because of the terminological and practical divides (e.g., students simply don't *see* students from outside their major very often) that exist among them. We hoped that concepts and language from the art of rhetoric—a discipline that for centuries has been known as the discipline that stands "at the crossroads" because of its wide applicability to all different fields—would help to bridge those divide in our general education classrooms, which include students from a variety of majors. And, of course, by extension, we hope that these collaborative experience continue to help students after they graduate to work in the multidisciplinary, collaborative settings in which so many artists and designers find themselves.

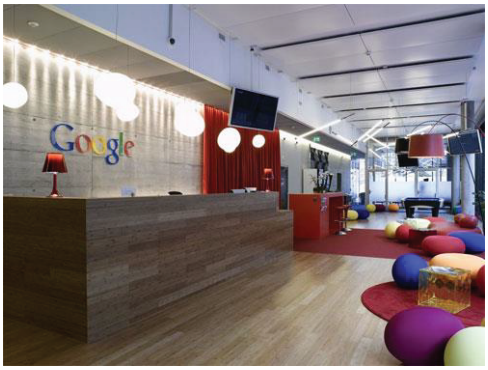

Figure 2: Google Corporate Offices. Source: "Google Office Pictures"

My colleagues and I who teach the course all devote significant attention to the concept of ethos, particularly, as I noted, as it was theorized in Aristotle's *Rhetoric.* There were, according to Aristotle, two kinds of argument available to a speaker—the inartistic appeals, which came from outside the art of rhetoric—namely, the laws, witnesses, contracts, and data that an orator had simply to gather together—and the artistic appeals: logos, pathos, and ethos, which were a part of the art of rhetoric. Aside from appeals to ethos, which I've explained above, appeals to logos, or logic, were appeals to the audience's reason or understanding; and appeals to pathos referred to the ways in which a speaker could seek to touch audience's emotions in a way that would be favorable to his argument.

For example, one may say that the BMW ad in Figure 1 employs a logical appeal in that viewers have to apprehend the logical analogy implicit in the ad—namely, that a BMW "used vehicle" is logically related to this attractive woman who has also been "used" through sexual relations. The ad implies that the woman—and thus the car—are still quite desirable despite the fact that neither is brand new. Students are generally surprised that the ad could be thought of as "logical" in any way, since it appears wholly and ostentatiously emotional in nature. And, of course, I note that the ad certainly does draw upon viewers' emotions—making viewers feel not only desire for the woman and the car (perhaps) but, probably more important, initial confusion about the ad and either shock or amusement when its racy analogy is apprehended. But even more important, I suggest, are the ad's ethical appeals—namely, the way that BMW presents its persona through this ad. Here is where I use three questions based on Aristotle's tripartite structure of ethos:

1. How is BMW demonstrating its *knowledge*? I point out that it's useful to broaden a conception of *knowledge* to take in such concepts as *savvy, experience, confidence, authority,* etc., as understanding knowledge more broadly via these and similarly additional terms often pushes the analysis much further.

2. How is BMW showing its *virtue*? Here, I clarify that—at least in Aristotle's conception—virtue is contextualized. For the purposes of this analysis, virtue in this case is defined as what seems admirable in a particular context, for a particular audience. For students' sake, I tend to put it this way: How is BMW trying to seem like the kind of company/person you'd want to hang out with ("you," referring of course to the intended readership of the magazine)?

3. How is BMW demonstrating its *goodwill* for its audience? Since "goodwill" tends to be a foreign term for students, I clarify ask them how BMW seems to be out for the audience's best interests.

In this ad, BMW establishes its authority in its decision to run such an ad that clearly—even in a men's magazine—is meant to shock. The choice to run such an ad suggests an image of a company that is confident enough to risk the offense that this ad clearly might give to viewers. Additionally, the company appears confident and experienced by what it does *not* include in this ad—namely, any data or statistics to support the reliability or attractiveness of their used vehicles. Closely related to this is the *virtue* portrayed in the ad. BMW, in this ad, is of a company who appears bold and

brazen, assured of its place in the luxury car market and just having a bit of fun, winking at its male readers, with this ad. The company portrays itself as "virtuous"—i.e., bold, brash, dismissive of convention, endowed with a good sense of humor—in the eyes of its intended audience. Similarly, the *goodwill* portrayed here consists of the company's image as a good old boy—more anxious to share a laugh and a beer with its potential client than to push a car sale on them. And so on. The important thing in our in-class analysis is *not* that the class come to a consensus, of course, on how they would analyze the ad; merely that the questions suggested by Aristotle's tripartite definition provide a fertile ground for growing a fruitful discussion of rhetorical strategy.

We do similar kinds of analyses with varied visual texts including film, fashion, and interior design. For example, we might look at an image of Google's corporate offices (Fig. 2) and discuss the ways in which the space suggests (logical) connections with the kind of service that Google provides (innovative, fresh, not stuck in ruts), and the ways in which it invites emotional responses (pathos) of amusement and comfort, and the ways in which it projects the company's corporate personality, or ethos, again using the questions above to lead us into deeper analysis.

These questions have served me well in the rhetoric classroom to clarify the rhetorical concepts and I hope they suggest some ways that a variety concepts from design might be addressed in the classroom. But in the final section of this paper, I will focus on just the concept of branding and elaborate on some of ways I see the concepts of ethos and branding working together to enlarge and enliven the education of designers and artists. I hope this brief discussion will suggest the myriad additional ways in which the study of rhetoric can contribute meaningfully to design education pedagogy.

Ethos and Branding

The most obvious benefit of a focused discussion of ethos in tandem with branding is the way in which the two, together, can get at the knotty issue of talking about the position of the author/speaker/corporation (the "sender" of the message), which is always harder to pin down than the audience/user. I see this gap when it comes to discussion of the sender across the board when I work with students on the concept and in the professional literature on branding. For example, Karen Post defines *brand* as:

[A] mental imprint that is earned and belongs to a product, service, organization, individual, and/or event. It's a story embedded in the mind of the market. It's the sum of all tangible and intangible characteristics of that entity. *A brand is what an audience thinks and feels when it hears a name or sees a sign, a product, and/or a place of activity. It's what customers expect when they select an offering over a competing one*. (emphasis mine)[15]

Miletsky and Smith define brand as "the sum total of all user experiences with a particular product or service, building both reputation and future expectations of benefit."[16] Many more such definitions could be cited, but what's notable in the majority of them is an absence of focused discussion on the position and activities of the sender. It's obviously true that the user is an essential part of the relationship, but the sender also needs also to be examined more comprehensively. The sort of focused

[15] Karen Post. Brain tattoos: creating unique brands that stick in your customers' mind (Saranac Lake, NY: AMACOM Books, 2004), 15.
[16] Jason Miletsky and Genevieve L. Smith. *Perspectives on branding* (Boston, MA, USA: Course Technology, 2009), 2.

discussion that I've proposed above on ethos can help students also get a deeper perspective on the activity of branding as a representation of a corporation's character to a specified audience of potential users. Often, it's simply insertion of a new terminological screen—exchanging "audience" for "consumers" or "users" and "corporation" for "speaker"—that makes such connections possible.

Once this connection between ethos and branding is made, I would suggest that additional benefit would be the engagement of ethical issues related to the activities of branding. The above discussion of *ethos* as a "dwelling place" that might invite the Other (i.e., the audience/consumer) into a collaborative relationship of equality where there is, literally "space" for all, rather than a relationship based on admiration of the sender/corporation's authority and stature indicates this possibility nicely. Such discussions might reference the many and varied initiatives of designers worldwide to make a name for themselves by basing their design strategies around the expertise and needs articulated by those they serve. One might think here of Chilean architect Alejandro Aravena, who engages low-income urban residents in developing "half houses" in a process of "participatory design."[17] Aravena's "brand" thus becomes more participatory in itself.

Implicit in these other benefits is the notion of encouraging conversations that cross time and discipline. As educators, most of us see the value of students being "broadly educated"—a goal that's frequently expressed but all too difficult to achieve. Putting a concept such as ethos, which has a long history in a discipline outside of design, into conversation with an issue in design of paramount importance and energetic interest—namely, branding—provides a great example of how a design education can help students broaden, rather than narrow, their creative thinking about the profession and their lives. My own institution has recently started a new major, called Collaborative Design, which was borne out of a need to educate designers who could think more globally and synthetically about the work of design. Students in this major are encouraged to "think outside of a narrow design box" to come up with creative solutions; they're helped to do this by getting broader training in a variety of design fields, such as interior, industrial, graphic, and so on.

To this, I would add the need for students in design to be educated in the field of rhetoric so that they also have the ability to think creatively outside the discipline of design and make strong connections with the variety of people—in and out of design—with whom they will come into contact throughout their professional and personal lives.

Historically, the "sister arts" of rhetoric were grammar (loosely understood as the study of language or semantics) and dialectic (the study of informal logic). Together, these formed the foundation of European education in the Classical and Medieval periods. The arts were so-called sisters because of their fundamental interdependence in students' education. As the title of my paper indicates, I believe that rhetoric and design may be understood and embraced enthusiastically as the new, "rebranded" sister arts. As a consequence, then, I would urge more programs in design to require coursework in rhetoric, particularly visual rhetoric, of their students. To my knowledge, my college of art and design is unusual in this regard, at least in the United States; I hope that our model might inspire other colleges to see the potential

[17] *Urbanized, DVD,* directed by Gary, Hustwit (Swiss Dots, 2011).

opportunities that may be afforded by exploring further the relationship between these sister arts.

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Making scholarship: Describing the field of inquiry and the research approach

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Abstract: *The project described in this paper is an upcoming postdoctoral project with the aim to explore the concepts of 'making scholarship' and 'doctorateness' in the practice-based field of Art and design education. This paper will describe the field of inquiry and elaborate on self-ethnography as a research approach. Self-ethnography can be an alternative when a researcher aims to study a professional community to which he or she is already a member. 'Doctorateness' is a central concept in organised research education, and even though the term has its origins in the discipline-based fields of research, the concept is of great importance to practice-related disciplines as well, such as the making disciplines. In 1976, the master program in Art and design education was established at two pedagogical institutions in Norway. The development of the master program shows how a practice-based field has acted with the intention to meet with the academic world, while at the same time, maintaining the field-specific character. Today we can see that there are some similarities between the situation in 1976 and the challenges addressed at the doctoral level. The project presented is part of an on-going Scandinavian research project.*

Keywords: making scholarship, doctorateness, self-ethnography, Art and design education

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Introduction

The concept, 'Making disciplines', has been developed by Halina Dunin-Woyseth, former leader of the doctoral program at the Oslo School of Architecture and Design in Norway. The concept covers professions concerned with artefacts and the manmade environment, such as architecture, urban design and object design (Dunin-Woyseth 1996; Dunin-Woyseth and Michl 2001; Dunin-Woyseth and Nielsen 2004).Relying on Gilbert Ryles'(1945-46) distinction between *knowing how* and *knowing that*, Dunin-Woyseth and Jan Michl define the knowledge base of the making professions as 'making knowledge'. To advance this knowledge base, Dunin-Woyseth and Michl stress that it is important to develop the making professions as independent disciplines – a 'Making discipline'. While the established academic disciplines maintain the field of *knowing that,* the making professions need to achieve disciplinary viability so that they can maintain the *knowing how*.

> It has to comply with the demands of two worlds: in addition to the world of its own professions, it has to abide by the rules of the academic world. While the main criterion of viability in the former world is its relevance to the practice of the professions, in the latter it is the ability to fulfil the criteria of science, the meeting of which constitutes disciplinary knowledge (Dunin-Woyseth and Michl 2001, p. 2).

The making professions also include the field of Art and design education. In 1976, a master program in Art and design education was established at two pedagogical institutions in Norway. From the start and up until today, the program was intended to combine creative practice and educational issues with regard to academic standards. The program was developed without any parallels in the university system, and as a consequence, without any established academic tradition to rely on (Norgesnettrådet 2001).

The project described in this paper is an upcoming postdoctoral project with the aim to grasp the concepts of 'making scholarship' and 'doctorateness' in the practice-based field of Art and design education. Through this project, the question will be asked whether the experiences from a more than 35-year-old master program can be transformed and adjusted fruitfully to the doctoral level. The project described is part of an on-going Scandinavian research project. The professors, Halina Dunin-Woyseth and Fredrik Nilsson, have for several years been occupied with the concept of 'doctorateness' with regard to architecture and design. Recently, they included a doctoral and a postdoctoral student in their research group (Dunin-Woyseth and Nilsson 2012c). As the postdoctoral project is in an early phase, the intention of this paper is to introduce the field of inquiry and self-ethnography as the research approach.

Field of inquiry

Scholarly craftsmanship

In recent years, the relationship between professional practice and research has been widely debated. An emerging interest for doctoral degrees within these fields has resulted in broad discussions, both on the potentiality and the problems of practice-based doctoral education (Durling, Friedman, and Gutherson 2002). In 1993, Christopher Frayling published a paper aiming to dispel some stereotypes concerning research in art and design (Frayling 1993). Relying on Herbert Read (1943), he

distinguishes between research *into* art and design, research *through* art and design and research *for* art and design. At the end of his paper, he discusses what he refers to as a fascinating dilemma concerning autobiography and personal development on one side and communicable knowledge on the other (Frayling 1993). However Durling, Friedman and Gutherson (2002) criticise Fraying, claiming that his definition of research, at that time, was ambiguous. In 1997, Frayling, together with a working group established by the UK Council for Graduate Education (UKCGE), published a report on the quality of doctoral work in the practice-based fields (Frayling et al. 1997). In the report, the term "doctorateness" appeared, and both 'analytical breadth' and 'mastery of depth' were key phrases used to describe this concept (Frayling et al. 1997; Dunin-Woyseth and Nilsson 2012c). Since then, several have debated the term. Denicolo and Park describe 'doctorateness' as "the quality that at least in principle all doctoral awards (of all types and in all disciplines) should have in common and all doctoral candidates should be able to demonstrate" (Denicolo and Park 2010, p. 1). The definition of the term has its origins in the traditional academic disciplines. However, as doctoral education is endorsed within the creative fields, there is a need to develop the term to be a fruitful one for these fields as well.

Dunin-Woyseth and Nilsson have investigated the concept through doctoral courses offered by them in Belgium, Norway and Sweden (Dunin-Woyseth and Nilsson 2012a). In 2011, they explored the concept, along with a group of international doctoral candidates, by studying recently published Scandinavian doctoral theses in architecture and design. Dunin-Woyseth and Nilsson hope to develop a more operative definition of the concept for the fields of architecture, design and the arts (Dunin-Woyseth and Nilsson 2012a, p. 48).

Art and design education in Norway

The master program in Art and design education is rooted in the Norwegian school subject, Art and crafts, and consists of a general part and a special part. In the general part, the students are introduced to three main areas: the pedagogical and educational area, the scientific and methodological area and the creative and aesthetic area. The general part introduces theories and practical exercises that are designed to prepare the students for the special part of the program, which is their own master thesis. In the thesis, the students explore their own creative practice and educational issues with regard to academic standards. According to Ella Melbye (1988), the intention has been to develop a research area of 'making' where the focus is on developing knowledge '*through making',* and not theoretical knowledge *'about making'*.

The process of establishing the master program started early in the 1960s. At that time, there was a debate on-going in Norway concerning teacher training education. A central issue was in regard to traditional academic thinking offered at the universities and the teacher training programs at the pedagogical institutions where the focus was on professional understanding (Halvorsen 2002, p. 7). Today we can see a parallel to the present debate concerning research *into, through* and *for* art and design. One question being raised is whether or not the institutions offering teacher training programs should be allowed to offer master programs, and in this case, a master-program in 'forming', or Art and design education. In 1973, a new law concerning teacher training was passed making it possible for students to study for six years at pedagogical institutions, thus including a master degree (Halvorsen 2002; Melbye 1988). Today, the need to develop knowledge *'through making'* is just as important as

it was in the 1960s and 1970s, but now also at the doctoral level. This type of inside perspective cannot be maintained solely by the art academies or universities of certain fields, such as art history, pedagogy or psychology (Nielsen 2004; Fauske 2010).

STUDYING THE FIELD FROM AN INSIDE PERSPECTIVE

This researcher is a member of the Art and design education community. This position makes it possible to study the concepts of 'doctorateness' and 'making scholarship' from the inside, using this perspective as a catalyst for a deeper understanding of the field of inquiry. Alvesson (2003) discusses self-ethnography as an alternative approach when studying an organisation or community where the researcher is already a member. According to Alvesson, it is not often that academics study their own organisations, and to do so can be problematic. The researcher can be too close to the situation being studied, and this can make it difficult to see the whole picture. However, Alvesson stresses that personal involvement can be a resource as well as a liability. In this project, self-ethnography has been chosen as a research approach, because it seems to grasp some of the methodological issues in regard to the project, such as closeness and closure.

Research approach

Self-ethnography

Ethnography is concerned with culture and the relationship between human behaviour and culture. This includes the study of cultural patterns, how humans define their reality and how they experience events. The natural setting for a culture is also a characteristic area (Gall, Gall, and Borg 2003). According to Hammersley and Atkinson(2007), what can be labelled as ethnography can vary. They identify the origin of the term from 19th century western anthropology. At that time, a descriptive account of a community or a culture was recognised as ethnography, and the culture was usually located outside of the West (Hammersley and Atkinson 2007, p. 1). Today, ethnographic research has evolved and can take place in more local environments, such as a town, a school or a business office. Both Hammersley and Atkinson (2007) and Alvesson (2003) stress that the opinion about what ethnography really is varies. Alvesson defines ethnography as:

> … studies involving a longer period of fieldwork in which the researcher tries to get close to the community (organization, group) being studied, relies on their accounts as well as on observations of a rich variety of naturally occurring events (as well as on other material, e.g. documents or material artefacts) and has an interest in cultural issues (meanings, symbols, ideas, assumptions) (Alvesson 2003, p. 171).

Alvesson also stresses that an interest in cultural analysis and thick descriptions, specifically careful accounts of social phenomena where meaning is expressed through different layers, can in some cases be seen as important criteria in ethnography. When describing thick descriptions, Alvesson refers to Geertz (1973). Very often ethnographers use different types or sources of data. Hammersley and Atkinson identify the following features when it comes to ethnographic work: research done in the field, studying peoples' actions and everyday life, participant observation and informal conversations, and unstructured data collection that neither includes a fixed and detailed research design at the onset nor uses observation schedules or

questionnaires. Typical is the in-depth study, focusing on a few cases. By analysing the data material, the interpretations concern meanings and functions in regard to human actions and institutional practices (Hammersley and Atkinson 2007, p. 3).

When discussing ethnography, Alvesson draws attention to some difficulties with this type of research and also with interview-based qualitative research. He claims that, most of the time, these types of approaches tell us about what goes on 'out there'. As an alternative, Alvesson introduces self-ethnography. This type of work is both "a study and a text in which the researcher-author describes a cultural setting to which s/he has a 'natural access' as an active participant, more or less on equal terms with other participants" (Alvesson 2003, p. 174). With an already established role in the community, the researcher is not a professional stranger with a specific interest in observing a specific setting.

FAMILIARITY AS THE EMPIRICAL STARTING POINT

Alvesson describes the researcher's role when doing self-ethnography as an observing participant, which is quite different from the traditional participant observation. Alvesson also stresses that self-ethnography is not the same as auto-ethnography. While auto-ethnography is personalized, meaning that the researcher tells the story concerning his or her own lived experiences, self-ethnography is concerned with the researcher's cultural context, but not the researcher's personal experiences. It is the work situation that provides the viewpoint, with the intention to do a cultural analysis and not introspection. For some self-ethnographers, writing in a confessional style can be an option, but for others the intention can be to observe and document events that the researcher is not directly engaged in.

> While conventional ethnography is basically a matter of the stranger entering a setting and "breaking in", trying to create knowledge through understanding the natives from their point of view or their reading acts, words and material used, self-ethnography is more of a struggle of "breaking out" from the taken for grantedness of a particular framework and of creating knowledge through trying to interpret the acts, words and material used by oneself and one's fellow organizational members from a certain distance. In the first case, we have the researcher as a burglar, in the second as a run-away (Alvesson 2003, p. 176).

An important aspect when looking at one's own workplace or professional community as a research field is to consider what one already knows or knows a good deal about, but perhaps is not conscious enough about. This can concern issues often discussed at the workplace, but at the same time, issues not yet looked into from a research point of view. As Alvesson suggests, when doing self-ethnography, familiarity will be the empirical starting point. In the project described in this paper, the researcher has used her own experiences and reflections when designing it. By being an active participant in the Art and design education community for several years, the researcher has experienced different settings and situations. These experiences and the reflections resulting from these have been the starting point when trying to design a strategy for a project concerning 'making scholarship' and 'doctorateness' in Art and design education. Turning the professional community into a research field requires a new pair of glasses, and the researcher must 'breakout' with the aim of creating some distance from the 'taken for granted' attitudes and thoughts.

A self-ethnographic study can emerge from both a well-planned systematic data collection or an emergent-spontaneous approach (Alvesson 2003, p. 181). The former

most accurately describes this project. There is a plan for what to look for and the situations to observe are chosen in advance. This is somewhat different from the latter in which the researcher is waiting for something of interest to occur. Alvesson describes the latter as a situation where the empirical material finds the researcher and not the opposite (Alvesson 2003).

Research design

The project is divided into three steps, and each is intended to illuminate the concepts of 'making scholarship' and 'doctorateness' within Art and design education. The first step comprises both a historical and a contemporary part, and relies on a literature review and the investigation of archived material. The intention is to shed light on the process behind establishing the master program in Art and design education in 1976, and to examine how the program has developed up to the present day. The main aim is to study how the creative practice has been maintained as a part of the program. Further, the process from 1976 to the present will be explored through interviews. The informants will be chosen because of their position within the Art and design education community, and their contribution to the development of the program over an extended period of time.

The second step focuses on the evaluation concept of the master program in Art and design education. The student's final work is evaluated in regard to the creative practice, the written thesis and an oral exam. At the exam, a central element of concern is the student's scholarly reasoning. The evaluation committee consists of an external profession-based expert, an external scholar with a field-specific competency and the student's tutors. As part of this research project, the researcher will observe a few exams as a starting point for unstructured interviews with some of the experienced examiners. In the interviews, the focus will not be on the student's specific work, but on the examiners' broader reflections addressing the concept of 'making scholarship'. The experts' opinions and reflections will be supplemented by the results of an assignment given to those master students attending their second year of study. Through this assignment, the students will evaluate an existing master thesis and discuss it in regard to scholarly craftsmanship. The researcher will act as an observing participant when the students present their results of the evaluation.

The third step includes observation of doctoral students evaluating existing doctoral theses from the area of architecture and design. Their written assignments will be analysed and incorporated in the study. This approach is influenced by the work of Dunin-Woyseth and Nilsson (2012a, 2012b, 2012c). The three steps form the foundation for discussions on the topic studied.

The different situations being studied throughout this project have been carefully chosen on the basis of the researcher's knowledge of the field. As this researcher acts within the Art and design education community on a daily basis, it has been possible, over time, to see how these types of situations call on reflection among the participants. By engaging in the chosen settings and by following up with interviews, the researcher hopes to grasp some of what maybe taken for granted within the community. Although the situations have been chosen in advance, this does not mean that they are fixed and cannot be changed. It also does not imply that what to look for has already been decided in advance. As part of this approach, the researcher will make every effort to be open in regard to the different situations being observed and the interviews.

When designing the project, it has been important to look for those situations that can contribute to the exploration of the field of inquiry. In this context, the researcher chose to focus on a few specific areas, making it possible to study them in-depth. Alvesson emphasises that it is important to "micro-anchor" the account. "This means that specific acts, events, situations are in focus. A good account then involves actors, acts (processes) and an institutional context" (Alvesson 2003, p. 182). He maintains that it is preferable to explore the richness of a few or maybe just one situation, instead of finding an average or to look for comparisons. By relying on self-ethnography, the researcher endeavours to produce material that can inspire others and lead to more theoretical interpretations.

Challenges when working with self-ethnography

There are several disadvantages when conducting this type of research project. Alvesson even calls it "risky business", and he lists several, such as taken for granted assumptions, taboos, blind spots and the will to not upset colleagues (Alvesson 2003, p. 183). Alvesson describe self-ethnography as an approach where the researcher has to address subjectivity and pre-understanding into a complex mix of both recourse and blinder. "The trick is to get away from frozen positions, irrespective if they are grounded in personal experiences or shared frameworks" (Alvesson 2003, p. 184).

Within conventional ethnography, the researcher will experience situations and settings that call for 'breakdowns'; that is the meeting point between what is actually going on and the researcher's expectations. These 'breakdowns' help the researcher to view the material in a new way, searching for an understanding. "Breakdowns continue to appear until the researcher 'fully'– given what is to be investigated – understands the culture under study"(Alvesson 2003, p. 185-186). In the study of a familiar setting, there will not be that many 'breakdowns', but they are still necessary in order to find the answers to the questions raised in the project. The researcher has to turn the familiar into something unfamiliar. This process implies the use of creativity and the will to illuminate the setting studied from different angles. To be concerned with the risk of closeness and closure is crucial. Alvesson encourages concentrating on micro-anchoring and rich descriptions, and not aim to cover broader areas in a thin way. Alvesson also encourages working systematically with reflexivity, trying to change levels of interpretation and looking into one's own first interpretations in a metatheoretical way (Alvesson 2003; Alvesson and Sköldberg 2000). Reflexivity implies working with empirical material in a dynamic and flexible way, trying to question and reconsider assumptions about what is studied, and attempting to avoid a simple theory/method divide (Alvesson 2011).

Educational connoisseurship and educational criticism

In his early work, Elliot W. Eisner introduced 'educational connoisseurship and educational criticism' as a productive method for evaluation in educational settings (Eisner 1975, 1976). This approach is characterised by Gall, Gall and Borg as an expertise-based approach (Gall, Gall, and Borg 2003, p. 568). Educational connoisseurship and educational criticism combines the processes of the appreciation of the qualities and the meaning of an educational program with criticism, which is describing and evaluating what has been appreciated (Gall, Gall, and Borg 2003). According to Eisner, educational research has been significantly influenced by the natural sciences. As educational research has evolved, the aim has been to develop theories and methods that would make educational practice scientific (Eisner 1975, p.

1). In 1975, Eisner suggested a supplement to this approach and introduced educational connoisseurship and educational criticism as a " non-scientific approach to educational evaluation" (Eisner 1975, p. 1).

Instead of a scientific paradigm as an entrance to educational evaluation, Eisner wanted to start from an artistic point of view. The educational practice is complex and unpredictable and it is difficult to control. By entering the educational setting as a connoisseur, appreciation becomes the essential starting point. "Appreciation in this context means not necessarily a liking or preference for what one has encountered, but rather an awareness of its characteristics and qualities" (Eisner 1975, p. 6). Eisner illustrates the connoisseur, using the cabinet-maker as an example. A central point is that the present evaluation is formed by experiences from the past. When looking at a cabinet, the cabinet-maker uses his craft expertise. "Knowing what to look for, being able to recognize skill, form and imagination are some of the distinguishing traits of connoisseurship" (Eisner 1975, p. 7). When it comes to criticism, Eisner describes this as the art of disclosure. "It aims to lift the veils that keep the eyes from seeing by providing the bridge needed by others to experience the qualities and relationships within some arena of activity. In this sense criticism requires connoisseurship but connoisseurship does not require the skills of criticism" (Eisner 1975, p. 4-5). Dunin-Woyseth and Nilsson (2012c) consider Eisner's concept of educational connoisseurship and educational criticism fruitful when studying 'doctorateness' in regard to architecture and design practice.

Even though educational connoisseurship and educational criticism are rooted in a research tradition other than ethnography, this approach may offer the self-ethnographer some tools when trying to avoid the traps concerning closeness and closure. The possibility to supplement self-ethnography with some of Eisner's ideas in regard to educational connoisseurship and educational criticism will be explored further throughout the research project described in this paper.

Closing comments

'Doctorateness', concerned with analytical breadth and mastery of depth, is a central concept in organised research education. With its origins in the traditional academic disciplines, the concept challenges the practice-based fields. Creative work and the making of artefacts rely on different approaches than conventional research, and combining professional practice with academic standards can be daunting. According to Dunin-Woyseth and Michl, it is important that the making professions develop so that they can become independent disciplines– a 'Making discipline'. It implies that it is important to develop the professions both with regard to the relevance of the profession, and at the same time, fulfil the criteria of science (Dunin-Woyseth and Michl 2001, p. 2).

The master program in Art and design education has for more than 35 years been aiming to meet the academic standards at this level. As there were no parallels in the university system, the program was developed without any established academic tradition to rely. In this project, the master program will be the starting point for an investigation of the concepts of 'making scholarship' and 'doctorateness'. As the project is in an early phase, the intention of this paper has been to introduce the field of inquiry and self-ethnography as the research approach. Self-ethnography can be an alternative when a researcher aims to study an organisation or a professional community to which he or she is already a member. Even though there are some

obvious challenges to consider when studying a cultural setting to which one belongs, this position, giving 'natural access' to the object of study, can also be a valuable resource.

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Development and pathology of Graphic Design in Iran

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Abstract: *Graphic Design is an aggregative art and has a huge function in its international field. But, in Iran there isn't any correct understanding of that because the different branches of this amazing art has not separately been defined and utilized to make the people see and receive its effect in their life environments. The graphic designer has to be like a working machine and does work in all of the branches alone to propound the functions in society. Although the designer knows all of these branches, such as designing a logo, they are not supposed to be included in her work experience, because each of those requires academic professional experience. On the other hand, the communications has taken a special new form these days and although the Iranian designers haven't still reached such technical development in the framework of graphic design profession, they have to follow the global direction and use digital technology but, the presence of digital technology has forced them to almost quit working with the previous tools and equip themselves to this new one, because the mentioned presence has been put into work before creating a suitable ground of acceptance for it. This occurrence has made the situation worse. Old hand designers have lost their jobs and even though just a few of them could have learnt skills in this regard, the power of computer is completely at the hands of young generation. According to my research, some solutions can be offered for this problem.*

Keywords: Communication, Environment, Graphic Design, Iran.

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Introduction

The word 'Graphic' is derived from a Greek word 'Graph' which means to write or to paint and because that writing or painting had an effect of the color of brush on the paper or on the white surface and created a contrast, it was known to be capable of a design activity. Later, the meaning of that Greek word changed to some other subjects like display and showing the opposed quality of ground, a ground or a thing on which the title was brought up (text), either in the form of a picture or a written text. For this reason, we may be able to say that the Calligraphy or in some cases, the writing has totally the quality of being understood as part of the Graphic design. Although they are different branches, they have the same design manner or influence for exhibiting their icon. It is generally believed that all of these should be in the Graphic design family because they have a function similar to the design works. However, other people emphasize that the discussions about every subject must be set separated from together which in fact is the action of Historiography or the theoretical aspect of story. There was no example of the icon like European countries in Iran. Instead, they knew the technique of decorating the books which was indirectly divided into three parts. One was the inscription which was done by a Calligrapher. The second part which was named as 'Miniature' included two sections: Illumination and Hair-pin Ornamentation that together created the art of Border-decorating. Finally, the last part was Illustration which always got done by painters. The important subject here is about the technical aspects of the work for demarcating which in fact, was Tabulation and that specifically was in the profession of special people. In this process, no one corporated to do the job with the title of 'Graphic designer' regarding today's understanding ,but all the professionals of art did these jobs as minor works besides the other important ones. Of course, we, in the 21th century, do not still have the individuals with that high technical accuracy in our land.

Literature Review

In a study done by Morteza Momayez who was known as the Father of Iranian Graphic design, it was discussed how Graphic design emerged in Iran and in the peoples' life.1 He has mentioned that the wall writings were the first forms of design works which were done by the usual people. After these, the works created by a painter or a designer and hung on the walls, were the pictures whose contexts consisted of the prisoners' faces that were killed by the last regime in Iran, the leader of the groups and parties, national champions and the portrait of Emam Khomeini. These were the first art works which the Graphic designers generated based on the design elements and had somehow the quality of a real design piece. In addition, he added that with his attempts, he could establish the Graphic design field in the Faculty of Fine arts in Tehran University to teach the students and to hold exhibitions and biennials in the country and more importantly, to propound this art and it's functions in society. But, with the presence of computer everything became almost out of control and never let the real Graphic works be produced in Iran and the talents came into view. Old skillful designers lost their jobs because they did not have any familiarity with this new strange equipment and the modern Graphic design were and still are in the control of some young and completely amateur people who create very bad and awful art pieces based on no elements.2

Nowadays, the communications has taken a special new form and in the countries where people work with the computer and digital world, the connection will be

disabled and the dialogue between you and the other person cannot be established if you do not use computer. You have to get in the line. Although the Iranian designers have not still reached such technical development in the framework of Graphic design profession, they have to follow the global direction and use digital technology but, the presence of digital technology has forced them to almost quit working with the previous tools and equip themselves to this new one, because the mentioned presence has been put into work before creating a suitable ground of acceptance for it. This issue is not merely limited to Iran. For example, in America, when working with computer was provoked, after a short period of time, many of the American Graphic designers lost their jobs. They had to follow the new technology, i.e. the computer or they had to give up the design work totally. Already, this problem in Iran has been so hard and pitiful that it is out of imagination. This occurrence has made the situation really intolerable. Old hand designers have lost their jobs and even though just a few of them could have learnt skills in this regard and become unique in the design field, the power of computer is completely at the hands of young generation. Unfortunately, my country has not still reached such academic, technical and professional development and most of the works are done just by one person. To do the jobs, the correct way is what we see today in modern societies as every body works best in a defined framework. When you do your job correctly and perfectly, you will get a good and enough experience but swimming upstream is likely to cause bad results. It is the same as you go to visit a general practitioner and ask her to prescribe medicine for your eyes, ears, nose, nerves or your bones and brain. Naturally, this practitioner will not be a skillful one and in this harmful situation there would be no proficient in our society.

In fact, there is no specific history of Graphic design in its exact meaning in Iran and by following the documents and symbols; we are able to set the past drawings in a selection called 'Graphic design' because they merely had a pictorial function. As this subject was not propounded in other countries like the present time, no one actually knew anything about the art or Graphic design in this country. Overseas, a black and white drawing was considered a design work even though it was just a drawing. Already, there has been made no special attempt to define, analyze and regularize a history for the Iranian Graphic design. However, there are documents by which an atmosphere or a ground can be generated for paving the way to accept today's world Graphic design inside the country and with the presence of our own mental scheme. On the other hand, in the prehistory period (before Medes), we had pictorial signs and symbols which have a modern implication even though they come from the past.3 During that time, the reason the painters did Illustration for the books was that they were following the primary basis of the painting and this was done in the field of Illustration ,too. Therefore, such art pieces are the illustrative and pictorial reflections of our literature. This is what can be called 'The Old Graphic Design'. But, the contemporary Graphic design is completely involved with the printing industry and this industry is a technological method which turns all the original symbols and hand-made patterns into a technical quality for the purpose of printing. Graphic means the art which actually is reproduced in different forms and ways and this definition can not include all the concepts of Graphic design because the meanings of this amazingly huge art are changing permanently. New frameworks such as Visual design and Visual art have come into existence of which Graphic design has been as part of them and these frameworks have become so widespread that many of their old meanings are still changing especially after the development of digital technology. These days, Graphic design does not have a particular meaning anymore. There is a Graphic designer who is

one of the members of a group that are involved with the visual productions. Perhaps there is no single and self-limited art even in poetry or in writing or they are going to be disappeared. Finally, it is not appropriate to recount everything limitedly and put it aside because, by doing so, that would be restricted in an old fabric. If we make a marking-out for something while all the things are moving forward and reaching new borders, we have stood on the way backwards because we know that this issue will change to something else one day. Actually, the mentioned speech is an introduction which can be used to find a hypothetical genealogy of Graphic design in the art of Iran. Today, different methods of printing like the old printing, digital and audio-visual printing are being used by which the text come into better effect and becomes more alternative. This is the general working style of Iranian Graphic design which comes from many decades ago. The history of Iranian Graphic design reveals a secret that they could successfully connect themselves to the global network but, they still lack in some skills. Various specialties have not still made in society and there is no management in the field of Graphic design. Some people are trying to call themselves as 'Art Directors'. Art director is a person who directs and guides the design for a specific purpose and she may not take any practical action. There are new occupations and expertise which are unknown to the community and the most general and unknown one is 'Art Director'. People do not have a clear understanding and the degree of jurisdiction and decision-making for an Art director is vague. Unfortunately, the reason concerns with a set of economic factors.

As a Graphic designer, you have to both work in an office and propound many of the design functions in society, meaning that you have to do Illustration which is a distinct specialty, do Lay-out that is a completely different issue and also design Book cover, Typography and the Fonts. These days, with the help of digital technology all of the mentioned expertise is not in the skill of one Graphic designer. Of course, the design individual is familiar with all of them but because of technical expanding and development like many other careers, each of those requires academic knowledge. For example, in Justice Administration, the job is usually divided between a lawyer, a judge and a justice and these three branches have also different categories. For example, the lawyer branch consists of criminal issues lawyer, legal issues lawyer, court-appointed lawyer and many dissimilar titles. This can be found in any other occupation in community. For instance, in the profession of perfumery first stands someone with the specialty of perfumes, then someone expert in spices and maybe a person who is professional in groceries. The basic problem in the area of Graphic design is that the issue 'Design' is not correctly understood for us. This is perfectly done in western countries and they have such a great domination on the design especially on Typography and Letter design. The design matter, as it should, does not have a meaning in the community and we do design works mostly in the field of Illustration. One of the reasons is from the past times, painters who were the forerunners in the field of art, started the work via Illustrating and after that, they were used as a help for Lithography or Linear printing. Nowadays, the very Illustration has unluckily more importance than design.

In the country's contemporary Graphic design, the function of design is very weak because the dimensions of this prominent subject are unknown in public and in the professional gatherings and for the lack of academic teacher, it is not completely set forth for discussion in colleges and universities. Also, if the design was propagated by the artworks, that could not have attracted the designers' opinions perfectly. When the word 'Design' is used, it does not mean the kind of work which is created for painting.

Design means an applied work, one that has technical and useful function by which the Graphic designers can get into action and put the functions forward in community. For this reason, we, in the field of Typography for instance, act just like a follower, meaning that the works which are designed in the world, provide an idea or an inspiration for us which in fact, makes us take our designs into that universal frame and therefore, makes us heedless of what there is in our history of Calligraphy and the works done in that art. There are several types of scripts in Iran's Calligraphy which show the functional necessity for writing.4 For example, in Kufic script there are different parts such as Western Kufic and Angular Kufic and because they had particular usages and caused many occasions, they were produced for the general needs in writing and eventually, they were designed and recorded and came down to us by inheritance. Actually, the absence of having a thorough and clear knowledge of design never allowed us to be active in Typography and many similar fields, as we should.

COMPENSATING THE DEFICIENCY

First of all, the Design subject must become clearly and thoroughly understood for us until we could have such great domination on it. We must perceive the design, the commission, and the purpose of design and they are the important factors which require more specific and detailed attention. One fast and effective way of reaching the mentioned goal is to get use of TV and in charming way, start showing about Graphic design, where it has come from, why it is used and what's the function of this universal art so that the people in various levels of community can see and know about it and they will understand that what ever they are facing with in daily activities, is directly or indirectly connected to the Design issue. The reason is the media especially the TV play a crucial role in the Iran's society and more than 85 percent of people watch TV during 24 hours a day so that it can be used as the best way to propagate the arts, specifically the Graphic design. Also, to reflect the correct design and to call the attention and the eyes for conveying the message, Graphic designers are expected to follow the design principles, because by not following the basics, design would be meaningless and can not be included any messages to transfer to viewers. This profession is a very young career and the persons working in this field are very young too. Therefore, they are required to work experimentally and experientially as much as they can and have a good study to get the great results because without having such deep and intense studies in this field of art, success seems almost unreachable. Secondly, the grounds of acceptance for the design works must absolutely be generated in the public so that the Designers would be able to play their roles effectively and would have the chance of living, working and becoming unique persons in society because for working, they absolutely need to have ultimate source of energy and the most possible way to gurarantee that for the group of Designers is the time when they could see that their created pieces have been appreciated and praised by their communities. In addition, it is urgent to control the degree of using the computer in the process of design and utilize it in correct way and there must be established Institutes or companies to do supervising on the degree of this uasge professionally and effectivelly. Also, it is essential that the cultural trades become propagated like the economical exchanges and let the designers get in the process. Thirdly, the equipment and the tools must be provided from the viewpoints of individual, investing and applied to help designers express their ideas and the arts in the public and call the eyes for transmitting the message, for developing the Design without having the required tools available is completely impossible. Also, teaching design students requires a huge demand for

training along with the training atmosphere and therefore, we have to equip ourselves to academic and high level teachers and universities. Finally, people should regard the designers as the group of people who have artistic and creative characteristics and always let the design works originate by them.

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Notes

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2. Omid Ghanbari, *GRAPHIC instinct, the last dialogue with M.MOMAYEZ* (Tehran, Iran: Ana, 2006), 50.
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From Tutor-led to Student-led design education: the Global Studio

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Abstract: "Tutor-led" design education has been argued to be a system where lecturers are at the centre of teaching & learning activities and where educators' tastes strongly influence students' outcomes. Design education has also been argued not to prepare graduates for working in highly complex professional capacities synonymous with the contemporary era. We argue the role of tutors in tutor-led design education to be a factor in this.

The Global Studio runs Web 2.0 enabled industry sponsored international collaborations between students. One aim is to introduce learners to "complex project situations" and consequently to prepare them for contemporary working life. It is operationally different from "tutor-led" design education as lecturers are more "distant" in teaching &learning activities and students construct conversations and outcomes primarily via interaction with peers. Feedback from home-institution students suggests many individuals struggle with making decisions without "tutor-led design education" involvement from tutors.

Given the on-going change in funding provision and the continuing dissolution of "normal" structures, universities are predicted to continue to undergo extensive transformation in their remit and the way education is delivered. We ask whether tutor-led design education is maintainable and whether educators and students are prepared for the consequences of change.

Keywords: peer learning, learning to deal with complexity, tutor led learning

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Introduction

It is perhaps only natural for educators to take an interest in the direction universities are heading. Not all are content with the track higher education is pursuing. For example, John Danvers (2003, p.53), argues that education is becoming 'increasingly determinist' and is promoting 'linear systematic processes [which] lead to predictable [student] outcomes'. However, for Danvers (2003, p.54), practice-led training of artists and designers appears to differ in its approach to the other sections of the higher education fraternity. He claims a dialogical approach is the norm in art & design education as '...there is an expectation that received opinions, dogmas and assumptions will be challenged by students and staff...' (p.54). In art and design higher education Danvers (2003: 54) suggests that,

> ...students are encouraged to take as little as possible as 'given', and to develop a critical stance in relation to the orthodoxies of practice, matters of taste, style and aesthetic codification, and to recognise and question ideological positions wherever possible.

Danvers' experiences of design education appear different to those of some other academics. Alain Findeli (2001) argues that problem solving through linear, casual means remains the most widely utilised method of processing seen in design teaching. Rather than facilitating the continued development of "voice" in learners, researchers have argued design educators speak more than their students during studio teaching sessions and are at the centre of learning activities (see Davies and Reid 2000). Perhaps more ominously, Cameron Tonskinwise (2011: 452) argues 'design education is exemplarily Bourdieusian' in that tutors' values dictate outcomes delivered by students. Rather than being involved in a perspectivist dialogue with students, Jorge Frascara (2007: 64) states,

> I have seen [design] instructors judge the quality of their students' work by saying: "This one is too busy" or "This is better, it is simpler." They suggest that "busy" is bad and "simpler" is better in every situation.

The behaviourist system described above is surely of some concern as it does not provide optimal conditions for creating mature relationships between students and tutors in the classroom (Baxter Magolda 2009). For Jorge Frascara (2007) this approach leads to curtailing of students' development evidenced through their delivery of unimaginative forms. Controlling students' outputs can add little to preparing them for life as a professional which demands graduates to be flexible, adaptable and to rely on their own initiative (see Barnett 2000). Brigitte Borja de Mozota (2010, p.98) disputes whether design education enables designers to operate optimally in tough professional climates. For her the problem is that even though designers 'have this potential to work at higher strategic levels... they are not trained to do so'. This, she claims, 'is a challenge for design education.' (Borja de Mozota 2010, p.98)

The educational theorist Ronald Barnett (2000) proposes that graduates are entering 'a world that exhibits global features of challenge, uncertainty, turbulence, unquantifiable able risk, contestability and unpredictability' (p.262). For Barnett, contemporary existence seems to have become messy – for he argues we currently reside in,

> A *supercomplex* world […] in which the very frameworks by which we orient ourselves to the world are themselves contested. It is a world where nothing can

> be taken for granted, where no frame of understanding or of action can be entertained with any security. It is a world in which we are conceptually challenged, and continually so. (Barnett 2000, p.257)

Seemingly in agreement, the sociologist and cultural theorist Scott Lash (2003, p.53) argues that in late modernity 'totally normal chaos is regulated by non-linear systems'. Michael Beverland (2012) suggests that design graduates will need to have 'soft' skills in order to deal with high levels of uncertainty. We argue the constrictive influence of "tutor-led" design education upon students' processing of problems is not optimally suited to preparing them to negotiate "normal chaos" as graduates. For Derek Miller (2010), Senior Fellow at the United Nations Institute for Disarmament Research, professionals should be involved in a process of 'figur[ing] out what is wrong with their own ideas, and not what is right about them.' However, Miller (ibid, p.5) argues,

> Designers are worryingly not involved in that process. Design is trying to prove itself, rather than disprove itself. It is the latter, though, that will serve the social good.

Perhaps the lack of exposing design students to complex challenges contributes to the situation described by Miller (2010, p.5). We attempt to introduce students to demands of "normal chaos" that are a function of the contemporary era via running projects through 'The Global Studio'. The Global Studio primarily centres on students taking responsibility for their own decisions through peer engagement. We construct this approach to give learners the opportunity of "dealing with uncertainty". We term the approach used in the Global Studio "student-led" Design Education.

The Global Studio

In the contemporary world of professional industrial design practice, it is not unusual for teams located in different geographic locations and from different cultural backgrounds to collaborate in order to deliver interventions (Wang et al. 2002, Gupta et al. 2009). The list of professionals in such operations is formidable: – clients, designers, researchers, engineers, suppliers and manufacturers. It is important to remember that each team contains a workforce made up of *human beings*. Richard Thaler and Cass Sunstein (2009, p.7) argue individuals from this species are not as infallible as they are sometimes made out to be:

> If you look as economics textbooks, you will learn that homo economicus can think like Albert Einstein, store as much memory as IBM's Big Blue, and exercise the willpower of Mahatma Gandhi. Really. But the folks we know are not like that. Real people have trouble with long division if they don't have a calculator, sometimes forget their spouse's birthday, and have a hangover on New Year's Day…

Add to this other requirements (for example negotiating differences in time zones, issues with spoken or written language as well as differences in cultural norms and practices) and one can imagine the likelihood of "normal chaos" ensuing in professional design practice.

Through enabling cross-institutional collaboration conducted between a university based in England, industry partners and international universities, the Global Studio responds to shifting trends taking place in design practice with regards the emergence of globally networked organisations and the inherent shift in ways of working (e.g.

Hoppe 2005, Horváth, Duhovnik, and Xirouchakis 2003, Asokan and Payne 2008). Harrison and Peacock (2010, p.878) claim this presents 'home students with [an opportunity to develop] a portfolio of globally relevant skills and knowledge without them leaving their home country'. The organisation of the learning activities aims to equip students with an appreciation of cross-cultural and distance communication and consequently strives to allow them an opportunity to experience "normal chaos". Our approach thus mirrors Ben Johnson's (Johnson 2011, unpaged) claim that education should prepare learners 'for uncertainty by helping them feel comfortable in postulating, guessing, hypothesizing, conjecturing, and testing their theories.' Our approach in turn aims to address the already cited criticisms of design made by Miller (ibid).

The Global Studio follows in the tradition of the Design Studio, with its emphasis on project-based learning and learning in and through "doing" (Schön 1985).

Concentration on project-based learning in the Global Studio is claimed to help embed established design practices into the students' repertoires (Bohemia and Harman 2008). The Global Studio makes use of a blended learning approach – a combination of online learning and face-to-face teaching. In order to facilitate cross-cultural collaborative learning, Web 2.0 technologies are utilises to enable communication between distributed student design teams. According to Harrison and Peacock (2010, p. 878) these technologies help individuals 'transcend national boundaries and the constraints of distance educational opportunities'.

In the Global Studio all participating students are allocated an online project site which provides a common interface and "space" for staff, learners and industry partners to collaborate on a given assignment. The use of such technology has led to the production of learner-authored content and has facilitating the development of a student-centred learning & teaching approach (Bohemia, Harman, and McDowell 2009). The shared sites also provide students with an opportunity to learn from and with peers from their own and participating universities and manage their own time frames in order to simulate a "real world design studio" scenario. Falchikov & Goldfinch (2000 cited in Cassidy 2006) claim peer learning also enables students to take a leading role in learning and to develop autonomy and independence. A central premise of the Global Studio is that throughout the projects, collaborating students are co-dependent on one another's inputs. This introduces a sense of 'risk' to the Global Studio. Earwaker (1992) suggests that for growth to occur amongst students, risk should be inherent to the experience of higher education.

We claim the Global Studio is structured in such a way as to deliver students the opportunity to experience the educationally valid phenomenon of "normal chaos" through introducing uncertainty. As an example of "student-led" – as opposed to "tutor-led" – design education, the Global Studio also promotes "risk" which is argued to be necessary for growth to occur.

Two Projects: Gifts and Festivals

These two Global Studio projects involved more than one hundred students from universities around the world. At a micro level, the projects were run via teams of three to five students from one university (Team A) collaborating with an equivalent group from another participating institution (Team B). Although these collaborations are provided with their own WordPress project sites through which they communicate, students are also free to choose to communicate via other Web 2.0 technologies such

as Skype or Facebook. Staff, other participating learners and industrial collaborators also are encouraged to provide feedback to students via the project sites.

The Global Studio projects advance through pairs of teams adopting client–designer relationships. As in professional design practice, the client delivers a brief and set of parameters for the designer. Ultimately, the designer's task is to responds with a design intervention. In the Global Studio, client briefs and eventual design outcomes must exist within an overarching "project theme" provided by the project coordinators. This theme contains a set of deliverables as well as deadlines. It is important to note that when a team acts as "client", their brief contains instructions to design products or services that are to be relevant to an aspect of the culture in which they are "home students" – this will be expanded on below. Each team within the pairing performs both the client role and the designer role. Thus, Team A is the client for Team B. At the same time, Team B must write a brief and expects appropriate design interventions from Team A.

There are many reasons for our choice to enable each team to play a "dual role" in the collaboration. Firstly, we wanted to help develop the opportunity for an egalitarian relationship between partnerships to flourish. We also wished to enable each individual a varied learning experience and subsequently the opportunity to develop a diverse range of material for their portfolio. Finally, our aim was that each student was given the space to experience and negotiate the simulated "normal chaos" of contemporary working life as a design professional. Our belief is that through experiencing this "normal chaos" and negotiating uncertainties during the project, students can become more versed in negotiating complex problems in professional life.

The authors have worked together over two consecutive academic years to initiate and help deliver two projects through the Global Studio. The first project, in which nearly 250 students participated, was termed 'The Gift' and was inspired by the anthropologist Marcel Mauss' seminal book of the same name (Mauss 1950, 1990). The sociologist Pierre Bourdieu (1998, p.94) claims 'Mauss described the exchange of gifts as a discontinuous succession of generous acts'. Mauss claims that 'giving', 'receiving' and 'reciprocation' the central tenets of human interaction. For the cultural theorist Stuart Hall (1997, p.3), these interactions, which are part of cultural practices 'carry meaning[s] and value[s] for us, which need to be meaningfully interpreted by others, or which depend on meaning for their effective operation.'

The Gift project aimed to encourage students to explore various aspects of communication and design. Such issues included:

- How do relationships form between people?
- How do bonds form between people of different cultures?
- Should cultural differences be bridged or should they be celebrated?
- What strategies might be employed in order to encourage relationships?
- What are the material effects of Design?

Ghassan and Bohemia (2011, p.5)

Over 200 students participated in the second project entitled 'Festivals Fairytales and Myths', it reflected the notion that in currently in developed markets, where consumers can get hold of seemingly limitless quantities of fungible commodities, there is a yearning for "authenticity" (Arnould and Price 1993). This helps explain the expansion of the 'Slow Movement', resurgent culture and the growth in festivals and community events (Pietrykowski 2004). The project also attempted to underscore the

importance of "context" and "meaning" to design students. For example, Peter Lloyd and Dirk Snelders (2003, p.250) claim that beyond what may be termed its actual intended function, an object can be something that 'expresses or embodies ideas' in society. The notion that designers should be able to understand contemporary or historical movements is highlighted by Paul du Gay et al. (1997) who state that they 'play a pivotal role in articulating production with consumption by attempting to associate goods and services with particular cultural meanings' (p.5) and are pivotal in presenting 'these values to prospective buyers'. Consequently designers are termed 'cultural intermediaries' (du Gay et al. 1997, p.62).

As noted, in both projects, when assuming the role of client, students were asked to write a brief which was relevant to an aspect of the culture in which they were "home individuals". Via opening channels for Web 2.0 communication we hoped to provide a platform through which designers would have access to a level of cultural knowledge they may not otherwise have. We will term this "local knowledge". In our experience, "normal design education" often promotes the practice of asking students to design *for* abstracted individuals (requesting students to create imaginary "personas" for whom their design interventions are aimed at is a good example of this). Through utilising feedback from collaborators, we wanted to enact a shift away from these practices. The aim here was to provide teams a means of designing *with* partners with local knowledge.

To summarise, our aims were:

1) To address the criticism of tutor-centred learning in design education. Through creating an environment which centred on collaborative peer learning, we wished to decrease the overarching influence of tutors in the design teaching & learning environment.
2) Through limiting our "control" of the project, we aimed to introduce – and thus ultimately help prepare – future design professionals to the "normal chaos" that is a function of late modern practices. We believe through this that designers can become more versed in negotiating complex problems.

Students' Reflections and Discussion

Individual feedback from participating students was collected at the mid-point and the end of the two projects. This paper will focus on end-of-project qualitative feedback provided by home students at the UK institution. We have only included end-of-project feedback as this data is provided following reflection on the whole learning experience provided by the Global Studio. We have concentrated on data from the UK HE establishment as the authors have observed practices there which are concurrent with criticism of tutor-centred philosophies already cited.

Through undertaking these projects, many students appreciated that understanding cultures different from their own is important in contemporary design practice:

> This festival is closely linked to Valentines Day, so it was important not just to skim over it and assume it as a western celebration but look for the unique differences this day holds in China… To have a successful project I learned that it is highly important to spend time trying to empathize, understand and respect other people's cultures, and breaking through this barrier will ease communications and enhance productivity.
>
> …we had missed the point that in China cupcakes are not popular and don't hold the same meaning as in our Western culture.

> …doing this project it has made me learn about other countries festivals and how they celebrate it.
> It is important to understand cross culture differences. And the differences should not be underestimated either.

The majority of students reported that working with peers from cultures different to their own helped develop their understanding of other cultures:

> Learning to work with a design team from a different cultural background was challenging and interesting; it was all about learning about a new culture, having to both understand and respond to new, and different cultural cues.

Importantly, the exercise of evaluating conversations with (as well as design proposals presented by) their collaborators located in other countries enabled students to critically evaluate cultural stereotypes:

> Seeing/observing what the overseas team had found on our own culture (or my own) demonstrating what the cultural stereotypes were. What the overseas team found was not necessarily appropriate to our culture or reflected our culture, but based on these cultural stereotypes and clichés.
> [I gained an appreciation of] the opinion of people so far away from the U.K. and Europe considering those places and how wrong are some stereotypes from both parties.

Through the Global Studio projects, students – for the first time in their experience in HE – were asked to tackle a range of complex issues highly relevant to contemporary design practice. These issues include, problems intrinsic to the client designer-relationship:

> ...I was able to experience both sides and the difficulties in communications and getting the correct information to gets stuff done, also giving the correct information so that the designer can get everything you ask for in the designs.

Issues relevant to communicating from within different time zones were also highlighted:

> I have learnt the difficulties of different time zones, for example Japan is 9 hours ahead of here. This often made it difficult to get quick feedback on ideas or as we found to clear up confusion. This had big affects on the speed of work as designers

Learners also experienced problems communicating when “mother tongues” are different:

> Because the languages are different, the meaning’s translation is difficult and often make people hard to understand, can’t transmit clearly.

Students also realised that some nations’ political policies were very different to their own - and that this impacts on what information can be accessed by their collaborators:

> One of the first to be brought to my attention is the fact that Facebook is blocked in China, as are several other websites such as Youtube. I first noticed this when we posted several links with our brief to websites related to the Evolution festival.

The ability to negotiate complexity was an important part of the success or failure of this project. An important example is creating methods to bridge the language divide between home students and overseas collaborators:

> ...re-phras[ing] questions and [...]talk[ing] a little slower and a little louder using more simple English so that we were able to get our point across.
> [we] learnt to communicate using more pictures and less words.
> To try to help them in the understanding of the brief we put together a powerpoint of our local area, general instructions as to how the cakes are made: including a video, and an information sheet with images, at the same time trying not to be patronising if they already had knowledge of this.

Collaborators were generally unfamiliar with the "local context" relevant to students from the home institution. This caused frequent misunderstandings:

> Our collaborators didn't understand the meaning behind our festival and this caused them ask questions such as 'Is there any special aspects of your local area.

The difficulties experienced by students while working with their counterparts highlighted for them the importance the research stage has on the overall design project's direction and the impact of communication on the design process:

> This project has also highlighted how important the research stage is especially when designing for an area that you have no previous knowledge or experience of.
> ...a thoroughly enjoyable project that i believe has taught both collaborating groups a lot about the true value of communication, the ability to understand and respond to different cultures and produce more relevant products as a consequence of this.
> …by collaborating with students where the distance was to the extreme, I hope that in the future I will feel more prepared for design collaborations across distance, whether it be again somewhere as far as Japan or on the other hand a company (person) based in the UK but a few hours away from where I am based

Some of the students also recognised that in order to make a meaningful difference to other people's lives they need to take into consideration the others people's cultures:

> Within design I see society and culture as the main driver for products, the ability to fully encompass a knowledge for someone else's culture will make you a well rounded, better designer who creates more effective designs that have an impact on peoples lives.

Central to the philosophy of the Global Studio is the notion that collaborating students are co-dependent on one another's inputs. Thus, for a successful outcome, teams must rely on a teaching approach that is not tutor-centred. As such, students who felt they had benefitted from the experience noted they had learnt to rely on developing their own problem solving strategies. For example, going beyond normal confines, self-evaluating design work, and feeling a greater level of control about their work's direction is as suggested by students' quotes below:

> I had to go outside and experience [the] world. Get out of the shell that is the [class] room 103.

> We then had to go ahead and use our own judgment, as designers to decide as to what concept would work the best.
> [The project] created several challenges that needed to be addressed without input from lecturers. This definitely formed an environment that felt greatly independent of University even though the project was undergone there.

Reflecting back, the majority of students stated the Global Studio projects were a positive learning experience and that they could foresee this learning being relevant to their future professional design practice. For example, this student informed us how difficult designing for others can be:

> Another positive was designing an idea for a culture that is very different from our own. It can sometimes become very easy to start incorporating your own views and preferences on an idea when you are designing for someone else, however when a culture is so very different from your own it becomes almost impossible to do this while trying to keep an idea relevant and keep your clients happy.

However, paralleling this reflection upon the positive effect on learning, many students informed us that they struggled with making decisions without tutor-led involvement from design educators. For example, in their feedback learners suggested that 'tutors pushing students to work harder' or that lecturers should provide 'more strict deadlines […] to make sure everything is done on time':

> ...improvements could be made by having interim presentations with lecturers present. It would have been good had we had two or three presentations to the other university.
> It would have been beneficial to the process if we could have had some input from the lecturers with regards to the actual designs too, perhaps resulting in some less dubious outcomes or smoother transitions between iterations.
> We really were stuck, as we couldn't progress an inch without the feedback [from our counterparts] on our designs. By now we had to take it to the tutors to set things in motion, eventually things started moving again.
> Our partners didn't act upon the initial concept feedback we gave them and therefore didn't upload any developed concepts. This caused us to panic

The student quoted below articulated how projects that learners are normally asked to work on are governed by the tutors – and how this impacts on the course project takes.

> I have learnt an incredible amount from this project and they are things that I would never have experienced from the in-house projects at university, the projects we get from the university are regulated often by your tutors but it is so different when it is done by fellow students. Evidently our tutors are our clients and it's so easy to gain feedback and direction as they are there with you in your classroom however when working with international 'clients' it is clear to me how important communication is, how important leadership is and how communication your ideas in the right way can stop allot of confusion and misunderstanding.

Through enacting a behaviourist approach, we argue design education is working to diminish students' exposure to "normal chaos". An important aim of the Global Studio is to help introduce students to the "supercomplexity" that is a function of late

modernity. The authors have attempted to achieve this through reducing the reliance on a tutor-centric approach to design pedagogy..

A student who wrote his feedback whilst being on placement with an international manufacturer of high-end sports cars reflected the need for an approach to design education which is less "dictated" by tutors:

> 'I feel I can understand this [Global Studio project] more so, as I've just spent my first week at the [...] Design Studio, where its extremely fast paced and not everything goes to plan when there are many things going at once.'

A Sustainable Future for "Tutor-Led" Design Education?

In a recent report, the leading UK management think tank the PA Consulting Group (2011) highlighted the unprecedented challenges ahead for home-based universities. Issues listed include the 'next wave of globalisation' (2011, p.5) which will continue to increase access to learning through Web-enabled technologies for individuals wishing to study. Also mentioned is the 'blurring of public-private divisions' (2011, p.5) in terms of funding structures. According to the PA Consulting Group (2011, p.5), this momentum is,

> ...systematically sweeping away the organisational and regulatory walls that have delineated higher education and universities, opening up a dynamic and expanding economy of purposeful learning.

These issues translate into the possibility of offering greater distance learning opportunities for an increasingly diverse population of students and the possibility of universities working with a greater variety of agencies in order to supplement decreasing funding from the State. They are symptoms of Barnett's aforementioned "supercomplex" era in which structures are dismantled. As part of a wider field of higher education, it seems sensible to suggest that design education is not immune from such upheavals. If it is going to become increasingly normal for the day-to-day logistics of higher education to become more complex, then it is highly possible the experience of higher education will follow suit design students. It may mean greater complexity in terms of the increasing the amount of time spent collaborating with peers and tutors across distance as well as routinely being involved in more diverse, externally funded projects.

We argue augmented demands placed upon design students necessitate changes in teaching methods employed by design educators. For example, implementing distance learning within design curriculum might result in reducing students' face-to-face studio contact with tutors. One outcome from this process could be a reduction in tutors' "voice". An increased diversity in the nature of projects may necessitate branching into areas design educators may not deem themselves to be experts in as well as increased collaboration with colleagues whose specialism lies outside of design. Reduced "voice", increased collaboration and a diminished claim to expertise may combine to reduce the influence design educators have over the solutions created by their students. Consequently, tutor-led design education may become less of a logistically workable principle as de-structured higher education systems continue to emerge.

Conclusion

In this paper we have argued that "tutor-led design education" may not be ideally suited in helping to prepare students for complexity and the "normal chaos" which

helps to define contemporary times. The Global Studio attempts to enable design students to experience normal chaos. Our aim is to help prepare students for this "supercomplex" era. Our qualitative data provided by home-institution students suggests many have found it to be a valuable learning experience.

However, student feedback suggests that many students have struggled with making design decisions during both Global Studio projects. We suggest one factor for this may be the difference in pedagogical approach between Global Studio teaching &learning philosophy and that of tutor-led design education. The latter is the dominant approach in the curriculum. Given the contemporary cultural and professional climate, we suggest there is a need to "introduce a much-needed sense of chaos" at an early stage in design education and to scaffold its presence into the curriculum.

Finally, given the operational changes continuing to influence higher education, we hope that our discussion raises the issue of the on-going logistical feasibility of tutor-led design education. If it may not be feasible going forward, we must ask ourselves whether tutors and students are ready for a changing dynamic? We argue more research should take place into this subject.

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Design values, designing values and valuing designing: three scenarios for values in design education.

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Abstract: *This paper discusses the importance and role of values in design education. As design scenarios constantly change, so do values pertaining to design. Design education should be ahead of those changes, however the theoretical development of design has not given values the same importance as other issues. This paper presents a theoretical framework to help understand the role of values in current design learning. It provides a general comprehension of how values affect both designing and design outcomes, thus aiming to offer arguments that strengthen the awareness and importance of ethical and moral issues in design education.*

Keywords: Values, ethics, moral, learning.

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Introduction

This paper is divided into two sections: The first will outline four scenarios in which design and values are interrelated, distinguishing three of them as key to understanding values' role within design education.

The second section will examine the role that values have in design education, exploring the implications of three main perspectives: design praxiology, design axiology, and teaching and learning to design.

Finally, it will draw conclusions and outline future challenges.

1 Four scenarios for values and design

Values and design are reciprocally embedded in one another. Design discovers, proposes and questions, features products, projects or services, it encompasses attributes of inner worth. However, most literature is ambiguous, because it does not distinguish the frame of reference from which values are drawn. This creates confusion, since values can be many things (beliefs, aspirations, attributes, moral precepts, ethical rules, etc.), so when we refer to values in design, what values are we talking about? In addressing this question, this paper will begin by outlining four possible scenarios for values and design in order to characterize their particular perspectives, and then go on to discuss those that are related to design education.

In English, one of the common problems that design theory faces is that the term *design* is polysemous, being noun, verb and adjective. As a noun, design refers to either the profession or the discipline,[1] as well as its outcomes (products, services), whilst as a verb it refers to the design process (designing) (Lawson 2005). Besides the previous alternatives, design as an adjective is used to describe the attributes of something, e.g. "designer jeans" or "design hotels". In theoretical discussions – due to such particularity - the term *design* induces frequent errors, since it conveys different meanings with neither grammatical nor syntactical alterations to the word. Ludwig Wittgenstein believed that philosophical problems occur when *"the language goes on vacation"* (cited in Echeverría 2011), although it seems that in the case of the word *design*, it enjoys a permanent holiday.

A similar situation occurs with the word *values*, which conveys different significances depending on the context in which is being used, so that the combination of design and values becomes hazy and a difficult concept to grasp.

Aiming to facilitate understanding, a simple diagram encompasses an explanation (see Fig.1). Both design and values are each shown as verb and noun,[2] thus tracing out four scenarios.[3] Each scenario encompasses a particular understanding of the joining of design and values according to syntactical and grammatical combinations, they are:

- Design values (the values of design)
- Designing values
- Valuing design (the value of design outcomes)
- Valuing designing (the value of the design process)

[1] Some researchers will disagree with this consideration; however, aiming to simplify the discussion, the term "discipline" will be used to name the field in which design operates.

[2] Design as adjective has not been considered because it results in applied characteristics of the subject, which are exogenous to it, e.g. designerly values.

[3] A scenario can be understood as a particular situation in which design operates.

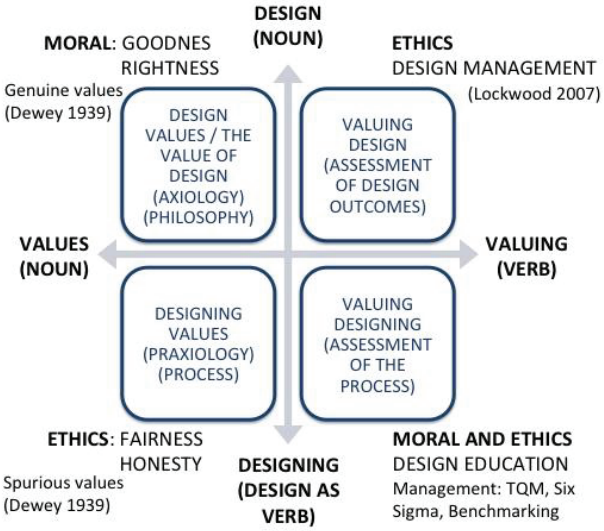

Figure 1. Four possible scenarios for the combination of design and values.

Design values, or the *values of design,* refers to principles embedding either the field of study or the design profession. In these domains, the term *design values* refers to the axiological study of design (Archer 1976), which is the philosophical study of the ethics and aesthetics of design. However, as we will see, based on the perspective presented by Dewey (1936), design values stand rather closer to the moral than to the ethical.

On the other hand, *designing values* alludes either to the constituent principles present in the design process and/or to the action of perceiving or developing attributes of worth in such a process. The study of these principles involves the application of scientific methods, mainly in the research domain, which would constitute design science, which is the study of design practice, or *"the scientific study of design"* (Cross 1999), implied by the design term praxiology. In this sense, *designing values* rests mainly on the ground of ethics, since it accounts for professional codes of fairness and justice.

Professional practice and design education are both topics within the study of design praxiology, which has been mainly related with decision-making in design; Trimingham (2008) proposes a taxonomy encompassing two kinds of values in decision-making: external and internal values. However – for the purposes of this paper – a clearer distinction – between subjective and objective values (Prall 1929) – is preferred based on the precision that the terms convey. Subjective and objective values belong to different epistemological domains. Subjective values rest on human interpretation, so they are relative and hence represent a constructivist stance (*designing values*), whilst objective values are independent of human interpretation, they are absolute and hence representative of a positivist approach (*design values*).

Subjective values are susceptible to evaluation; as Lawson asserts, "For such an item there is no right answer since different purchasers are likely to place different values on factors such as manoeuvrability or reliability" (Lawson 2005, 78). On the other hand, objective values are prescriptive, as Mayal notes: " …I decided to identify a

number of principles in design which are as appropriate to the design of an aeroplane as they are to that of an armchair" (Mayal 1979, 5), illustrating that positivist laws are not a matter of interpretation, they are simply obeyable.

Valuing design alludes to the process of measuring the assets present in products or services, which may or may not be tangible. In this sense this activity has its place in both the design engineering and design management domains. For management scholars, valuing design has been a main concern because of the difficulty of finding an adequate framework to evaluate design different aspects; as Lockwood rightfully claims, *"Design may enhance performance, but unless there are metrics to gauge that benefit, the difference it makes depends on conjecture and faith"* (Lockwood 2007, 90). Although some authors include "the worth" delivered by design within the term *design value,* what they are really addressing is a *valuing design* perspective. This is truly a confusing issue in design theory, since the same syntactical structures may signify two different things.

Finally, *valuing designing* applies to the task of assessing the processes of conceiving, developing and delivering new goods, projects or services (e.g. Total Quality Management (TQM), Total Quality Control (TQC), Benchmarking, Reverse Engineering). Even though some companies develop methods for evaluating those processes, with special attention to efficiency and quality, such as Motorola with Six Sigma in 1986 (Tennant 2001), it seems that there is a mismatch between evaluation and development. Lawson (2005) notes that there is not enough evidence for how the contribution of scientific tools to design assessment improves design standards.

Alternatively, the practice of *valuing designing* seems to be particularly relevant in design education, where students' judgement skills are being shaped and enhanced. In most cases, design education is performed based on a model of practice inherited from the *beaux arts,* based on masters and apprentices, which has spread worldwide as "studio" ("atelier" in French, "taller" in Spanish, "Werkstatt" in German). Lawson and Dorst note that when looking at the education of architects and industrial or urban designers, *"remarkably similar patterns"* can be seen (Lawson and Dorst 2009, 16). In fact, learning to design has been developed via what is actually known as "scaffolding", a process in which students are closely assessed with special regard to their judgemental skills.

Based on the previous classification, three main perspectives – *designing values*, *design values* and *valuing designing* – have to be considered in relation to design education. The first conveys the development of design praxiology, it deals with values that arise in design practice; the second, design axiology, is concerned with values attached to the disciplinary sphere, and the third relates to teaching and learning to design. Each perspective will be analyzed to show its main characteristics and implications for design education.

Three perspectives for understanding values in design education

1 Design praxiology: Designing values

During the 1960s, the Design Methods Movement[4] established the theoretical foundations that allowed the improvement of design praxis[5] understanding through rationales that could explain the design process. Some years after, Archer made claims for the development of Design Praxiology, that he defined as *"the study of design techniques, skills and judgement applied in a given area"* (Archer 1976). His definition points towards the development of this specific branch into the broader field of design studies initiated by John Chris Jones and Christopher Alexander.

In general, the Design Methods Movement's aim was to outline a universal design method, a kind of model that could fit every situation, or a general design procedure that might tackle any design problem. Their research explored the procedures that can be observed in the design process, aiming to find the answer in design practice. In this approach, values were ascribed to the method, in other words they were method-centred. However, the understanding of design methods has changed radically since that time, being now regarded no longer as an end but as a mean to an end. So, what is the role of values in current design practice and how do they influence design learning? To answer this question, two main roles are devised:

1. Ensuring answer uniqueness: Learning to design means exercising design practice (*designing values*), where decisions are led by judgements that create a distinction between one designer and other; as Lawson asserts:

> "This knowledge is predictive but uncertain and laden with values. It is clear that the application of such knowledge is a highly selective process and therefore inevitably results in designers making their own unique interpretation of design problems." (Lawson 2004, 14)

Lawson's assertion also explains why computers do not design (they just optimize). The same components, ideas, requirements and constraints programmed into different computers result in a common answer: the optimal, since computers' decisions are value-free. Apocalyptic films in which machines take control of the world base their arguments on this fact. In contrast, inherent to human decisions, values are a key issue in design answers. Design processes emerge from singular interpretations and decisions that each designer makes, either for framing the problem or for finding the answer, making different and unique proposals.

Furthermore, design theories have concentrated the explanation of such uniqueness in spheres like singular abilities: *"Great design does not come from great processes; it comes from great designers"* (Brooks 2010); personal expertise (Lawson and Dorst 2009; Cross 2011); background or context of practice (Scandinavian, Italian, British "heroic" designers). Alternatively, Trimingham sees design decision-making as related to values, observing that *"an initial literature review found that the role of values within decision-making had been largely unexplored"* (Trimingham 2008, 38), thus providing a useful framework to understand values in design.

Trimingham classifies values into two groups:

[4] 1962–1972 approx.
[5] Practice, as distinguished from theory (Oxford 2012).

1. External values:

- Societal values;
- Identified stakeholder values;
- Economic system values;
- Values embedded in design;

2. Internal values:

- Perceived societal values;
- Perceived identified stakeholder values;
- Perceived economic system values;
- Embedding values in design;
- Designer's personal values;
- Meta-values.

Moreover, this framework is also useful for explaining a second role of design values.

2. Fostering a design answers understanding: As noticed, Trimingham's classification can be better understood by replacing external and internal values by subjective and objective values, as previously noted by Prall (1929). Furthermore, both subjective and objective values each host sub-types of values: those embedded in "something" (design, stakeholders, technology), and those which are society-based. Accordingly, Lewis proposes a framework accounting for three kinds of values: intrinsic, extrinsic and inherent. He affirms that:

> "The intrinsically valuable is usually described as that which is good in itself or good for its own sake; the extrinsically valuable, as that which has value as instrumental to something else", and " …inherent mean to suggest that the value in question is one which is found or findable in the object itself to which the value is attributed." (Lewis 1950, 380, 391)

In this sense, Lewis's proposal may conform to an axis based on opposing intrinsic and extrinsic values, while inherent values can be place equidistant from the previous two concepts (see Fig.2). Adding Lewis's referential axis to Trimingham's categorization results in four areas, representing four different epistemological perspectives, and hence four different ways of perceiving knowledge. Identifying the values in each one may improve our understanding of their nature and, accordingly, our design decisions. For instance, distinguishing personal values from technical or cultural values may lead to selecting more suitable methods for either research or to evaluate ideas associated with them.

Accordingly, some researchers believe that personal values are the result of societal values, e.g. Norman (2008) who sees design knowledge as something that is inherited from society, whereby personal beliefs are influenced by external values. He supports his opinion with Cross's viewpoint: *"Designers have the ability to both 'read' and 'write' in this culture… "* (Cross 1982), conveying the idea that designers are sensitive to cultural influences, yet able to contribute to the creation of culture too. Both root their understanding of design value in social constructionism, in which design is the result and expression of culture.

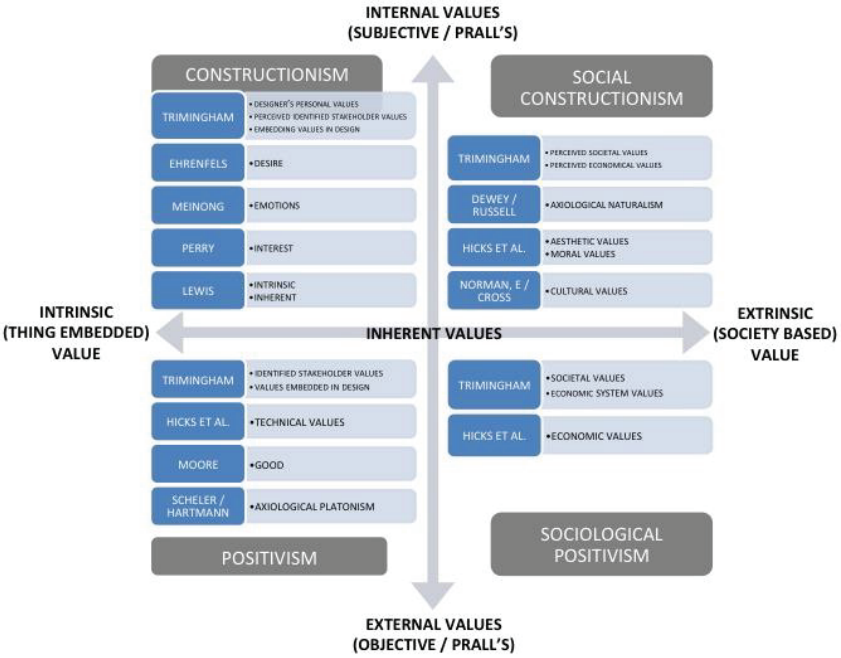

Figure 2. Epistemological domains of values based on Trimingham (2008) and Lewis (1950).

2 Design axiology: Design values

Before the 20th century, most philosophical theories comprising axiological issues were merged with metaphysical and epistemological topics (Hart 1971). By the beginning of the 20th century, Lapie coined the term *axiology* in his seminal work *Logique de la Volonté* (Lapie 1902), after which many other philosophers, such as Ehrenfels, Meinong, Prall, Scheler, Hartmann, Moore, Ross, Dewey and Lewis, developed different understandings of the term. Axiology deals with the philosophical study of values, and although values may be regarded as abstract entities lying far beyond our daily life, they coexist in most of our common actions, as Hart lucidly asserts:

> "The concept of value permeates our life in every step. We prefer one thing to another, we shift our attention from one event to another, we praise one behaviour and condemn another, we like and dislike, and whenever we do it we value." (Hart 1971, 29)

For Hart then, valuing is an everyday activity, yet his assertion implies an implicit fact: we evaluate with regard to something – i.e. to value. In this sense, judgements presuppose a frame of reference against which every thing, action or behaviour is assessed. Echeverría states that whenever we evaluate, we must confine our assessments to specific domains of action (Echeverría 2011), such that values reside in domains. In the case of design for instance, efficiency – as an outcome – is accounted for as a value in the domain of mechanical design, but it is not necessarily included in toy design or in the design of ceremonial places.

Hence, in which domains must design values be found? Addressing this question, Archer considers axiology to be "the study of goodness or value in design phenomena, with special regard to the relations between technical, economic, moral and aesthetic values" (Archer 1976, 14). However, in Archer's definition, design domains seem to be too broad; according to the previous diagram (Fig. 2), technical values are positivist and economic values reside in sociological positivism, whereas moral and aesthetic values are perceived from a social constructivist perspective.

Trimingham also considers values in the broad sense of the term, comprising either values that meet society's needs, wants, feelings, aspirations and demands, or desires which do not necessarily relate to the sense of goodness previously accounted for by Archer. Dewey was particularly interested in this particular dilemma, aiming to make a distinction between genuine and spurious values. On Dewey's thoughts, Hart asserts that" *"Statements of what we like, desire, are no proper value judgements. They merely record what we like or dislike"* (Hart 1971, 37). Hart explains that Dewey's search for genuine values is attached to the concept of morality, in which social well-being acts as the guiding norm. So, following Dewey's search for genuine values, do genuine values in design exist?

The key distinction provided by Dewey is to relate values to morality, instead of ethics or mere assessment frames. Moral deals with goodness and rightness, whereas ethics involve behaving in a fair and honest way according to a code of conduct, especially in relation to a profession. In this sense, if ethics relates to praxis, it relates to decision-making too, so design decisions have ethical implications; however, ethical decisions should not be confused with "like" judgements made at lower decision-making levels.

However, generalizations around the concept of value in design decision-making do not necessarily imply an absence of Dewey's genuine values in design. Alternatively, those values may have emerged via design-related fields, like sustainability and usability. In this sense, Dewey's ideas can be good criteria for discerning genuine design values.

Another characteristic of design values is their positivist character. Since design deals with the world to be created, good or bad design decisions affect people's lives, as well as their environments. Bad design decisions may result from bad design processes, but also from a lack of proper guiding principles or values. The famous designer Richard Dreyfuss referred to that as *"the five-point formula"* when he declared:

> "We have a yardstick in our office for good industrial design. It represents twenty-five years of experience, and we apply it to every design problem. It has five points: 1) Utility and safety, 2) Maintenance, 3) Cost, 4) Sales appeal, 5) Appearance." (Dreyfuss 2004, 178)

Dreyfuss' principles comprise a mix of moral values (utility and safety) and technical, economic and aesthetic values (the remainder), developed from experience, which supposes their refinement through failure and success. In this case, values act as precepts (existing before concepts), becoming positivist principles even before they were built in practice (rooted in constructivism). However, referring to principles might indicate the rightness of some ideas over others; as Lawson warns: *" …there are dangers there. The comfort of a set of principles may be one thing, but to become dominated by a doctrinaire approach is another"* (Lawson 2005, 162). In fact, the

problem with values and principles is that – as a matter of routine, time or power – they may blind our judgement, subjugate our design freedom.

Furthermore, encompassing the philosophical problem of defining values is the linguistic problem (again Wittgenstein) of releasing them from their pronouncement; for instance, the *Evolving manifesto for eco-pluralistic design* states: *"the thoughtful designer of the 21st century will design with integrity, sensitivity and compassion"*, then adding as its first point: *"Design to satisfy real needs rather than transient, fashionable or market-driven needs"* (Fuad-Luke 2009, 15). Indeed, the first sentence accounts for some values expressed as a law (mandatory), while the second phrase does not describe values, yet it conveys them tacitly in the form of guidelines. Furthermore, the book *Universal Principles of Design* presents one hundred concepts that their authors introduce, commenting: *"broadly referred [to] as "principles" consist[ing] of laws, guidelines, human biases, and general design considerations"* (Lidwell, Holden, and Butler 2010, 10), although many of the principles accounted for, such as accessibility, affordance or forgiveness, rest on values deeply rooted in Universal Design, where compassion and equality are leading moral ideas.

However, the linguistic problem of discerning values from grammatical structure can be solved by using a non-grammatical criterion, such as the one introduced by Dewey. In this sense, the confusion created by concepts such as axioms, principles, postulates, premises, surmises, rules, norms, maxims, protocols, canons, precepts, laws or guidelines can be overcome by assessing the worth they convey to social well-being.

3 Teaching and learning to design: Valuing designing

Actually, design training aimed at achieving professional degrees is taught in higher education institutions. In that context, values can be placed on two levels: at school in the form of institutional principles, policies and strategies, and at the individual level.

Values at the school level operate as macro orientations, providing a frame of reference based on principles that shape the ethos[6] or identity of the academic community, for instance: *"use design thinking, to inspire multidisciplinary teams"* (Stanford) or *"Compassion: we strive to alleviate others´ suffering by assisting them in realizing their values and visions"* (KAOSPilot). While the first example deals with teaching-learning strategies (community values) inclined towards the concept of competency, the second deals with moral values linked to responsibility.

Findeli – accounting for the outcomes of a research project about ethics at the School of Design of the University of Montreal – asserts: *"There can be no responsible design without a responsible designer, i.e. education should be directed to the development of an individualistic ethics"* (Findeli 2001). His concern deals with designer values at the project level. Projects, either group based or individual, convey discussions about personal preferences and convictions into design answers. Responsibility is then related to either the ethical or moral compromises that designing involves, or in other words the awareness that design process decisions affect the world, encompassing positive, neutral or negative consequences.

This issue was largely addressed by Papanek in his 1970s book Design for the Real World which, in a chapter entitled "Design Responsibility", states: "Today the myriad objects of daily use are mass-produced to a utilitarian and aesthetic standard often completely unrelated to the consumer's needs" (Papanek 1971, 220). Papanek critiques

[6] The characteristic spirit of a culture, era, or community, as manifested in its beliefs and aspirations (Oxford 2012).

the absurd disconnection between supply and demand that gives rise to overproduction, thus disregarding such consequences as waste, pollution, the overexploitation of natural resources and cheap labour issues, among many other problems. Today, forty years after Papanek's claim, in a world dominated by market forces, his claim seems to remain valid regarding the aggravation of those problems. In that sense, Findeli asserts: "design responsibility means that designers always should be conscious of the fact that, each time they engage themselves in a design project, they somehow recreate the world" (Findeli 2001). Assenting to Findeli's opinions, the author believes that responsible design is an urgent discussion to be developed in design education. However, both ethical and moral values are a thorny matter and the most obvious question arising is how we define what is valuable and what is not, or what the values are that design should embrace. This question is not new, as Coles and Norman quote: "Cross says of education, deciding what is worthwhile is "Obviously value-laden and problematic"" (Cross 1982, 222), raising the concern that teachers' questions about what values have to be taught are already affected by teachers' own values.

Furthermore, values at the school level are also conveyed by means of learning strategies. For instance, Buchanan describes the implementation of a new design course – at Carnegie Mellon University – via a metaphor that compares two distinct perspectives in literature: rhetoric and grammar. He states:

> "The relationship of these two approaches is perhaps evident if one observes that the last chapter of a school grammar book is usually a chapter devoted to "how to write an essay". In contrast, the last chapter of a school rhetoric book is a chapter on grammar style." (Buchanan 2001, 13)

Carnegie Mellon's new course is based on "the rhetoric of design", replacing a traditional one based on "the grammar of design". Buchanan argues that giving students reasons to design, instead of providing them with the tools for that, is what primarily triggers students' motivation. His assertion illustrates a change of focus from teaching "something" (instructive) to teaching to "someone" (formative). In fact, the *grammar* approach resides in the belief that particular issues should be taught before general ones, creating a sort of technical base (that can be ethical too) that will help students to take decisions when designing. Accordingly, schools based on that vision will privilege the delivery of content over individual motivation, and hence the body of content that every student must know to become a designer has to be defined a priori. That represents a kind of positivist education, in which practice has to be performed within the limits of a theoretical frame of reference – values included – as occurs in many engineering design schools. In this context, values might take the form of positivist axioms, such as "less is more", "truth to materials" or "form follows function", accounting for aesthetic values, or ethical values, such as those accounted for in the *Principles for Responsible Management Education:*

> "We will develop the capabilities of students to be future generators of sustainable value for business and society at large and to work for an inclusive and sustainable global economy." (United Nations 2007)

In contrast, the *rhetoric* model conveys a flux from general to particular knowledge, so that learning is grounded in understanding design problems instead of knowing predetermined bodies of content. The belief that design problems are so vast and diverse that no design course is able to teach the whole scope of matters to deal with

those problems supports this strategy. So what this stance comprises is a way of approaching problems, or what Cross calls *"designerly ways of knowing"* (Cross 2007). In this understanding, it is the general framing of a specific problem that demands particular knowledge according to the nature and scope of that problem. In addition, the *rhetoric* model builds on students' ability and values, encouraging them to act – framing problems and solutions – according to their own principles.

Alternatively, values placed at the individual level in design learning mainly correspond to personal decisions over design projects, which can be perceived as being reflected in learning outcomes. Traditionally, learning outcomes were related to the results of cognitive operations converging in the concept of respondency, the ability to be able to give an answer whereas, regarding values, learning outcomes relate to responsibility, defined as *"the state of having a duty to deal with something",* but also *"a moral obligation to behave correctly toward or in respect of"* (Oxford 2012). The first definition of responsibility points to "being in charge" of, while the second to a duty to act according to a frame of values.

Kimbell and Stables propose the concept of *capability,* as a merging of competency and responsibility. Regarding knowledge just as a medium to act on the world, for them, to act goes beyond mere intervention, it is making such intervention count, as they assert:

> "Whilst some might prioritise knowledge, understanding and scholarship as the cornerstones that mark out the "educated" person, we hold a somewhat different view. We prefer a view of education that celebrates qualities that empower people to make a difference in the world." (Kimbell and Stables 2008, 13)

At the present time, one of the main criticisms that can be made of traditional education (rooted only in the acquisition of knowledge and mainly concentrated on demanding learners' answers) is that neither procedural nor theoretical knowledge is commonly paired with ethic or moral virtues, whereas the overvaluation of knowledge as a key issue in education has mistakenly turned itself into a goal, as Kimbell and Stables state: *"knowledge is a resource, a means to an end, not and end in itself"* (ibid.; 36). By the same token, it is questionable why neither ethical nor moral principles have been widely taught, as they should be. Furthermore, the belief that values underlie shared cultural observances and thus are automatically acquired (Cross 1982; Norman 2008) encompasses the inaccuracy of considering values as a sack containing societal needs, wants and cultural standards, or what Dewey calls "spurious values". Moreover, that vision represents a social constructionist vision in which values are shaped by the community, whereas considering values as immutable ruling principles constitutes a positivist stance. However, as Hartmann notes: *"the values themselves do not change. Their nature is timeless, super historical. But the consciousness of them evolves"* (Hartmann 1926), denoting a link between positivist and constructivist perspectives.

Moreover, both visions are necessary in design. Issues such as corruption, ecological damage, disregard of social needs and human rights show that knowledge is not always coupled to ethical or cultural values either. The United Nations Global Compact document *"The Principles for Responsible Management Education"* (2007) is an example of how management has addressed that concern through protocols that summarize consensus among practitioners, researchers, academics and stakeholders.

In design education, principles or values can also provide the design project's *raison d'être,* or what Buchanan (2001) calls *"reasons for designing"*. In this sense, personal values act as drivers of learning, creating fertile conditions that stimulate students'

engagement and enhance their ownership of the process. In fact, contemporary educational theories consider students as protagonists in the learning process (the so-called learner-centred model), regarding individual ability and a particular learning pace as initial conditions for the student's development. Accordingly, educational goals are no longer related to what a person knows, but to what a person can do with their knowledge instead. Therefore, the learning process becomes a competence in itself, as Kimbell and Stables note, quoting Oxman: *"a form of education that is oriented to "knowing rather than to knowledge"* (Oxman 2001, 282), conveying the belief that education should be grounded in developing learning ability rather than content. So learning to learn is then seen as a core ability, but then what role do values play in knowing and where are they supposed to be developed?

Regarding this question, two perspectives can be outlined: the first relates to cognitive processes and the second to domains of practice.

As a basic distinction between cognitive processes, Ryle distinguishes between "know that" and "know how" (Ryle 1949). In basic learning stages, *knowing that* – mainly centred in the world of facts – learning outcomes are appraised by simply retrieving taught ideas (Marzano and Kendall 2007). On the other hand, *knowing how* involves more complex cognitive operations – comprehension, analysis, knowledge utilization – (ibid.) involving procedural learning, the reason why Coles and Norman (2005) note that some researchers associate know-how (in French savoir-faire) with skills (Polanyi 1962; Hicks 1982).

However, according to learning progression, Marzano and Kendall propose a taxonomy – based on Bloom's improvement – that separates values from cognition and places them within what they call the "self system", described as:

> "The self system consists of an interrelated arrangements of attitudes, beliefs, and emotions. It is the interaction of these attitudes, beliefs, and emotions that determines both motivation and attention." (Marzano and Kendall 2007, 55)

The relevance of this proposal is that it establishes two categories of values in which ethical/ moral value judgements are independent of technical principles; and, moreover, the first commands the second. In fact, *know-how* is confined to the "cognitive system", where decision-making and problem-solving occur, whereas values are placed within the "self system", which rules the whole. This change of paradigm implies that both *knowing that* and *knowing how* are now taught, bearing in mind "the being's" development as a whole instead of just individual operative skills.

Finally, both *knowing that* and *knowing how* conform to the identity of every profession, establishing domains of knowledge and associated practices in each case, but furthermore an outline of disciplinary values. For instance, in Industrial Design, knowing that and knowing how deal with materials, production technologies, ergonomics and user experience issues, to name but some (Norman 2008). However, the dominion of such ideas in design practice is led by judgements (which create the distinction between one designer and other as already accounted for), but also each specific matter has inherent values, such as comfort and adaptability in ergonomics.

Conclusions

Values in design education have seen meagre theoretical development in comparison to other design areas. That may reflect the lack of importance that design educators assign to values. At the same time, the indistinct use of the term value has

resulted in theoretical misunderstandings in which is not clear to what the term really refers. This paper has presented a model that, in the main, shows that values in design can be understood from three different perspectives. The first considers values within design practice, in which decision-making articulates values' emergence as frames of reference for assessing design decisions. In this understanding, values' role is neither ethical nor moral, but "referential".

The second considers the values attached to design practice, in which design methods will confirm the framing of a code of practice that will outline ethical implications. In this sense, as Cross proposes, design praxiology is the *"study of the practices and processes of design"* as an elemental and necessary field for design research (Cross 1999, 6). Since design practices are dynamic and constantly being developed, this claim is justified.

The third perspective regards values as constituents of a disciplinary field that explains them in relation to moral issues. Particularly relevant is Dewey's point of view, that relates "goodness" to social well-being.

Related to values in design education, all these perspectives are valid and useful, however their differentiation is essential for a better understanding of them.

Moreover, in design education, the inclusion of values comes through the practice of *valuing designing,* which corresponds to the educational enterprise of assessing student's work. Here, values can be displayed at the macro level – through school principles or policies – and at micro or personal level, through projects. The first one takes on the shape of general strategies that drive the identity of each school or programme, while the second becomes the individual's beliefs that thrive on learning through motivation and engagement.

Actually, the shift in paradigms (Kuhn 1962) in education and in the design field prompted a repositioning of values at the core of design education. An understanding of values can nurture design education by providing a new foundation for design courses. At the beginning, in the design profession, technical and aesthetic skills conformed to key capabilities for designing. Lately, those abilities have been enhanced by the mastery of design methods, extending design expertise from the factory to the consumer's realm. At the present time, however, the sum of economic, environmental and social crises encompasses a new scenario for designing that is neither technical, aesthetic nor methodological, but moral. If design is about acting on the world, it seems inexcusable to consider first whether those actions are either necessary or worthy, and to develop a deep understanding of design responsibilities and the implications of designing. Design education should not be grounded only on providing design answers; current world circumstances demand questioning of these answers too. This demands the development of design axiology and design praxiology as bodies of knowledge to nurture design education, and to envisage the future of both practice and learning in design, going beyond the current boundaries of wealthy countries' comfort zone.

The implementation of such knowledge in design education is however thorny, since the bases of most Western economies where design has flourished are deeply rooted in consumption, thus topics such as ethics and moral matters are mostly subjugated to profit-related issues. Besides, design is not immune to the inertia of tradition either. However, where there is a problem, there also lies an opportunity for design. Moreover, design has demonstrated itself to be a powerful tool for developing new strategies in which the traditional structures of business can be re-thought, as well as in any other field to which design may be related.

The challenges related to the implementation of values in design education are now in the sphere of design theory, and it is the author's belief and hope that, in forthcoming years, design education will school not only skilled but wiser designers.

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Which Way is Up? Space and Place in Virtual Learning Environments for Design

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***Abstract**: The role of 'place' in design education is essential in providing a structured learning experience that can be trusted and which allows dynamic social connections to emerge in the development of reflective practice. With increasing demand for distance and online learning resources, this paper considers how such a sense of place can be arrived at using 'virtual architecture'. Analogies with physical architectural space – for example 'homes', 'forums', 'studios', 'libraries' can be useful, but in many ways the opportunities for design learning in virtual architecture go far beyond what is possible with physical architecture. We describe how the virtual architecture of an Open University course in Design Thinking has consciously tried to create place rather than space, in crafting an environment with intrinsic learning opportunities, and the benefits this has brought to students studying the course.*

Keywords: Place, space, design education, virtual learning environments, phenomenology.

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Introduction

In our physical world gravity is a universal force that acts downwards. It creates weight, it makes things difficult, but it also makes things possible. It's also constantly there, to the extent that we don't think about it. We experience its effects – we get tired when we climb a long staircase, for example, or are exhilarated when we can freewheel down a ramp – without necessarily thinking that it is gravity that is enabling these feelings. It also has a linguistic life. People, actions, and situations have gravity if they are serious and, as Lakoff and Johnson (1981) have argued, gravity provides us with all kinds of fundamental metaphors about how we understand (up is good, down is bad).

In the virtual world gravity does not exist, though in many ways we expect it to. We still expect things to fall from up to down, not the reverse. We can easily imagine gravity even when it doesn't act through nature. Yet we don't need it and that hints at a more complex idea of what is achievable in virtual worlds. The asymmetry in what we understand about gravity in virtual and physical worlds is less obvious for a concept like 'place' however. We have a strong sense of what 'home' is in both physical and virtual worlds, even if we can't say exactly what that is. The idea of place, then, unlike gravity, extends across the physical and virtual worlds, where, for example, strong feelings of what home is in both physical and virtual worlds seems much more familiar. Yet 'place', so central to our experience, remains an elusive concept.

In this paper we develop an idea about place in working towards applying architectural and urban design conceptions to the creation of online educational environments for design. These notions of place are then used to demonstrate some of the mechanisms for place creation in for an online Design Thinking course created by The Open University in 2010, and now studied by more than 2000 students.

You are here

The attic and the cellar

Gaston Bachelard, in his book The Poetics of Space (Bachelard 1994), describes architecture in a vivid, phenomenological way, exploring how we conceive the physical world around us. Rather than simply viewing our environment as a series of objective elements, Bachelard argues that we are constantly interacting with it – interpreting, filtering, and attaching our ideas and values to it. The ideas we conceive about our environment are, then, every bit as important as the physical things we perceive. Bachelard uses the examples of the cellar and attic as two very different conceptions of place in a house:

> Verticality is ensured by the polarity of cellar and attic, the marks of which are so deep that, in a way, they open up two very different perspectives for a phenomenology of the imagination. (Bachelard 1994)

Bachelard is suggesting that there is something very different in our conception of going up to the attic when compared to going down to the cellar. We not only perceive the attic and cellar, we react to them as very different objects with different values attached. For Bachelard, the phenomena of attic and cellar are the 'real' events – not simply the physical objects themselves. Moreover, he also suggests that these two examples, attic and cellar, are conceived so strongly that we actually generate further conceptions – that of up, down, or verticality.

It is this kind of phenomena that is of interest in this paper, the idea of the thing in our minds is necessarily different to the reality of the thing outside of our minds. The significant aspect of concern is the *conception* - the event we conceive in our minds. It is argued that this conception is a fundamental aspect of place and place creation.

Doorways

Other writers and practitioners have argued in similar ways to Bachelard. The architect Aldo van Eyck refers to 'occasions' in architecture, giving the example of a doorway as a "…localised setting for a wonderful human gesture." (Smithson 1968). Bloomer & Moore write:

> The feeling of buildings and our sense of dwelling within them are more fundamental to our architectural experience than the information they give us. (Bloomer and Moore 1977)

Some architects clearly think more in terms of the human behaviour in place. The Dutch architect Herman Hertzberger famously made the behaviour of people a priority in his architecture, proposing the existence of 'arch-forms'; underlying spatial arrangements that have meaning when human interaction with them takes place (Hertzberger 1991).

But in none of these examples are explicit definitions of place given that might be of useful application in any sense other than the general. Indeed, for many of the architects, designers and writers quoted above, it is only through the use of extensive written and verbal exploration that we are able to achieve any understanding of the particular aspects of place. As with phenomenology, we are able to understand what is meant by place in architecture, and can even discuss it at length, but it is difficult to be explicit or precise about the particular aspects we might predictably use to create place from nothing. The American architect Louis Khan summed this up perfectly in architectural terms:

> The Agora, for instance, was a place of happening … a recognition of something which you can't define, but must be built. (Wuman 1986).

Interactions

Place is not only used as a philosophical or architectural conception. In fact, it could be argued that the disciplines of geography, sociology and ethnography have contributed just as much to our understanding of place as architecture - at least in terms of their explicit use of the word itself and attempts to incorporate the richness and complexity of place into their studies.

Theorists have drawn on these disciplines in presenting broader ideas about how spaces can be used to create place. Christopher Alexander, for example, describes the 'natural' city comprising of complex, overlapping interactions between events, objects and people, leading to the creation of 'city units' (Alexander 1966). Cities created by intentional zoning or separation of these elements (artificial cities), lead to reduced richness of experience and possibility of interaction. Meaningful and valuable human engagement with the city, Alexander argues, requires that complex and emergent events occur between things. This emergent behaviour lies at the heart of Oldenburg's concept of 'third places' (Oldenburg 1999), interstitial places of behaviour that people naturally seek out to enrich their lives.

These considerations of place clearly provide a strong hint that the elements that make up any place are certainly more than the physical components of that space.

Did you remember where you were?

Generating a 'mental map' of our environment is necessary to how we operate in physical space and there is a growing body of research to show the importance of spatial conception in cognition. Cognitive mapping in buildings demonstrates just how disruptive poor spatial arrangements can be to how we make, navigate, and make sense of a space (Carlson, Holscher, Shipley, & Dalton 2010).

Once understood, though, experience of physical space can be used cognitively. The technique of creating memory palaces (Yates 1992) creates a cognitive structure by using the physical experience of space. Learning to recite the complete works of Shakespeare can be achieved through interaction with place (or space that has meaning to us).

What is important in all these examples is the requirement for people to *conceive* of their environment - not simply *perceive* it. To generate the meaning or value we apply to (or take from) space, we must embody both the physical perception and the cognitive response. It is argued here that this embodiment, or conception, is some aspect of the definition of place we seek to explore in virtual space, and particularly virtual learning environments.

You are here (again)

In virtual environments, like first person computer games or virtual worlds, we have the freedom to create any shapes and spaces we wish to, though typically we tend to ape physical reality, since we believe that a translation between physical and virtual will bring with it a similar translation in meaning. 'Rules' can be generated to maintain the illusion - we make sure avatars cannot go through walls, we simulate gravity, we make use of spatial arrangements that make sense in terms of physical reality and help us to understand ourselves as being 'in' the environment.

The success of first person computer games, however, doesn't rely on a recreation of reality alone (Coyne 2003) and the success of other types of computer game is interesting to consider. This success could be due to computer games being essentially self-contained learning environments. Places to achieve, and to be recognised for that achievement.

The failure of 3D virtual learning environments then is equally interesting to consider (Doyle 2008). Directly copying physical environments (the maths building is right next door to the physics building) is a prime example of the generation of space without consideration for place. The failures of virtual university campuses, for example, are failures to recognise that complex elements in perception and conception are also required. Just as with architecture, the creation of blank space in the hope that place will emerge is fantasy.

In more traditional online spaces, such as websites, social media environments or virtual learning environments, we use 'home' pages, 'portals', 'forums' and 'navigation' to describe patterns of space and portray the virtual space being presented in a physical way. And the fact is that this works at a simple, spatial level. Dalton et al (2002) provide examples of studies into the similarities and analogies between physical and virtual environments in cognitive neuroscience and psychology. But they go further by considering the human use *in* such spaces, not simply use *of* those spaces. In other

words, the use of virtual space relies as much on psychological and social aspects as our use of physical space.

Virtual worlds can clearly allow complex social constructions to emerge and exist, with communities forming, for example an online blogging community, and social interaction taking place (see Twining & Footring (2008) for one of many examples of this). Even negative aspects of any socially organised system can be found (see Carr, Oliver, & Burn 2008; de Jong-Derrington & and Homewood 2008; Minocha & Tungle 2008, for examples). In each example, the complexities of social interaction we might expect to see in the physical world are present in the virtual analogy, with all the rich and emergent behaviours required for place creation evident.

The role of place may not be openly discussed by website designers but it is implicit in every element we use to structure increasingly sophisticated online environments. Indeed, talk of an environment at all presupposes an idea of architecture, rather than simple layout. And in any environment, place is an essential element in allowing human behaviour to emerge, and for learning to occur (or take place).

The architecture of education

The journey

The architecture of museums has increasingly sought to educate at a deeper level than merely providing wall and floor space to show off carefully curated items. Rather than let us wander idly around, creating our own meanings and connections, we are increasingly (and ironically) led down a well-trodden path, on a 'journey of discovery'. Lloyd (2011) writes:

> That hollow feeling is the feeling of being manipulated by a building with a purpose. The purpose being to deliver an experience, like a ride at a fair ground. It might seem interesting and exciting at the time, but it's soon forgotten. What we tend to remember are the people we meet, the unexpected conversations we might have, and the funny things that happen to us; the human things that connect us. Of course these things can happen in iconic buildings, but the buildings themselves aren't helping us when they manage us through an experience in our own little bubbles, coughing us up into the gift shop at the end. (Lloyd 2011)

Clark & Maher (2001), Brook & Oliver (2003), Northcote (2008) all discuss the importance of a 'sense of place' in online educational environments. Brook & Oliver refer explicitly to anecdotal evidence from teachers and note the difficulties in assigning value to particular aspects of community creation. Northcote provides lessons learned without defining the mechanisms of success, only suggesting them. Clark & Maher suggest, like Louis Khan, "Architects create space – people bring Place".

Similarly, Swan (2006) argues that successful virtual learning environments require "…a clear and consistent course structure, an instructor who interacts frequently and constructively with students, and a valued and dynamic discussion", clearly setting out that the behavioural aspects are just as important as the discrete 'physical' elements.

The analogy to notions of place described in the previous sections are striking. All note that place in an online learning environment has social and pedagogical significance. But they also recognise that the precise mechanisms for the emergence of such places are not well understood.

A counter argument may be applied to learning designs. Why should we hope that speculative, context-less information should be meaningful without the opportunity for place-making, interpretation, value and all those other necessary human desires expressed by Khan's vision of architecture or Alexander's rich 'city unit' that go to reinforce a deeper learning experience, rather than providing something like entertainment?

Stopping along the way

The core element in most virtual learning environments is information, usually static and displayed as a hierarchy. In terms of information architecture, this is a spatial pattern that we are all familiar with from early education onwards. A simple analogy is a book, where the title, content and chapters form an immediately recognisable 'map' of what can be expected.

Making use of these sorts of analogies makes a lot of sense but care does have to be taken. If we are creating a large learning environment, say of a year's worth of material, this does leave us with a very big book indeed. In response to this, we might then divide up the material into several 'books', each with a certain theme, logic or shape. These might then be collected together and presented to students as a structured set of information.

But this perhaps misses the fact that orientation to learning material occurs in other non-linear ways – just as place-making in towns and cities relies on more than road layouts and landmarks. Successful students do not simply spend their time taking in learning materials in a linear fashion – they spend time making *sense* of learning materials. It is certainly true that a spatial, cognitive map of information may be formed but it is argued that, just as with our physical environment, this map is personal as well as rational. We may see the overall structure but we also overlay this with detail that allows us to relate to that structure at different scales. Just as the good author takes care to present their work in a way that avoids cognitive dissonance, they also allow the possibility of cognitive resonance with the structure and form. Moreover, it is possible to make active use of such cognitive structures to support the learning material itself.

Online courses are now emerging at an incredible rate but many only provide information repositories that are not designed for active student learning. In other words, they are virtual analogies of passive, information-based learning models that often offer very little opportunity to embody any of the knowledge they seek to impart. It may seem very obvious to state it, but the quality of online learning courses has an impact on the students' experiences and learning outcomes (Tallent-Runnels et al 2006).

In Urban planning, Alexander suggests that prediction of, and planning for, place is simply too complex to be represented, far less designed. Similarly, many of the notions discussed thus far are complex ones without precise and predictable mechanisms that can be used directly. But what we are able to do is provide the *opportunity* for these elements to emerge and ensure the robustness of objects to allow their adaption to human needs and changing desires.

This notion of opportunity is important with respect to learning design and one that all teachers will recognise instinctively. Opportunities for small learning events happen all the time in any classroom and the reactive teacher makes use of them constantly. It is argued that emergent and complex opportunities are required to engender this in learning place design. Alexander's 'city units' or what Schön (1987) terms the 'right

sorts of experiences' are both examples of emergent conceptions relating to place. They cannot be predicted entirely but the opportunities themselves can be tacitly encouraged by the virtual architecture.

There is a difference, then, between thinking that you have created 'place' and knowing that you have only provided the opportunity for it to emerge.

The destination

Education can be argued to rely entirely on the generation of conceptions - not simply the transfer of facts, and that is especially true for design education. In fact, information transfer is arguably the least part of the education of a designer. Whether we call it Problem Based Learning, Constructivist Learning or Personal Learning Environments, they focus on the generation of conceptions in the mind of the student. The transfer of information is of a lower priority to how that information may be applied or how meaning may be derived from it.

It is worth noting that this is not limited to virtual worlds and is certainly not new - despite the latest names or acronyms. We can all reflect on physical learning events that have stayed with us throughout our lives and might recall a specific teacher at school, a particular subject (or even concept) and certainly the sense of place of that interaction; a provocative question posed in a lecture theatre and the spectacle of challenge and explanation. It is argued that these types of memorable events, are the phenomenon or conception that is the thing remembered.

A virtual and physical example is provided by Jornet and Jahreie (2011) where the entire design process was driven by the desire to create 'place' and acknowledging the complexity that is embodied in such a term. Interestingly, the authors recognise and actively take advantage of precisely this difficulty, considering the design process in the project study as a "learning process". This affirms what many designers know intuitively - the process of design is one of incompleteness where discovery and emergence are essential. But in this particular case study it was essential in both defining the shared conception and resolving its designed solution.

A similar argument is made by Jones (2011), where the generation of the conception in architecture and online learning design is advocated to be the primary consideration for designers of those environments. Clearly, the conscious design of richer learning environments (physical and virtual) requires much more than simply providing the building components alone.

500 students in a building

Welcome to YOUR building

The Open University course U101, *Design Thinking: Creativity for the 21st Century*[1] is based firmly on design education as 'reflection-in-action' after Schön (1987) as well as design thinking principles in general (Lloyd in press). As such, it deals with difficult concepts and issues, such as uncertainty, creativity and personal development. Over three years of running the course it is clear from student feedback that there is a significant emotional attachment to the experience of learning - both positively and negatively.

[1] http://www3.open.ac.uk/study/undergraduate/course/u101.htm.

On the one hand there are students who reject the course completely, struggling to come to terms with the ideas, activities and learning intentions. This response is usually initiated early in the course when students first come across ideas that are contrary to their world-view. For example, the playful nature of early activities is intended to instigate a simple cognitive response in students: thinking through doing (Schön's 'reflection-in-action'). The nature of these activities can be seen, by some students, as trivial and without any value or meaning to them personally. The personal reaction of these students is one of confusion, irritation and even anger, strongly suggestive of Relph's 'outsideness' of place (Seamon & Sowers 2008).

On the other hand, there are those students who respond to these activities in the opposite way - extending them to mean something personally valuable and taking far deeper lessons from them as a result. The phrase 'life-changing' is one that is encountered in feedback from these students, and is equally suggestive of Relph's 'insideness' of place.

In both cases, there is clearly a personal and profound reaction to the material presented that has an emergent quality. The challenge for designers of places of design education are significant with respect to this aspect of place - to generate place that allows the change of thinking required. From experience in developing the educational environment for U101, it tends to be the little things that really matter in this respect and, like place itself, these are varied, complex and very difficult to articulate.

For example, the tone of learning content, attitude towards student interactions, and even the graphic design of course elements are all thought to play a part in setting an overall character of the education. Indeed, one of the central learning elements of the course is the personification of a conception of design thinking - that of creative and analytical thinking, represented by two characters, Lola and Sam respectively. The fact that the identity of the module generated by the course code logo also happens to spell Lola when turned through 180 degrees further reinforces this conception in many students. This conception in itself leads to students referring to the course itself as Lola and even themselves as 'Lola-ites'. The identification or projection of the personal in this way indicates that a more valuable transaction is taking place between the student and learning material.

Find your way around

The cognitive, spatial map of U101 is central to its operation. When Alexander's 'network' elements are considered with respect to student use, a complex structure appears behind the larger, simple one. Online content can be very linear in structure simply because we tend to only view one discrete element at a time and this can be particularly true of traditional content. With the rapid development of web 2.0 technologies, the interleaving and connectedness of these elements has taken a huge step forward. The difference is not simply one of doing away with linearity, it is one of introducing Alexander's 'semi-lattice' structures by allowing dimensions of relationship to form (recommendations, trending, networks of attention).

U101 makes use of a range of these elements in a particular way that breaks up the linearity of mode (or medium) of communication. A piece of written content, for example, is 'interrupted' by a video considering a particular aspect, or is followed by an activity that requires the student to act in a different mode of thinking; or embeds a portal to another part of the environment. The key feature here is that the content is of a particular granularity and complexity that encourages a diversity of activity which leads to an emergence of richer learning events.

This will be of no surprise at all to any teacher of design - precisely the same rich events are the very reason for the design studio. They are the material artefacts that make up Schön's 'right sorts of experiences'. It is perhaps this blend of complexity discovered through a simple 'map' that allows this to take place.

Make yourself at home

In design education specifically, Schön refers to the 'place of safety', meaning the studio as a place where the student can feel secure in the knowledge that they may try things without the fear of failure (either physically or psychologically). This is an essential aspect of learning the practice of design, where failure is a valuable part of the process. Engendering this as part of an educational environment is more to do with people, psychology and social 'events' than the simple physical space or layout itself. It is also important for the space not to reinforce feelings of failure by making navigation and wayfinding difficult or to generate a feeling of exposure beyond which the student feels uncomfortable.

This last point about exposure could be applied to the architectural and urban design concepts of private/public space, where the degree to which we feel enclosed or exposed, isolated or connected is considered. It is argued that the individual elements provided to support learning on the course generate complex overlaps of place, allowing students to identify with elements that are private (their relationship with their tutor and the activities that provide this), semi-private (relationships formed with particular students across specific places), semi-public (activities at a tutor group level in particular places) and public (activities at course level in particular places). The social networks formed by students in the course are complex and future research will look at these topologies.

A key aspect of the emergence of these 'layers' of place can be found in OpenDesign Studio (ODS) an online design studio specially developed for U101 – see Lloyd (in press) for further details. Although designed as a key element of the course, what was surprising was the reaction and engagement of students within this place. Tutor feedback from several module presentations confirms that students' interaction with ODS is significant, meaningful and, more importantly, was far greater than anticipated. A genuine personal relationship is generated between students and this environment and it provides critical places within which they can begin to present and enact their ideas as design thinkers.

Schön's place of safety is provided here and it is not simply achieved by functional elements. The materials that support students to use it are all carefully designed to engender this sense of place through behaviour, approach and attitude as much a navigating the space itself. The interaction between students is what makes this a place, indeed what makes it a place at all.

This emergence of behaviour and interaction generates something that is greater than the simple information being presented. This in turn leads to a range of alternative tuition opportunities and experiences - both between students as peers and between tutors and students – further enriching the place that is created.

Apologies for any inconvenience…

A key feature of U101 is the fact that it is entirely online, blending learning content that actively changes to react to students' needs and behaviour. In many ways, it is an incomplete construction – just as real world buildings rarely remain the same throughout their lives.

In architectural design, the need to allow for emergent or unpredictable human behaviour has been long understood. The classic example is providing 'blank' ground to allow people to create pathways which are then created permanently. Of course, as soon as such pathways are created, further shortcuts are always found by the users of these spaces. Our constant reuse and repurposing of our physical environment is one that can be easily replicated in an online environment. This type of emergent behaviour is found in the planned places of the course, such as ODS and the forums but it also occurs at a larger scale, introducing possibilities of more complex 'crowd' behaviours.

Students on U101 are encouraged to find problems with the course and, more importantly, come up with solutions. A trivial example would be the reporting of broken links where a student might discover the problem and then come up with alternative sources. This is often followed by a discussion about the relevance of the content, what is actually intended by it, and ultimately change to the course itself. But the fact that students can then see that their ideas and opinions are taken account of, and that this is then acted upon in changing the course, means that they now 'own' a part of that place. They are not simply inhabiting it – they are creating it.

Conclusion

We have repeatedly come across research that struggles with the articulation of a definition of place without resorting to the intangible and descriptive - inferring and relying on the fact that the reader *understands* what is meant without *articulating* what is meant. Deliberate place creation, it seems, is not something that is predictably possible through particular, prescriptive elements of design. Rather, it seems to depend on descriptive, intuitive and process-oriented acts of design.

We have considered several elements that seem to allow place to emerge and these notions of place are not simply defined by their physical or literal characteristics. In each one, the proper sense is only achieved by considering the meaning and value that is brought by the users of those notions and we find that they are dynamic and emergent qualities. Using a language of design, in this case architecture and urban design, it is possible to conceptualise these elements and use this discussion as a basis for the design of such places. The language of design is as much about the *process* of design as it is the object designed. By engaging in design thinking as process we are able to take into account much more than the object of design itself, allowing the emergence of genuinely meaningful places of education.

One of the mistakes that can be made in design is that we assume the object designed is complete at some particular point. But the lesson of our built environment is very much the opposite - the design process continues as the new house owner creates a home: converts space to place. The endless iterations of personalisation, adaption to circumstances or simply responding to our physical needs continues long after the original designer has left the building.

Ultimately, what we seek in education is this continual development of conceptions of place, where we enable the same embodied understanding that allows us to conceptualise which way is up. Bachelard (1984) claimed that the home was a place of dreaming, an essential place for the mind as much as the body. Surely the place of learning should be no less important.

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From Bauhaus to DESIS: exploring solution-focused methodology for social design education

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Abstract: *What are the social responsibilities of design schools? In order to explore this question, we employed action research methodology. Through our on-going collaborations with different design schools, our main research goal is to investigate the social role of designers and further of design schools and the design education system as a whole. 'Ageing in place', the overarching concept for these labs, was to enable participants to experience and question how the life-course approach to ageing could inspire new community design processes. So far, we have engaged different types of design schools and in this paper, we reflect on one of our design labs with a vocational training college in Hong Kong. We worked with staff members and students teaching them how to employ design as a means to engage housing estate residents in their neighbourhood. In-depth interviews and observations of stakeholders who participated in our design actions have been conducted throughout the process. To conclude, three tactical actions on how an individual designer's responsibilities relate to the systems of design education will be suggested and shared: confrontational tactics, empathy and imagination of replacement.*

Keywords: Solution-focused, Civic Education and Design Lab

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Introduction - what are the social responsibilities of design schools?

Education has particularly been regarded as a means to train young people to achieve more social growth and development while in fact it has been channelled towards marketization. Commercial benefits have been prioritized while people's needs have not been thoroughly interpreted. This is also going in opposition to the ideals of design education. In this paper, we also reflect on an alternative teaching module that was conducted for a vocational training design collage to question the responsibilities of design schools towards social development. As Cunningham (1979) argued the formation of schools of design was *'not simply a prototype of technical education, established for commercial reasons.'* Instead, we argued that it should occur against *'a background of increasing public encouragement of art, which laid emphasis on the national prestige, and social benefits, as much as on the commercial advantages to be derived from art'*.

From Bauhaus, the most famous design school in the modern history, its main purpose was to train designers for industries. According to its founder, Gropius (1965), the school was founded with the 'idea of the fundamental unity underlying all branches of design.' In the introduction of Gropius's book, *The New Architecture and the Bauhaus*, Frank Pick praised Gropius's approach that *'[t]he designer for industry must be placed alongside the architect, with a training equivalent and in character, if directed towards another end, and a status and authority equivalent, too'* (ibid, 10). Worked like an experiment and it only operated for 14 years (from 1919 to 1933) the German term Bauhaus, literally "house of construction" stood for "School of Building" set a benchmark for modern design schools with its fundamental role of design education: *'... the principle of training the individual's natural capacities to grasp life as a whole... '* (ibid, 52).

Our project should be seen as a response to this calling for training individual's natural capacities to grasp life as a whole. However, to us, education should not be confined to the boundary within the campus of any educational institutions, but extends beyond, as design is with people. We follow the spirit of participation research to involve people who might be the potential users of any design ideas. We also maintain that design has a particular nature, which needs abductive logic to accomplish more venture and discovery, just like Dewey and Cross's ideas that appositional thinking would bring us more insights into our future. This project is about engaging both young people and potential users in design, with the application of solution-focused method of design. We take the form of design lab as an alternative-learning module to ask participants to work for indigenous sustainable change. This is an echo to what Manzini (2011), DESIS (Design for Social Innovation and Sustainability) founder and international coordinator, suggested that '*design schools now have the potential to play a second important role: that of agents of sustainable change: of critical and creative actors in the on-going transition towards sustainability'.* This new role as agents of change requires a new mode of collaboration: *'peer-to-peer mode, as intelligent actors in the new design (school) networks…they can use design classes and academic and professional design research to stimulate and support design networks…'* (ibid).

In our design labs, we invited students to investigate how we could engage local people in design activities. The aims are both training and engagement; training young participants with solution-focused design strategies and engaging local people to achieve sustainable social development through design.

The details of each project will be delineated in the related sessions, but the overall aims of these two projects are the same. We asked participants to focus on how indigenous people design their lives with a view to enjoying ageing. The first concern is to see if they are aware of the changes in their body experience. The second concern is to see how they make use of local community resources. We expected to see the process by which participants search for more insights from the local people who are themselves 'ageing in place'.

Why do we practice solution–focused design?

From a star-institution like the Bauhaus to a network of DESIS Labs within design schools, how does teaching and research methodologies in design education change? Our team comprises a design researcher and a sociologist and we have collaborated to explore answers to the question or have even worked to reframe the question.

We referred to the solution-focused approach to design promoted by Nigel Cross (2006), chairman of the DRS. Cross pinpointed four core features of design ability:

1. Resolve ill-defined problems
2. Adopt solution-focusing strategies
3. Employ abductive/productive/appositional thinking
4. Use non-verbal, graphic/spatial modelling media

The use of solution-focused strategies is related to the nature of problems in design practice as 'design problems are inherently ill-defined, and trying to define or comprehensively understand the problem (the scientists' approach) is quite likely to be fruitless in terms of generating an appropriate solution within a limited timescale' (ibid:18-19). Underlying the solution-focused strategies is the abductive logic in the sense that while '…induction shows that something actually is operative; abduction merely suggests that something may be…It is therefore the logic of conjecture' (ibid:19). In our view, design should not start with any propositional logic or scientific hypotheses then employ scientific methods to identify the 'real' nature of the problem, and finally put forward designers' solutions. Conversely, we start with a view put forward by Cross that which emphases 'the role of the conjectured solution as a way of gaining understanding of the design problem, and the need, therefore, to generate a variety of solutions precisely as a means of problem-analysis' (ibid:17). Moreover, we highlight Schon's ideas of 'a reflective conversation with the situation' and situations where designers are encouraged to use non-verbal ways of knowing. This is because design works might happen outside the boundary of verbal discourse.

In light of the combination between solution-focused design process and non-verbal means for reflective communication, we would highlight the limitations of designers themselves. Our reason is related to our understanding of the concept of experience. Certainly, the design process in the form of solution-focused ways of knowing could be regarded as a kind of experience. Actually, it is a kind of learning experience. This echoes Dewey's (1916) idea of education and experience that true education can only happen with the empirical situation and a reflection of the real world. Once we work

in the real world, we know that we are dealing with a real social situation in which it is not only designers but also ordinary people, potential users and many other stakeholders. As design activist, Papenek (1971) also encouraged designers *'to pay by giving 10% of our crop of ideas and talents to the 75% of mankind in need.'* When we carry out inquiries into the problem in our hands, we, together with potential users and even the public, constitute a community. By conceptualising the context in which designers encounter potential users as 'the community of inquiry', we encounter the issue arising from the nature of such a community.

In a traditional scientific domain scholars and researchers play a dominant role in designing and monitoring the process of research; the community of inquiry in design is completely different. Abductive logic opens up the communicative space in the community. The term 'opening up' could be interpreted in two senses: firstly, it implies a more 'open' attitude in performing conjecture; secondly it implies a more democratic arrangement among the members, i.e. both designers and the public (or the potential users in the narrower sense), of the community of inquiry. Such an understanding of 'opening up' falls in line with Reason's tenet of action research in which the major concern is not about accurate representation of the external world, but about whether our knowing, our belief, could provide reliable guidelines to getting what we want. This is the reason why the traditional role of science and the dominant positions of social scientists have been challenged. Designers are not looking for any triangulation to support or validate their hypotheses, but are attempting to accomplish the target set by the 'community of inquiry'.

How did we practice solution-focused design?

'Ageing in place' is the overarching concept for our labs. This concept enabled participants to experience and question how the life-course approach to design could inspire new community design processes. So far, we have engaged different types of design schools: postgraduate art & design college, vocational training college and art & design academy within a university. Along with formal institutions that teach design, we also began to engage public organisations to deliver civic education for diverse learners: people with spinal cord injuries, young entrepreneurs for ageing innovation and participants for social design awards.

Process: from problem-solving to solution-focused

One of our on-going collaborations is with a vocational training college in Hong Kong, which recently reformed into a formal design institute with a new campus built in 2010. Here all the students are freshly graduated from high school and in the last years of their teens. The collaboration is well situated between civic and formal design education. Originally, we were invited to conduct a research project about developing design implications for the ageing population. With concerns about the limited life experiences of our learners, we decided to expand the focus from aged people to the ageing process and local community. Instead of focusing on educating young students, we set out to collaborate with staff members and the overall school strategy by asking three layers of research questions. The questions aimed to stimulate a rethink of the design implications for our future selves informing a new perspective for the design school, developing a long-term vision:

- What is the research direction in ageing and community?

- What is the NEW research methodology for investigating ageing and design? How to get from a problem-solving or solution-focused approach.
- Who are the research targets and how to describe the relationships with them? i.e. design for older customers, design with local ageing communities, or design by ingenious aged people/amateur designers

Our aim was to address the specific subject of ageing and social inclusion and we conducted a three-week Design Lab with staff members. Their new campus is surrounded by six different housing estates where over 20,000 households are residing in this new town of the city. Six teams were formed with over 30 Higher Diploma students from three design disciplines: Interiors, Products and Graphic Design. A three-week design workshop was organised for students to experience solution-focused design and participatory methodology in design with local communities. Students were briefed to act creatively about the concept of design outside their disciplines and beyond. Each team is responsible for designing 'something' with the residents of an estate close to their design school.

There are three stages to the workshop. In the first week, we were inclined to allow more free space for the students to practice problem-solving methodology. Here they were given the freedom to employ their favourable methods of investigation, such as visits, interviews and data mining. We conducted short design exercises (Figure 1) giving students a chance to present their tentative results and build team spirit. In the second week, we intended to challenge students' habitual ways of knowing. Therefore, we invited a social designer from Brazil as part of our team, to conduct games with students in order to understand the significance of non-verbal experiences. In this stage students were asked to invite residents from their assigned estates to join a tea party at the design school (Figure 2). In the tutorial section, we began to present our ideas about solution-focused methodology and participatory design. In the third week, students were responsible for setting up six design booths, creating a Chinese New Year Market to 'sell ideas' to the local residents. The aim of the 'market' was to build bridges between the design school and local residents of the six housing estates in the neighbourhood.

Result: designing participations

The brief to young students was unlike ordinary design projects during their study.

Figure 1. 2D-3D workshop to challenge students creativity in form building as well as building team spirit (left)

Figure 2. Tea Party for local residents – first time for residents to visit the design school (right)

We did not ask for a final design proposal. We commissioned a local bamboo structure master to build six traditional temporary market stalls for the six teams to install their designs. Instead of designing objects for sale to celebrate Chinese New Year, students were asked to design means of participation to engage the local community. Each team was guided to identify an object to represent their experience (Figure 3) and design their booth around the object. After two days of construction, the final task for each team was to 'operate' their stalls and develop operation ideas for further interactions with residents. There was a team who aimed to encourage residents to have more physical interactions than online debates; they used balloons as a way to invite people to leave messages for others.

Similarly, one team focused on developing methods for residents to express their wishes especially those with a disability. Here they collected fallen leaves for people to write messages on and then send them back to others. A large lantern was constructed with colourful colanders, attracting visitors to make Chinese New Year wishes. Recycling was a popular issue around design students and two teams collected waste from their housing estates and reconstructed items back to the community. One team used newspaper to recreate plant plots for fresh plants, giving them back to local residents. Another team collected unwanted furniture and deconstructed them into new pieces of furniture, demonstrating new uses.

Discussion: Issues of the problem – solving approach

Deviating from the instrumental view of participation, the advocates of co-design/participatory activities have maintained that participants (other than designers) in design research are partners and so involved in selecting the problems and

Figure 3. Six design booths

sanctioning the search for solutions. Recently, the role of people in the process of design has been re-shaped as that which is tantamount to professional practitioners, termed as 'extreme users', 'active design partners', 'experts of their experiences' or

'co-designers'. They are regarded as crucial in knowledge development, idea generation and concept development (Sanders *et al.*, 2008; Visser *et al.*, 2008). There has been a more extreme version about the role of participants, as suggested by Banham (1972) that the only real Design Participation is 'do-it-yourself'. This configuration of the roles between participants and designers is based on the idea that users should have total autonomy to invent their rules in order to enhance the efficiency of the designer-user game. In other words, Banham suggested that designers are relegated to a considerably passive position.

Inspired by the solution-focused method, we argue that the participation of users is more methodological. As Reason et al argued, the de-monopolisation of knowledge led to full involvement of participants that '*the action turn in the social sciences is a turn toward a kind of research/practice open in principle to anyone willing to commit to integrating inquiry and practice in everyday personal and professional settings'* (Reason and Torbert, 2001:7).

However, the natural attitude of design students has been identified as one of the barriers against the practice of opening up the design practice community. In our view, the pre-reflexive designerly attitudes, or what phenomenologists refer to as natural attitudes, are *"our original, world-directed stance, … the default perspective, the one we start off from, the one we are in originally"* (Sokolowski, 2000: 42); or simply put, our taken-for-granted attitudes. This natural attitude of designers is usually more visible when we observe designers in action.

Intervention: Practicing Solution-focused Method

Our ways of doing design research is basically informed by Reason's action research. We know that the research process does not emerge in a tidy and linear manner. The outcomes may not be eventuated how they were planned. Some intervention tactics and advice as well as comments to students may be on an ad hoc basis. However, three components are essential. First, it is necessary to find channels to work with potential users whose practical knowledge and practice in daily life are valuable for design ideas. Secondly, outcomes are tentative, always ready for modifications, and thus design is a process through which solutions are continuously proposed, tested and evaluated. We are not looking forward to 'design in one go'. As with Thomas and Carroll (1979), after a number of experiments and protocol studies of designing 'a fundamental aspect is the nature of the approach taken to problems, rather than the nature of the problems themselves' (Cross, 2006, 19). In other words, focusing on continuous modification and evaluation of the proposed solutions is not owing to the necessity of checking the nature of the problems, but examining the nature of our approach taken to problems. The third element is the awareness of pre-reflexive thinking. Our preliminary findings have shown in the last section that problem-solving methods encourage the dominance of the expert-driven role of designers and discourage reflexivity. Students also easily took design education as a kind of craftsmanship rather than a process of exchange between designers and people. We also found that students took design as a kind of technical profession that would be translated into a number of roles as problem solvers, craft makers, active citizens, and opportunistic entrepreneurs. However, all these roles are built on the foundation of the expert-driven role of designers at the expense of users' participation. We argued that reflexivity and awareness of this kind of pre-reflexive being are needed in order to accomplish participatory design.

Here we attempted to ask designers to identify their pre-reflective being which to a large extent 'unconsciously' shapes designers' orientations and interpretations of roles, needs, natures and the kind of lives toward which participants should live up to. In order to achieve this, we make use of three tactics, namely, confrontational tactics, empathy and imagination of replacement. We practiced these tactics in this Design Lab with the design students throughout the third week of the event.

Confrontational tactics:

It is a common practice that novice designers would take their work as the final product of the design process, leaving little room for modification by others, let alone by users. In our design lab, one group revealed a strong inclination to treat their work as a 'monument'. In day two of the market, they left their created lantern as a monument there unnoticed. We, together with a guest, found it strange to see the absence of responsible design students there and decided to dismantle, or re-modify, the work. Cutting down all the ropes hanging the sieves, which are supposed to be the place where residents could place their Chinese year greetings (Figure 4). The design students thought that it was a design as it provided a tool by which residents could communicate, and of most importance, it is aesthetically sound and acceptable. Twenty minutes after the 'intentional attack', one of the students from this team came back and asked the 'destroyer' for the reasons of the attack. She said the work is 'sacred' and deserved 'respect' from all people. We enquired about this, supposed that we were residents, whether we would be granted the right to 'modify' or 're-design' the work. She looked speechless. We further asked her about their coded message underlying their work. She revealed that it was a tool for communication and a place for putting and sharing Chinese New Year greetings. She further explained that they would stand by the work and tell any onlookers the way to use the piece. A few minutes later, three more students came back and expressed their grievances. Clearly, novice design students really treasure their work, but in the context of participatory design, they gave no room for manoeuvre to any potential users. Users could participate in 'using' and 'expressing their feedbacks', but not in any process of design.

Figure 4. Modification of one of the 'designs'

Our reaction to their unhappiness, we asked the students to think about the objective of their design. As our rationale of our workshop was to design with the people who are believed to be protagonists to enjoy the fruits of design, we should work out a way for both the designers and the potential users to know what the best design is. We asked the students to think about what kind of a design could at least make both parties happy.

Our co-tutor, a Brazilian social designer at this moment started using the sieves as footballs and invited other groups to play together. Those design students really felt embarrassed, as it seemed that their work was insulted. But they found that the participants were really happy playing together. Then, they attempted to transform the 'monument' into a game-like activity. They used the robes to make a net and participants were invited to write their greetings on a small piece of paper, put the paper into the sieve and throw the sieve onto the net. After that, participants could pick one sieve and take the greeting paper home. Although this game was not designed by any local residents, it was co-designed with other participants who are onlookers, their classmates and some guests. At least, they found that participants could enjoy the activity of throwing and picking, and at the same time have a chance to share Chinese New Year greetings. Of most importance, the novice design students could understand that they have a pre-reflexive habit that their work would be treated as sacred and not allowed to be modified. However, this is one of the major hurdles against participatory design.

Empathy

In our view, empathy based on intersubjectivity helps us understand user experiences. The view of phenomenologists is that there is ultimately something in common with individual's intending toward a thing in the world, this shared realm of experience can be achieved through reciprocally understanding self-experience when experiencing alongside the others. Understanding self-experience, however, is not easy, because it takes reflective efforts to transcend the immediate experience and natural attitudes. Husserl suggested that individuals are expected to transpose themselves to the other's place so as to achieve the meditation of empathy. Therefore, it is necessary for the researcher to experience how subjects experience their lives *in situ.* As Husserl (1989) suggested: *'I secure [the person's] motivations by placing myself in his situation, [with] his level of education, his development as a youth, etc., and to do so I need to share in that situation; I not only empathize with his thinking, his feeling, and his action, but I must also follow him in them...'*

We have accordingly broken this phenomenological task into three layers. The first layer is to listen to the details of the others' discourses. This is the initial step of constituting intersubjectivity. As Finlay (2005) suggests, *'the researcher's task is not simply to listen to another's story: the researcher also needs to be open to being with the participant in a relationship. '*Following this initial activity, the researcher should practice 'doing empathy' by a connection of the other's embodiment to one's own. Essentially, it is to achieve empathetic understanding of the other's embodied experience by intimately connecting to the lived experience of the researcher's own. Apart from the two layers, the third empathic act of acting into the Other's bodily experience brought forth the *imagination of replacement*.

In our design lab, however, the first failure is the low participation rate of residents. The novice design students were upset as they could not find effective promotion channels to attract more residents to their booths. Hence, we were not able to practice the first layer of empathy. In the final days of the event, we asked students to try the second layer, namely 'doing empathy' by making connections with the other's embodiment to one's own. We asked students to recollect their experiences, which are supposed to be similar to those of the residents. We could illustrate such a process in our workshop by focusing on the group whose members collected dumped furniture at the estate.

The design students reported that they found a large pile of dumped furniture in the estate. They commented that the residents had wasted a lot of useful resources, so were intended to educate the residents to live sustainably. They recollected the dumped furniture and placed them in their booth. The setting was decorated like a furniture showroom as those run by IKEA. Lines were on the floor to indicate the distinction between exhibition areas, and customers' path. Things were re-built and put orderly on the floor or on the wall. Signage was also provided. It seemed that participants were customers who should follow the signage and designated path to 'appreciate' the re-built work and finally acquired a moral statement that dumping is a kind of waste.

We gathered the design students one afternoon and asked them to choose one item from the booth and imagine where that item could be placed in their home. The basic requirement is that they should be true to themselves and really willing to 'use' the piece of furniture. Finally, few showed their willingness. The students were further asked if they were willing to re-use some pieces of furniture, which were supposed to be dumped by their neighbours. Moreover, they were asked if they felt embarrassed once their dumped furniture was known by their neighbours. After that, the students were invited to walk along their designated path, act like another participant, and feel the journey. Finally, they reported that it was a very strange experience, as they seemed to be acting like a customer looking over something 'useless'. The journey was somewhat unpleasant. This indicates that novice designer would find it difficult to go beyond their expert-driven role as a professional designer. Once they leave their designer role behind and take over a new one, they could discover something different.

They found that residents would not be pleasant either when walking along this path. We asked them to try to recount their experiences, especially searching for the moment when they were shocked by the large pile of dumped furniture. They had to search for the astonishing feeling at that time. We asked the novice designers to connect the moment of astonishment to the potential users' possible feeling. Then, they decided to re-arrange their booth and began piling up the pieces again. They just wanted to re-build the pile just as the one they discovered in the estate at their first visit. After that, more participants, mostly their classmates, joined in and asked why they did it. The students gave no answers and just recommended the participants to try to choose one and use it immediately. Some students re-built the 'things' and sat on them. After a short period of time, it seemed that participants were no longer conscious of sitting on their own designs. Most of them chatted there for a rather long time. The booth was extended into its front area and transformed into a temporary public area. One student commented that it seemed to be a kind of magic that more participants found the dumped furniture interesting and some even could immediately 'design' its alternative usages. At this moment, we asked the student to try the third layer of empathy, that is, the third empathic act of acting into the other's bodily experience which brings forth the *imagination of replacement*, that means, we asked the students to imaginatively change their identity from designers to participants. This tactic is to encourage the designers to think about the bodily experience of participants when using their design, and in this process the student designer is the participant. We asked the students if we could understand why participants were willing to sit on the dumped furniture publicly, and under what circumstances the participants are willing to 'design' their own furniture. The design students however could not make sense of the tactic of the imagination of replacement while this tactic has been performed well by another group.

The imagination of replacement

We learned this concept from Finlay. The original interpretation is to perform a kind of empathic act through which an observer and observant would become one, each is absorbed into the other. The imagination of replacement is the moment the practitioner takes up two roles at the same time, i.e. in the practice of design, a designer and a user. In other words, the design student performs as 'a DIY designer'. The idea was introduced to one group of students after they finished construction of their booth. The booth was titled 'shouting-out', an area where different forms of paper-made speakers were placed. Participants were invited to use the speakers to express their grievances. The idea came from the experiences during their visit with residents living in the estate. They found residents, were very unhappy with many restrictions of the environment set up by the estate management. However, after they successfully mounted up all the speakers, only a few people went into their booth and tried the speakers. We asked the students to give some reasons about why the residents would come over and use their design. They had no ideas about the residents' preferences. We further asked the students, given some residents came, if the residents would have some grievances that should be vented out. One final question: who needed their designs? After the questioning time, the students were instructed to try out their own design. They shouted, yelled, and roared. The content mostly revolved around inviting people to come join them, making some noises and testing their personal vocal capacity. They began finding this activity meaningless. There was no impact. Then, they were asked to use their designs their own way. They began persuading their schoolmates to come join them. They expressed their dissatisfaction with their academic assignments, their grievances against their lives, etc. One of the students found that the speakers could be used to amplify her voice. She then went around the campus to test the effects of using different paper-made speakers. She further found that the speakers were not only for venting but also for making wonderful sounds in the campus.

This experiment went no further. But one student expressed that it was possible for them to use it to persuade the residents to design their own audio instrument to make different kinds of sound within their estate. According to this student, they could think of possible ways of designing with the residents to improve the living quality through better audio environment. Surely this idea comes from their experience of the imagination of replacement. It is not only from the empathic act of putting one's feet into other's shoes, but also from the empathic act of being that user. To us, this tactic is important, as this would facilitate us to move onwards in the direction of 'designing by the user'.

Conclusion

Design schools as a place for knowledge transfer are inevitably responsible for the production of knowledge. The aims of knowledge production could be for the development of this profession to meet needs arising from production industries. It seems to be running for the needs arising from economic needs. As has been pointed out, this view of design schools for industrial and economic purposes is a dated one and the design professions should be responsible for social change, i.e. from designers for industries to designers for societies. This leads to the question – what is the role of designers in the process of social change? The traditional view in this respect will point to designers as a group of pioneers who are guided by knowledge and expertise

towards helping others. Nevertheless, digging into the nature of knowledge could find that designerly ways of doing may be an inherent popular expertise by which every ordinary person could employ their own designerly wisdom when designing for social change.

From our research, we aim to promote the idea that designers should act as facilitator when grooming ordinary people's natural ability. Thus, design schools are the institutions by which design activities are organised and both designers and people work together to try out creative ideas for making social change better. In this process, there are a number of necessary skills required when dealing with the power dynamics between users and designers - use of power over the ordinary people by designers, and the use of power to protect designers' so-called 'original ideas'. To us, the use of power is the major social factor that would ruin the establishment and operation of communicative space and suffocate the community of inquiry. In this respect, we advocate the use of confrontational tactics, empathy and the imagination of replacement to dissolve the mechanism of power employed by designers in the process of knowledge production.

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Digital gardens with *real* toads in them: the place of heritage media in a digital art and design education.

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Abstract: *At a time when digital media is regarded as orthodoxy in education, in advanced global economies there is a pressing argument to review the lessons of the past and reflect on whether they are still applicable. This paper will enquire into today's issues with digital practices in art and design education using relevant, historical examples from the main changes in approach of the last century. It will also explain how the changes of approach to art and design education has affected the choice of materials, the stress on different skills and the values of different creative arts within the subject. From a position as a practitioner in the moving image, and in response to this autoethnographic research, the author puts forward a pluralist approach to teaching design, through a hybrid of particular aspects of 'heritage' and digital practices.*

Keywords: design education, drawing, digital, hybrid practices.

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Introduction

When Dick Field wrote his landmark study "Change in Art Education" (1970) the debate on the relevance and place of art, design and craft education was as strenuous as it is today (Addison, Burgess et al 2010; Steers 2009). This paper seeks to contextualise today's issues with the combination of digital and heritage practices in art education, and disseminate the pertinent changes of the last century in order to explain how the changes of approach to art and design education has affected the choice of materials, the stress on different skills and the values of different creative arts within the subject. In this research of teaching and learning practice in digital art and design, the author uses autoethnographic methodology to look at the significance of storyboarding, and argues for the importance of learning by hand through drawing.

The place of drawing and craft practices in the curriculum and the economy

In their "A Manifesto for Art in Schools" Art is defined as referring to Art, Craft and Design (Swift and Steers 1999). The disappearance of the words "Design" and "Craft" have caused significant anxiety amongst "Art" educators for many years, and indeed there has been increasing concern that art would also lose its place as a distinct subject within the school curriculum (Hughes 1989; Peers 2011). "Craftsmen are being made to feel inferior fellows, instead of the salt of the earth as Morris and Gropius believed. Art and Design are being separated" (NSEA Journal editorial 1981 in Hughes 1989, p.126). The concern remains that art, as a subject would be marginalised unless it could justify its position by providing employability, economic value and literacy (Hughes 1989; Peers 2011), and it could be argued that this is where the relationship with art and technology is critical, "failure to familiarise children at school with the use of such technology inhibits their imaginative potential" (Warnock in Hughes 1988, p.132).

In Australia a similar concern exists, Peers argues that the dropping of "art" from the "National Review of Visual Education" (2008) is a symptom of the neo-liberal politics that encourages market forces to dictate curriculum provision and further commodifies the human capital of children: "in educational terms, it no longer matters whether knowing is authentic so much as whether the performance can be capitalised" (Peers 2011, p.420-1). Technical skills appear to have economic value, expanded consciousness and creative thinking seem harder to quantify and therefore value. Measuring the value of art and design education against economic human capital has been an aspect of industrialised societies in the twentieth century (Wood 1996), as Field also illustrates: "throughout the thirties there were complaints from industry and commerce that the schools of art were failing to produce designers of much practical use" (Field 1970, p.57).

Good teaching practice aspires to combine critical thinking and technical skills in order to develop individual creative expression. Many design courses at universities and art colleges are firmly grounded in a practical creative ethos that is relevant to industry's present and future needs. "The fusion of technology with the creative and digital industries is as vital to the UK"s economic growth as that of science, engineering and manufacturing" (Council for Industry and Higher Education 2010).

Art and design pedagogy and the teaching of the use of materials and technologies of creative practice are taught continues to be informed by the work of Dewey (1934), Bruner (1960) and Polanyi (1964). An analysis of current teaching practice also reveals remarkable similarity to Field's experiences over forty years ago.

Learning through materials

Over the last century there have been various challenges that have impacted on the provision of materials, but while war years brought scarcity, more recently budget cuts and government policy have made an impact (Facer 2011). Sometimes scarcity is the mother of invention. Field describes it as a "revolution", because the utilisation of new materials changed the working processes and assessment culture in art education.

The Bauhaus and Modernist approach was to re-educate the student to be more individual and sympathetic with their materials, and it changed the relationship between artists and technology (Itten 1963). The response of the teacher and the child in 1950 is still relevant to the digital age today, because both the teacher and the child had to "start from the same base; both had to invent or discover, to respond to the material, to find ways of using it, to accept the thing made" (Field 1970, p.14). Working and learning with new materials and technologies brought "a clarity of vision with respect to the material, a sincerity of response" (Field 1970, p.14). This differed from the response to traditional materials through "the conventional way" because new concepts of skill had to be developed "while actually doing the job" (Field 1970, p.14). The process became as important as the finished artifacts. But what really stands out as a parallel to today is that "many teachers soon realised that new media might serve as a stimulus for failing interest or as a compensation for lack of success in other directions" (Field 1970, p.15). This echoes Wood (2003) who claimed similar success with digital media in modern artrooms. The 2009 OFSTED (The Office for Standards in Education, Children's Services and Skills) report on art education in England and Wales found that digital media was making a positive impact on pupils" attainment and the exploration of abstract concepts. The report found that students (particularly boys) improved in art classes when ICT was provided. Students who struggle with traditional media find recognition as competent manipulators of digital media (Wood 2003), which "is often supported by considerable home use" (Davies and Worrall 2003, p.92).

In 2004 Scottish primary schools in the Angus district took part in a four-year pilot with Scottish Screen (now Creative Scotland). The Moving Image in Education initiative was a programme that used literacy, numeracy and visual skills to make short films and animations. Bazalgette (2009) reported that this pilot had provided previously failing or excluded learners with access to the curriculum, and built bridges between "home "and "school" cultures and knowledge, a view shared by other recent reports (Wood 2003; Lord, Jones et al 2007). Other key findings were that moving image offered different routes into concepts of literacy, and it gave learners a sense of agency and autonomy that supported self-confidence. I would argue that this is possible through the collaboration and nonlinear line of imaginative inquiry associated with digital making. For Sullivan (2010) this is evidence of motivation and engagement on a deep emotional level rather than an organised division of labour.

> As such, concepts of collaboration are grounded less on notions of expert systems that divide up roles in terms of ends and means, or design and delivery, but more

> like shared wonder that requires new ways of thinking about visual and virtual systems of inquiry. (Sullivan 2010, p.158)

Younger children still approached physical materials with the same elastic and flexible approach that Field (1970) acknowledged, but using a hybrid practice they also synthesised them into a digital world as collages became scenic art or 3D models became characters.

Dewey and Bruner argue that the availability of the tool affects the thinking and creative problem solving ability of the learner. "The pupil operating as artist must "think" in his (sic) medium; his subject matter is, in Dewey's words "the qualities of things of direct experience" (Dewey 1934)" (Field 1970, p.45). Bruner (1960) sees the culture of what tools are available and how they are organised as also being fundamental in how cognitive ability develops, which arguably have special relevance to design. "Design is a compound of artistic, social and technological elements" (Field 1970, p.61).

> During modernist times, the prevailing construct was "to *see* is to know". This was grounded on empirical understanding based on direct experience and it was mostly achieved by participation in the grand tradition of cultural tourism…During postmodern times, we live in a mediated visual world where there is little distinction between the real and the virtual. If we understand the constructions that shape what we see, then "to *know* is to see" (see Rose, G. 2001 Visual Methodologies). (Sullivan 2010, p.171)

Sullivan (2010) brings the subject to the mediated world of contemporary postmodern times and the importance of moving image in art education to increase learner literacy, in both text and visual modes, by thinking and learning through this media. Wells, Hardstaff and Clifton (2008) argue that animation teaching must be flexible enough to maintain the evolution of a robust critical methodology.

> All arts education should be about incitement, not about complicity, and this is something that the freedoms of expression in animation can readily accommodate. (Wells, Hardstaff and Clifton 2008, p.21)

Moving image offers stimulating opportunities for screen-based digital skills, 3D modelling and drawing to develop together, allowing contemporary modes of creation to be taught in a structured programme in an arts context. Within the craft there is freedom to critically interpret and think while doing.

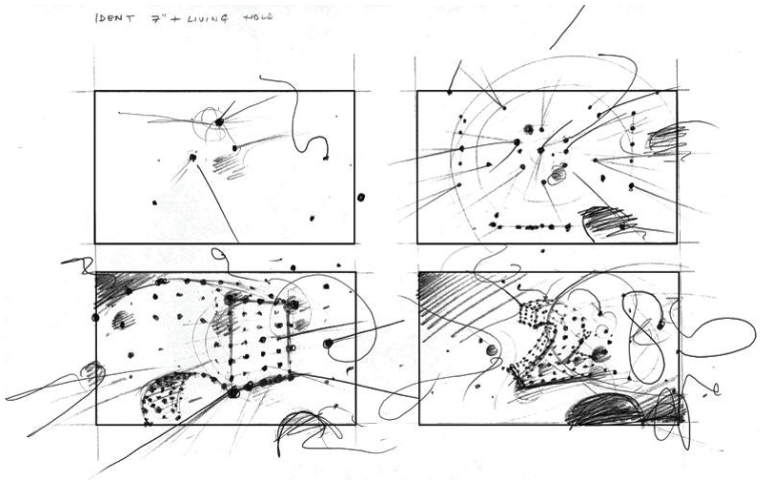

Figure 1. Storyboard for BBC 2 ident. Source: Gouldie 2005.

Storyboarding- praxical knowledge

There are several reasons for learning to draw in a digital age. Krcma (2010) argues that drawing can be given new visibility and purchase, re-energised as it enters a transformative relation with other visual technologies. Hanna (1998) argues that drawing with pencil and paper has been superseded in design by computer-aided design (CAD) and the digital pen and tablet technology. In architecture "the uniqueness of sketching as a design tool…is an outdated and inaccurate concept…CAD is not a tool; CAD is a medium" (Hanna 1998, p.39). Architects may well be able to visualize 3D space more rapidly with the building blocks and tools CAD offers on screen, but for the motion graphic designer and film director the process of drawing a storyboard (see figure 1.) offers an immersion into the visualisation of 2D, 3D and 4D space (Wells 2008).

> Drawing is considered the most intellectual of the visual art disciplines …because it is the primary means by which artists and designers initially depict three-dimensional form, conduct inquiry and conceptualise their works. (Addison & Burgess 2007, p.204).

The contemporary art practice of William Kentridge provides an example of a creative approach that uses drawing to find new ways of thinking. Both Bolt (2011) and Krcma (2010) use Kentridge to illustrate the particular theoretical understanding of creative practice that comes from our "concernful dealings with our materials" (Bolt 2011, p.94). Krcma (2010) gives a similar account of how Kentridge comes upon aesthetic or narrative problems within his drawn films, which become opportunities where he finds new ways of thinking through the act of drawing. It is "the contingency of circumstance and the "interference" of material process, which encourage what art historian Barbara Maria Stafford has called "nonformalizable moments of flexible insight" (Krcma 2010). According to Montgomery-Whicher drawing appears to be "marginalised by new image-making technologies" (Montgomery-Whicher 2001, p.10), but the significance of drawing will endure because of its very difference to dominant practices and media.

In broader theoretical terms, Heidegger directs us to experience the world, by being-in-the-world as Dasein, in order to understand it. Practical knowledge is not atheoretical, because "handling is not blind, but produces its own kind of sight" (Bolt 2011, p.96). Our theoretical understanding allows us to use materials, tools and processes with care, "handling as care produces a crucial moment of understanding, and that understanding is a revealing of possibility in its very possibility (Bolt 2011, p.97). Discovering a Heideggerian praxical knowledge through our skill, Bolt (2011) sees Kentridge"s account of his practice as "material thinking", referring to Carter (2004) who suggests that materials have "their own intelligence that come into play in interaction with the artist"s creative intelligence" (Bolt 2011, p.163). This has pedagogic relevance in the teaching of students in the creative arts. Students themselves can recognize that they can best learn through actually handling a material or "doing it" (Macdonald 2012). Montgomery-Whicher (2001) also takes a Heideggerian view to explain how drawing can counter an enframing of the world, by expanding and increasing the detail of our vision, and through a focal practice that brings contemplation it can centre our lives.

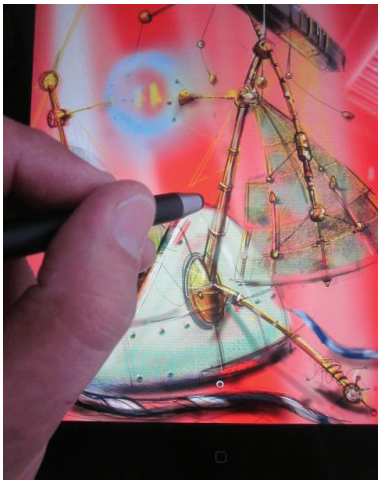

Figure 2. Drawing on an iPad. Source: Firth 2013.

When I am working at a storyboard, as I draw I am visualizing the movie in my mind. I immerse myself in the setting and the narrative; my pencil becomes part of me as I think through the sequence in a series of frames. It is a similar approach to the word association drawings of Marion Richardson, the pioneer of progressive art education in the New Education Movement of the 1920s, to let the inner imagination express itself (Holdsworth 1988; Smith 1996). I am only conscious of the material when the lead in the pencil breaks. Heidegger reminds us that it is only at these moments of technical failure that we become aware of the being as equipment (Heidegger 1954). Our helplessness without the presence of useable equipment becomes apparent. The product designer and lecturer Richard Firth, recognises the difference in the digital and analogue materials when it comes to making mistakes. Firth draws directly on a digital screen using an Apple iPad (see figure 2.), but finds that the drawing "lacks the scars of the thinking process" (Firth interview conducted by author 2011) which would normally

be evident in a drawing on paper. These scars represent points of learning, and act as reference points of thinking and mark the living experience with the medium.

The artist David Hockney, a vocal advocate for drawing, most recently exhibited a series of digital drawings, created on his iPad, at the Royal Academy, London (2012). These drawings, made by using the side of his thumb and sent electronically to friends to share, are described as "as delicate as a Turner, luminous as stained glass and as hi-tech as any art being made in the world today" (Gayford 2010). It is over ten years since Raney (2001) wrote of her Palm Pilot study with an artist in school intervention, now that digital hand drawings have been elevated to public display at the Royal Academy, children may not find the experience of drawing on an iPad as levelling and as less self conscious as on the far cruder Palm Pilot. Gombrich (2002) explains how representational drawing depends on schemata that is learnt culturally. In some of the new media, such as the Palm Pilot in 2001, there is not an established schemata to conform to. Further research exploring whether technology achieves greater sophistication to mimic traditional media should be explored, taking into account traditional schemata, and expectations of traditional drawing skill transferred to the new media.

When teaching moving image I begin with taking the students through my own storyboards. The storyboards provide a learning tool, a drawing that represents my creative thinking and visualisation of a script or brief. Adams (2001), the coordinator for the Big Draw, the education programme for the Campaign for Drawing, defines three functions of drawing. These can be applied to storyboarding. The first is drawing as "perception", for personal pleasure or insight. In my practice a director can begin an idea with the crudest outline sketch, as the legend has it "on the back of a fag packet" or "napkin". Secondly it can be worked up into greater detail for client presentation: a drawing as communication. Thirdly, drawing as "manipulation" it can allow the director to reflect, refine, discard and develop a sequential narrative of images or scenes that illustrate a moving image film. By visualising camera angles, arranging the elements in the shot that need to follow the script or idea, a mosaic of shots can be laid out (see figure 3.). Often it is useful to photocopy and cut them out to allow more fluid thinking. Each frame can represent either a significant point of different action or another shot entirely. It can represent a fraction of a second or many seconds.

Conceivably, because it can be read as a comic strip, many filmmakers and advertising agencies commission storyboard artists with a graphic comic book style. However, the idiosyncratic drawing style of an individual designer or director can communicate just as well and it allows a more intimate and personal involvement with the project, which can be communicate a compelling visual understanding of the film. For some students it can be a challenge to visualise different angles and depth of action, so I may suggest that they find suitable secondary picture references to trace and collage rather than draw from imagination.

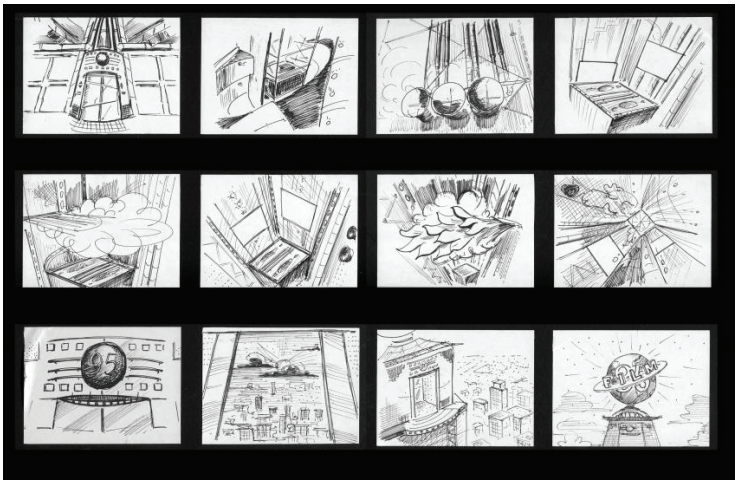

Figure 3. Storyboard for BBC 'Film 95'. Source: Author 1994.

Unfortunately, some clients can only read a storyboard when they see it moving, and this can be especially true with motion graphics, which can often have a more abstract composition and compressed duration than a commercial. Many of my television clients had a literary arts education rather than a visual arts one and often when discussing a brief I was relied on to translate their script into images, whereas in advertising an art director would begin a creative discussion with their sketched storyboard. This was expanded and developed with my own creative input. With camera technicians, set designers and props my storyboards were read literally as a builder would follow an architect's plans, or used suggestively if required. Filmmaking is a team effort and often there can be a better outcome from embracing colleagues" suggestions as a result of offering them creative breathing space. This can be replicated to some degree in the classroom with small group tutorials that allow the student to present their storyboards to their peers for feedback and evaluation of the means and content of what is being communicated.

In this study, the storyboard's validity in the digital age is questioned. There still appears to be a high demand for someone who can draw, but also someone with the expert knowledge and experience of a director who can visualise a script for a client, be it in advertising or feature films (Wells 2008). Within the motion graphics industry creative directors still regard drawing as a highly desirable, if not essential, skill to have when looking to employ new graduate trainees (Wormleighton interview conducted by author 2010). Designers and directors need to be able to express and think their ideas through their hands, and as Kentridge demonstrates in his work, drawing can be a process of thinking as well as learning.

Hybrid futures in art education

In "Why throw the negs out with the bathwater?" (Macdonald 2012) it is argued that there is a digital orthodoxy, especially within education, in response to the anxiety to prepare children for a digital future in a global workplace. By focusing on lens based media within art education the paper revealed sites of resistance and alternative pedagogic practices that provided a more pluralistic learning environment. Contrary to

public opinion not all young people are "techno-geeks", some find heritage media not just "cool", but more tactile and real – qualities that they value in the digital mediated world that they grow up in (Macdonald 2012). There are several advantages, it could be argued, to a hybrid of heritage and digital approaches to education in the visual arts.

The first advantage could be to bring art and science closer together. Current thinking on the future direction of education as whole suggests that there should be greater convergence of skills across the arts and science. In the 2011 MacTaggart Lecture at the Edinburgh Television Festival Dr. Eric Schmidt, CEO of Google, called for an end to the pigeonholing of "luvvies and boffins" and that tomorrow's graduates should not see themselves segregated in such narrow definitions (BBC 2011). Sullivan argues that new digital technologies can provide the bridge between art and science:

> It is the development of newer technologies sparked by the digital revolution that is forging links between the arts and the sciences. And for Wilson (2002), the arts are crucial to this enterprise as they "can fill a critical role as an independent zone of research, in which artists integrate critical commentary with high-level knowledge and participation in the worlds of science and technology" (p.35). (Sullivan 2010, p.163).

John Maeda, Director of the Media Lab at the Massachusetts Institute of Technology, argues that education should enable people to become "humanist-technologists" through a "post-visual arts education". Art and technology "compliment each other in a necessary union of relevant vision united with relevant construction" in a purposeful learning environment (Maeda 2000, iv). This approach is not as new as it may seem. Maeda (2000) acknowledges the tradition of the Bauhaus and the art educational research of Josef Albers and Moholy-Nagy to find an appropriate pedagogy at a time of unprecedented technological advancement and mechanization during the 1920"s.

Other American East coast academics, such as Lupton and Phillips (2008) at Maryland Institute College of Art (MICA) in Baltimore, also draw on Bauhaus approaches that combine a humanistic (individual rather than machine centred) approach to using technology to describe and interpret visual forms in design thinking. At The Cranbrook Institute of Art in Michigan "the messiness of human experience is warming up the cold precision of technology to make it livable, and lived in" (McCoy & McCoy 1990, p.14). In a reaction to the rational, systematic approach of Modernism they have embraced expressive rule breaking and deconstruction since the eighties. Cranbrook would argue that they offer students a pluralist approach to suit the individual rather than the singular philosophy of the Bauhaus.

There are other voices that suggest "algorithmic thinking requires an analytical bent of mind" (Vidwans 2008, p.152), and that we need to "develop technological intuition without losing aesthetic intuition" (Huang 2008, p.167). Huang (2008) suggests a more Eastern philosophical approach using Wu-Wei to develop a mastery of technology in harmony with artistic practice. This is contrary to Western thinkers such as Heidegger who would advocate that we work with technology rather than attempt to master it.

It is significant that some of the most radical and highly reputed art and design education institutions are using new technology to bring art and science together, but retaining a pluralistic approach that accommodates heritage practices to interrogate and often subvert the original use of new technology. Kittler (1999) describes a world that will only be conceived and experienced through digital media where cables connecting computers form a human bypass, removing us from the information

highway loop and so "computers themselves become subjects" (Kittler 1999, p.258). This is surely a dystopia we must avoid.

Another advantage of a hybrid approach to visual art education is linked with literacy. Futurists such as Alvin Toffler acknowledge the continuing technological change necessitates that people must continue to educate themselves, otherwise the 21st century illiterate will be "someone who cannot learn, unlearn, and relearn" (Toffler 1971, forward). Illiteracy at its most basic level of reading and writing is a central concern across the world so Toffler warns us of the potential for greater social and economic inequality. In the UK and other developed countries the rapid increase of digital processing power at a corresponding falling cost has allowed a democratization of digital media and communication. (Moore's Law follows that £1000 of memory today will be worth £1 in twenty years time (Facer 2011).) While some contested the assumption that the use and availability of digital media was universal with UK children (Hall in Stanley 2009), it is evident that each year it becomes a reality. The impact of this is that "those children with access to digital technologies outside school, such resources have the potential to intensify the impact and reach of their informal learning" (Facer 2011, p.19). Within this there will continue to be inequalities.

> Importantly, some of these augmentations will have the function of empowering and extending children's agency, others may be administered to limit, and control them, and these different patterns may play out along lines of wealth, ethnicity and gender. (Facer 2011, p.54)

Wildermuth (2010) argues that education should focus on empowerment rather than digital inclusion. There are striking imbalances across the globe where the vast majority of humankind is without the physical resources or skills to be a digital citizen. In India, the Sarai research project in Delhi has challenged the cultural Western hegemonies and the digital divide by bringing together artists, activists, urbanists, theorists and critics on a hybrid mission to share learning (Lovink 2005). Nations such as Brazil, India and China are rapidly growing economically and have enormous resources of people. These nations, increasingly, will bring innovation and a resourcefulness, which includes heritage and digital practices, to education. Having taught recently in China I have witnessed the appetite to adapt and embrace new educational research, to involve handcrafts and digital skills to model and develop 3D designs.

As digital technology develops it seems to mimic more analogue experiences and so bring a whole new dimension to education. Haptic literacies that grow through heritage skills and analogue processes are likely to be developed in digital technologies that have motion sensors, for example those technologies found in the Wii. Information and experimental designs could be felt and navigated through in a virtual simulation. The speed of reflection and action is further accelerated; the plasticity of a design process becomes greater. It "bridges the divide between the academic and vocational knowledges, between knowing "that" and knowing "how", between reflection and action" (Facer 2011, p.65). Of course endless plasticity and a faster cycle of action and reflection may have a bewildering and overwhelming effect to less competent and literate artists.

> To be "literate" in this environment, is to be able to model, to experiment, to visualize, to verbalize, to write and to film (among many other things)…Educators will need to engage with the materials by which representations are produced, with the ways in which the hardware and software, the networks and biology of our modes of communication also serve to structure our possibilities for representation, modelling and comprehension. (Facer 2011, p.71)

The world is more mediated and so the experience of the learner, both young and old, is also more inter-textual (Darley 2000). "Nothing is finished, nothing is complete, nothing cannot be modified" (Facer 2011, p.75). The creative opportunities online allow for people to "mash up" music, video, text and image to create individual compositions and products. These can be found on fansites, which provide opportunities to create, disseminate and engage discourse far beyond the classroom. This heavily mediated experience may be creative, but it is far removed from Richardson's approach that viewed children's art with a Romantic purity of vision, or Heidegger's argument for unmediated authenticity. It is questionable whether authentic creative expression can ever be found or taught if the technology and media used allows for content to be easily so fluidly inter-textual. This may be the boundary between art education and media studies.

Conclusion

This paper has endeavoured to contextualise the challenge that faces art and design education in contemporary digital art and design. There are perennial similarities over the last hundred years on how the choice of materials has an affect on the relationship between art and technology. The changes that Industrialisation and American commercialisation brought to art education at the beginning of the twentieth century has resonance with the digital revolution in the early twenty-first century. Yet it can be argued that the place of drawing as a means of thinking through the medium remains a vital and immediate as it has no economic or social constraints. Whatever the label given to visual art education, the challenge remains to defend its purpose and role in education. The emphasis will change with the language used in its defence, depending on the audience it seeks to influence. Western Governments look to the economic value of the arts as a commodity, a workforce that can generate prosperity and economic growth. Within academia there is also the opportunity to bring art and science closer together through technology, and following Heidegger, a means of continually questioning the authenticity of the inner vision in creative expression.

Many art colleges and universities continue to support heritage and analogue facilities that attract and are appreciated by students. Digital monoculture can be found in higher education, but if it were to become the mainstream it would mark a significant threat to heritage processes that could atrophy and be lost forever. It is particularly important in my field of moving image and animation.

Pluralist approaches should embrace all visual arts education, to allow individual expression, a critical questioning and thinking using a choice of media and cross-curricula cooperation and exposure through new sites of public engagement, both physical and virtual: digital gardens with real toads in them.

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A Multidisciplinary Approach to Design Education: Providing a framework for informed designers of the future

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Abstract: *This paper recognizes the need to integrate design in all levels of education in order to foster creative skills that are applicable in most aspects of life. It highlights unique challenges associated with teaching design in the digital age and the need to encourage students to see in a critical and meaningful way. The methodology used in design education must build on existing virtual tools to promote a physical reconnection to one's surroundings in order to promote an appreciation and understanding of place. This paper explores the notion that design does not occur in isolation and is part of a larger process that involves sharing in a collective sense. A multidisciplinary design education drawing parallels between various areas of design, other diverse fields, and larger societal structures, will allow students to see the importance of sharing in building a solid design foundation. This will lead to more informed citizens and a better quality of life.*

Keywords: Design, physical connection, sharing, digital

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A Multidisciplinary Approach to Design Education: Providing a framework for informed designers of the future

The intention of this paper is to raise awareness about the unique challenges associated with teaching design in the digital age. Many students are immersed in a reality that is very much a virtual one and, as a result, they have lost their connection to the physical environment. This becomes particularly poignant when the teaching relates to spatial design where the skills being taught rely on the ability to embrace both the tangible and intangible world we live in.

The position put forth in this paper is that there is a need to integrate design in all levels of education, from kindergarten to PhD, in order to foster creative skills that are applicable in many aspects of life. We need to teach and encourage students to see in a critical and meaningful way. The methodology used in design education must use the existing virtual tools and social media students are so comfortable with to promote a physical reconnection to one's surroundings, thereby establishing a tangible understanding of place that reflects our visual and material culture.

This paper relies on a definition of multidisciplinary from the report *Multi-disciplinary Design education* (2010); "'multi-disciplinarity' describes situations in which several disciplines cooperate but remain unchanged "(8). Sharing of diverse approaches to problem solving is of great value and while this allows each discipline to grow, the core remains the same. The disciplines discussed include those within and outside of the design fields.

The cultural context that surrounds us is constantly changing and it is implicit that the definition of what is "meaningful" will also shift. This is also true of design. As Sudjic states, "This [design] is a language that evolves and changes its meanings as rapidly as any other. It can be manipulated with subtlety and wit, or with heavy-handed obviousness. But it is the key to understanding the man- made world." (2009, 51)

The report *Connected Learning: An Agenda for Research and Design* (Ito et al. 2013) summarizes recent research findings regarding students of today that support the claims above. The dependence on social media is resulting in a generation that lacks the ability to engage in meaningful social communication and it is tied to declining literacy and reduced capacity for reflection. (29) Sources provided within the report led to further investigations.

Patricia Greenfield's article "Technology and informal education: what is taught, what is learned" examines the pros and cons of the media available to students today. She claims that while television, video games, and the internet develop an "impressive visual intelligence, the cost seems to be deep processing: mindful knowledge acquisition, inductive analysis, critical thinking, imagination, and reflection" (2009, 71). We cannot afford to lose these skills.

Sherry Turkle (2011) echoes these fears in her book *Alone together* in which she explores society's relationship with technology by providing case studies of various young people. She draws attention to their lack of deep social engagement due to their dependence on technology. This multi-tasking, over-connected generation appears to be remarkably disconnected from their families and their physical surroundings.

In order to shape a world that will foster creativity, we must teach students, using a multidisciplinary approach, to understand the physical realities that make places meaningful. This requires an experiential understanding based on sensory qualities. "Design is understood as a primarily visual language. It uses colour to suggest playfulness or masculinity, and shape to engage or inform users about functions. But it is much more than that: it makes uses of all the senses." (Sudjic 2009, 89)

Design education, which incorporates teaching strategies unique to design practice, is being recognized as invaluable in many professional and educational organizations. Creative problem-solving skills and the ability to produce multiple solutions using visual techniques have widespread benefits. The report *Multi-disciplinary design education* (2010) emphasizes the importance of design and innovation in the UK if they are to achieve their economic goals. Multidisciplinary design teaching is being integrated in programs across the UK with the understanding that it is both relevant and necessary to industry at a global level. (6)

The world around us is in a constant state of flux. We must prepare students to respond to rapidly changing realities by using design skills to devise innovative and flexible solutions. This is the key to a stable economic future. In the article "The state of design" Bruce Brown (2012) claims that everyone is engaged in design, at both the tangible and intangible level. The built environment with its effects on nature has repercussions for the generations to follow. Our social and political systems are examples of intangible forms of design. Design impacts all aspects of our lives and, as such, there are moral responsibilities of citizenship that accompany it. The designed objects that surround us "now constitute a parliament of things - that governs our everyday experience of life." (165)

"Given that most of our experiences are governed by incremental shifts happening, imperceptibly, over very long periods of time… it is disorientating, and rare, for us to experience a sudden step-change to the environment." We do, however, find ourselves in that "step-change" moment at this time. We have moved from the Symbolic age and its cave painting to our current state where "Facebook and Twitter provide the social networks of a new Digital Age..." (Brown 2012, 155) The power of the digital is undeniable and we must build on its momentum to create artefacts and places that also have the power to bring about significant societal change.

Students respond to fast-paced images, text and movement but in that rapid-fire exchange, there is less time for reflection. Educators must emphasize the power of looking by engaging students in activities that require interactions with the physical environment. This is critical if students are to extract true meaning from their surroundings.

The ability to analyse, deconstruct and form personal connections is an important skill that must be valued by today's student if we are to improve the places in which we live. The goal is to teach students to attach meaning to their surroundings and to form a sense of collective conscience. This is crucial to the building of a collective memory, which helps to create a sense of belonging. (Brown 2012, 157) Students are already operating, on many levels, as global citizens with a keen sense of responsibility towards the world at large. Let us harness this interest and extend it to notions of design and how they can help students achieve the goals they already have in mind.

This paper also explores the idea that design does not occur in isolation. It is part of a larger process that is the result of the forces surrounding its manifestation. We will only begin to realize our full potential as a society if we tap into these very forces and use their influence to shape our surroundings. The ideas presented should be viewed as a collage of thoughts, which build on one another in the spirit of sharing so that we can begin the questioning and exploration that must come if we are to keep developing a dynamic design discourse.

The methodology used in this paper represents the multidisciplinary teaching strategy that is proposed to facilitate this discourse. The strategy is based on Nicolas Bourriaud's *Postproduction* (2002) in which he tries "to show that artists' intuitive

relationship with art history is now going beyond what we call 'the art of appropriation'…and moving toward a culture of the use of forms, a culture of constant activity of signs based on the collective ideal: sharing." (9) It is this definition of sharing that will be considered in the approach to design education. The notion of sharing in a collective sense has broad applications if we consider the virtual experience of the student today.

Drawing parallels to diverse fields such as biology, fine art, fashion, and mathematics and making connections to larger societal structures, will allow students to see the importance of sharing in building a solid design foundation. This approach will contribute to an evolving design language that reflects our ever-changing times.

> Nowadays, the idea of sensory training is connected solely with artistic education proper, but the refinement of our senses and sensory thinking has an irreplaceable value for all of us, in many other areas of human activity. I want to say more: the education of the senses and of the imagination is necessary for a full and dignified life. (Pallasmaa 1999, 140)

The quote above reinforces the importance of instilling the ability to see and to experience life at a sensory level. Much of our experience is based on the world of imagination and possibility, according to Pallasmaa, and it is largely an unscientific pursuit (1999, 129). The ability to explore our imaginations and to extend our ideas to the physical world can be developed through design in order to establish strong emotional ties to the world we live in. This will allow us to expand our experience as human beings.

Now, more than ever, it is essential that we educate the public in the *Ways of seeing* as proposed by John Berger in his seminal text published in 1972. The book was based on a BBC television series that demystified the experience of fine art. We can easily apply these ideas to designed objects and environments. The viewer/visitor must be encouraged to simply experience these things and to allow the emotional experience to connect with a more pragmatic one. At some point, there is an intersection of the two, and the impact of the design is translated at a level that resonates within the individual. We must encourage the ability to recognize and distill the influences around us. It is this rudimentary, almost visceral, understanding that must be cultivated to allow students to begin to form their own network of intricate tangible and intangible connections.

The cultural landscape has changed dramatically since 1999 when Pallasmaa's essay "Lived space: embodied experience and sensory thought" was written and even more so since 1972 when Berger first published *Ways of seeing*. In the digital age where virtual experiences are often viewed as being equal to or even more powerful than the real experience, we face the challenge of teaching students to see in a world that has different meanings for different generations. The concept of seeing has entered a new plane where each group must address both the virtual and physical experiences and assign meaning as they see fit.

The digital age, mass media and the proliferation of objects around us dictate a new design direction. This must involve teaching and learning the importance of distillation to the essential elements that make good design. A multidisciplinary design education focused on sharing will provide diverse opportunities and approaches for students to become informed citizens who will champion the cause of a global society in which the design of environments and their contents promote a better quality of life.

Let us consider the definition of *Postproduction* (2002), the title of Nicolas Bourriaud's book in which he presents an analysis of today's art in relation to social changes, whether technological, economic or sociological. (8)

> Postproduction is a technical term from the audiovisual vocabulary used in television, film, and video. It refers to the set of processes applied to recorded material: montage, the inclusion of other visual or audio sources, subtitling, voice-overs, and special effects…
>
> This art of postproduction seems to respond to the proliferating chaos of global culture in the information age, which is characterized by an increase in the supply of works and the art world's annexation of forms ignored or disdained until now. (13)

Bourriaud equates the art being produced from the early nineties to the present to the process of postproduction. He sees this as a movement where artists are creating works on the basis of pre-existing work, creating a new cultural landscape in which meaning and context are constantly shifting. This has led to the questioning of originality and the blurring of boundaries between high and low culture. The playing field has been expanded and the levels are no longer distinct. (2002, 13)

The discussion in Bourriaud's text is centred on fine art; however, these ideas are also applicable to the design world. Many students are drowning in the sea of information available at their fingertips. They must learn to navigate the waters through the collective sharing of ideas in order to find true meaning. The act of sharing leads to analysis, which allows students to begin to form their own definitions. The personal nature of design cannot be overstated. It is, ultimately, a subjective process of discovery that shares a common language and methodology.

Bourriaud uses the term "culture of use or culture of activity" to define this new form of culture he sees in the art world. This culture is one that is in flux and "the artwork functions as the temporary terminal of a network of interconnected elements, like a narrative that extends and reinterprets preceding narratives" (2002, 19). "The artwork is no longer the end point but a simple moment in an infinite chain of contributions" (20). The artwork challenges passive viewers and leads to activated responses.

A similar trend can be observed in the design world. Design is no longer a chronological exercise but involves influences from the past, reimagined in the present. As Bourriaud (2002) says "The quality of a work depends on the trajectory it describes in the cultural landscape. It constructs a linkage between forms, signs and images" (40). Students must be taught to recognize meaningful signs and to construct pertinent bonds in the on going narrative that defines our society.

There are many examples in furniture design where traditional forms and materials are reinterpreted to lend new meaning to the familiar. One such example is the ubiquitous Louis Ghost armchair designed by Philippe Starck (see Figure 1). According to Sudjic "Nobody better encapsulates the contemporary version of designer as celebrity, capable of transforming anonymous domestic objects with his signature." (2009, 26)

Figure 1: Louis Ghost Armchair
Source: http://www.allmodern.com/Kartell-Louis-Ghost-Dining-Chair-Set-4853-KTL1556.html
(Retrieved Oct.17, 2012)

> Who else but Philippe Starck would dare mess with a king? Reinventing the classic Louis XV armchair for Kartell, the playful Louis Ghost Armchair (2002) is a postmodern triumph of technical innovation and historical style. Translating the varied lines and formal geometry of its predecessor into a single form of translucent injection-molded polycarbonate, the Louis Ghost is a robust chair with a medallion backrest for leisurely comfort. When interviewed about the collection by the Dallas Morning News, Starck commented that it "has a mix of materials and styles based on our shared memories. We all own this piece in a way. The chair is well balanced; I try to be balanced myself"
>
> (Design Within Reach website)

In the quote above, Starck makes reference to "shared memories"; the basis of the Louis Ghost chair. The designer has, perhaps unwittingly, applied the principles of "Postproduction" to his design in the annexation of the Louis XV form.

A more recent, very whimsical example of furniture that challenges our sense of scale and proportion, is the 56 Cabinet designed by the artist turned designer, Ron Gilad. The legs of the cabinet are, in fact, very small steel reproductions of Thonet chairs. The repositioning of the iconic Thonet chair provides cause for reflection on the current state of design (see Figure 2).

Figure 2: 56 Cabinet
Source: http://www.adele-c.it/eng/p/56-cabinet.php (retrieved Oct. 19, 2012)

> While creating pieces for Adele-C I allowed myself the freedom to play with extreme irony and scale while maintaining the balance between the useful and the abstract; going all the way to the edge of the cliff but not jumping off. The "56" collection started with two functional objects; one for resting and the other for storage. My task was how to elevate these functions, both literally and conceptually. The past came to my rescue. Appropriating Thonet chair no.14, shrinking it and reproducing it in steel, allowed the stability for it to function as a support to the other components rather than our butts.
>
> (Ron Gilad, Adele-C website)

Adele-C is a division of the Italian Furniture company, Cassina, which is renowned for its commitment to excellence in design. This division of the company not only promotes the design of furniture collections by artists and individual designers but they have also reinterpreted the design of the product binders, an important tool for a design practice. The traditional 3-ring binder has been transformed into a magnetic system that is both flexible and easy to use. The company has acknowledged the importance of design at every level. There is a connection between past and present, and the complete packaging and dissemination of design vision in the form of the binder (Adele-C website). We see once again, the use of the Postproduction strategy in furniture design.

These examples reinforce the notion that design education, with its promotion of creative problem solving, is a layered process. The core skills of good design can be built using a non-linear approach that brings influences from other disciplines while still promoting and perfecting essential design skills. The approach of a mathematician will vary significantly from that of a biologist. Yet a multidisciplinary approach will instil an understanding of the design process while addressing the broader context in which we live. This provides students with the tools necessary to address the changing realities they face on a daily basis. The skills gained through this approach to design education

will allow students to adapt to shifting economic and political trends to better shape the world we live in.

> The duty of education is to cultivate and support the human abilities of imagination and empathy, but the prevailing values of contemporary culture tend to discourage fantasy, suppress the senses, and petrify the boundary between the world and the self. The main object of artistic education is not being found in the principles of artistic making, but in the personality of the student and their image of the world (Pallasmaa 1999, 139).

A multidisciplinary design education will encourage students to dissolve barriers between the world and the self and, ideally, to promote a better understanding of both. As the report *Multidisciplinary design education* (2010) found, this approach would ultimately benefit a globally sustainable economy. The cross-pollination of ideas between disciplines will encourage teams with different expertise to devise innovative solutions that are vital to our future wellbeing. (9)

Creativity and place

In the *The rise of the creative class*, Richard Florida (2004) heralds the arrival of a new creative class of people who will fuel the economic development of the future. "The creative individual is no longer viewed as an iconoclast. He-or she-is the new mainstream". Creativity is multidimensional and comes in many mutually reinforcing forms. Creativity also requires a social and economic environment that can nurture its many forms. (6)

He argues that creativity is now perceived as the most highly prized commodity in our economy. It is the reason for a new order in the workplace, according to Florida. He stresses the importance of creative problem solving skills in all lines of work. These skills must be taught at an early age if we are to reap the full benefit of a creative workforce living in an optimal environment (5). These views are reinforced throughout the report *Multidisciplinary design education* (2010) in which design education in the UK is linked to innovation, productivity and economic growth. These are essential ingredients to our future.

Mitchel Resnick (2002) also supports this idea in his article "Rethinking learning in the digital age" where he discusses a major change in the 1990's when people began to shift their focus from "information" to "knowledge". According to Resnick, information itself would not bring about important change but, rather, how people transformed information into knowledge and how they applied this knowledge. He sees this shift as the beginning of the "Creative Society". He states that, "success in the future will be based not on how much we know, but on our ability to think and act creatively." (36)

"Place has become the central organizing unit of our time, taking on many of the functions that used to be played by firms and other organizations" (Florida 2004, 6). This leads us to the understanding that we must design and foster places that attract the creative class to encourage economic and social development. Successful places are both creative and diverse, and it stands to reason that their designers possess these qualities themselves.

Students must be encouraged to immerse themselves in their immediate surroundings to observe, analyse and criticize. They must learn to distinguish the essential from the superfluous. Design education will instil an awareness of the

important factors that contribute to the production of well-designed objects and spaces. This process will allow students to connect and dissect the places they interact with on a daily basis. Such an approach will establish a deeper understanding of the meaning of place and the material culture at hand. This will enable future citizens to address important issues in the world and it is essential if we are to improve the environments we inhabit.

Pallasmaa stresses the importance of developing the senses and the imagination. He states that, "We continually construct an immense city of evocation and remembrance, and all the cities we have visited are precincts in this metropolis of the mind" (1996, 145). We must foster the design of rich urban environments, which will allow the imagination to grow.

Design Objects vs. Place

"From a computer so revolutionary it needed only one button, to a wardrobe filled with a single signature sweater, Steve Job's unwavering creative discipline charted a new era in American design." (Isaacson 2012, 45) The general public is able to appreciate the beauty and simplicity of the I-phone shown in Figure 3 but only a few extend these principles to their overall environment. In North America, the general public's willingness to embrace technology does not extend to their relationship with design at large. This is due, to a great extent, to a lack of exposure to design.

Figure 3: I-Phone 5
Source: http://www.apple.com

> Its guiding tenet was simplicity—not merely the shallow simplicity that comes from an uncluttered look and feel and surface of a product, but the deep simplicity that comes from knowing the essence of every product, the complexities of its engineering and the function of every component (Isaacson 2012,45).

The simple beauty in the design of Apple products is widely acknowledged as good design. The public's appreciation of these products, which verges on devotion, is testimony to society's ability to recognize well-designed objects. If the general population can recognize the beauty contained within a piece of technology, we must question why so many North Americans are reluctant to apply these ideas to the broader context.

Architecture, urban planning, and even fashion remain stuck in time. The design of suburban cookie cutter homes that make reference to details and forms of bygone eras

(see Figure 4) seem out of synch with the world of technological advancements. Why have these forms remained desirable? We become more and more intolerant of obsolete technology and we are constantly searching for the next new development, yet many of us seem unable to move forward in a new design direction for the rest of our lives. North Americans are falling behind design developments in Europe and Asia (see Figure 5). One need only look at current design directions to witness the divide.

Figure 4: A Typical North American Suburban Home
Source: http://bldgblog.blogspot.ca/2008/01/horrible-secret-of-number-6-whitten.html
(Retrieved Oct. 18, 2012)

Figure 5: A Home in Tokyo
Source: http://www.bitesizejapanese.com/7-blog/buying-a-house-in-tokyo/
(Retrieved Oct. 18, 2012)

The public must demand that the same attention be paid to the design of our built environments and their contents as is paid to the technology we are so enamoured with. Ultimately, we can attribute this gap to a lack of education where design and the creative process are concerned. Richard Florida (2004) uses a creativity index (xxii) to

rank various cities in North America according to their ability to attract the creative class. Truly successful places are those that provide a sensory experience that we can equate at some level to the pleasure one feels when using an Apple product. The interface between user and object is sublime; the boundary between the world and the self dissolves.

Fashion and Trend in Design

*Wallpaper**, a popular design magazine founded by Canadian Tyler Brulé, displays the subtitle DESIGNINTERIORSFASHIONARTLIFESTYLE in the masthead. The range of content attracts trendy hipsters as well as design professionals. This publication provides a reasonable overview of all aspects of design, both past and present. There is a global perspective and, while the articles are limited in editorial content, it provides readers with enough information to peak their curiosity, and resources are included to promote further research in areas of interest. The combination of images, text, and advertising offers a visual representation of the multidisciplinary design outlook we are seeking to foster in design education.

The October 2012 issue, for example, features several guest editors including the celebrity pianist, Lang Lang. In this issue he gives us his insight into his ten favourite concert venues around the world. The inclusion of a pianist as a guest editor adds another layer to the multidisciplinary picture. This encourages conceptual connections and leads to narratives that may not have been possible before. This magazine offers a glimpse of the shifting cultural landscape that is relevant to the design world.

This particular issue of *Wallpaper** also includes an article "Letters from the near future" by Douglas Coupland: a Canadian novelist, visual artist and designer (see Figures 7, 8). He is, in fact, the embodiment of the multidisciplinarian and it is important to analyse and learn from his design process. His first novel, *Generation X* (see Figure 6), "is a frighteningly hilarious, voraciously readable salute to the generation born in the late 1950s and 1960s" (Coupland 1999, book liner). This novel gave rise to the widespread use of the term "Generation X" and figures prominently in the study of popular culture. "Couplands's novels and visual works synthesize high and low culture, web technology, religion, and changes in human existence caused by modern technologies" (Coupland website).

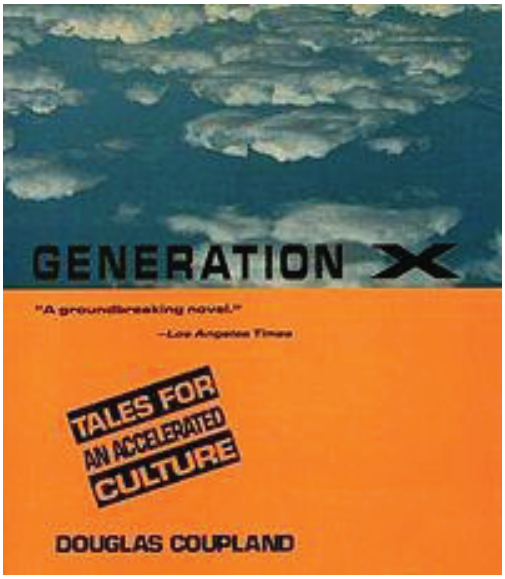

Figure 6: Book cover for Generation X by Douglas Coupland
Source: http://en.wikipedia.org/wiki/Generation_X:_Tales_for_an_Accelerated_Culture

Figure 7: Arctic Landscape Fuelled by Memory - painting by Douglas Coupland
Source: http://www.toronto.com/article/711680--douglas-coupland-welcome-to-the-21st-century

Figure 8: The Electric Table – designed by Douglas Coupland
Source: http://tmagazine.blogs.nytimes.com/2010/08/26/future-world/

Coupland's article offers a somewhat cynical view of the future beginning with musings from iconic new buildings in Asia and ending with a letter from a cinema in Detroit. His thoughts are critical of the architecture we are building in a world obsessed by technology. The article makes reference to Steve Jobs' lasting influence on the design of our future. In a letter from "Post-Tornado Singapore" he is living in an imaginary community called The Interlace:

> Today is, of course, the birthday of Steve Jobs, so we will be holding our celebrations in the central hexagon of our Interlace unit. It has been a good year for growth and the entire complex is vine-bound…
>
> Mr. Jobs would be pleased with our never-ending commitment to quality and simplicity and hope that we channel his spirit when we compress another five flatmates to our unit. That is my news for you, Comrade- I know it will be even more crowded with 19 to a suite, but you must remember that this is still relatively light compared to other units and The Interlace remains the premier residence for information architects stationed with the Southeast Asian Coprosperity Sphere. Hail Steve. (2012, 199)

The "Happy ending" we would like to imagine seems like a distant possibility and Coupland leaves us with a nostalgic desire for the past. He is critical of the high-rise projects that continually reduce our living spaces and our increased attachment to the technology that surrounds us. There is a feeling that we are losing our sense of self. Coupland conveys the idea that there is comfort in the nostalgia for the past that helps to alleviate our fears of the future. This is, perhaps, why so many people cling desperately to obsolete architectural forms in the places they choose to live.

The loss of a true sense of self as described by Coupland is a valid concern and it is one that is shared by Pallaasma and the researchers previously mentioned. This attitude prevails today and it must be addressed. Design education can help to rebuild

the bond between the world and the self if we re-ignite the senses and work towards a collective ideal.

Publications such as *Wallpaper** are important in illustrating the connections between the many areas of design. Students must be encouraged to embrace a wide range of printed and digital media in order to gain a global understanding of design and the world we live in. We must train designers of the future to remain current while being aware of the essential design principles. The frenetic pace and excitement of today's society must be translated into the education model we follow. We must keep abreast of changing trends and technology while constantly referring to the building blocks of a solid design foundation.

The multidisciplinary framework that will provide the structure for future design education will draw on the dynamic references around us. Post-production strategies, the sharing of knowledge between all disciplines, and engaging with our physical surroundings will contribute towards an evolving design dialogue. We must work towards a collective narrative that addresses our current context while acknowledging the constant need for change

Conclusion

The majority of students today are fluent in the language of social media and they are constantly sharing in virtual space. Students must learn to extend these ideas to their physical surroundings in order to develop physical sites of contact that can play an important role in establishing a collective memory in the on going narrative of our culture. This is critical if we are to re-establish the bond between the self and the world around us.

We must look towards the many sources of inspiration: artists, designers, scientists, and authors who are engaged in multidisciplinary practices. By studying these examples and by examining the Postproduction techniques being used we can begin to design an approach to a better future.

Douglas Coupland is one source of inspiration. In the *London Review of Books*, June 2000, Jenny Turner reviewed Douglas Coupland's novel *Miss Wyoming*. Her assessment of Coupland's strengths as a writer connects to the idea of the power of a multidisciplinary approach in all creative fields. Coupland's educational background, as well as his method of writing supports this notion. The appeal of his writing, according to Turner, is stronger for those who are able to make visual connections as his writing is based on visual cues.

> Coupland …comes to writing not as a student of literature or whatever, but as a post-Pop visual artist. He sees the words as pictures and picture-captions. He conceptualizes ideas as visual-spatial-logical relationships, diagrams and graphs. The trashy references he fills his work with are like scraps torn from magazines, the rough white paper edges proudly out on show…It's positioned as an episode of refuge and bliss…
>
> You will notice that the memory forms itself into school-of-Rosenquist collage even as the words hit the page. This way of folding an idea into a visual image, with a couple of clever tucks and angles, is Coupland's party trick. And this is partly why people with strong visual drives themselves enjoy Coupland in a way the wordy don't. (Turner 2000)

The visual-spatial-logical relationships that are developed in Coupland's work can be taught using a multidisciplinary approach to design education. The visual drives that Turner refers to can be promoted using a combination of scientific and creative approaches. There are endless possibilities of connections that can be constructed using the tools available to us. These connections, grounded in both the physical and virtual worlds, must be explored to enable and enhance our daily experiences. We need to create an environment shaped by individuals with a well-honed sense of self, an awareness of place, and most importantly, the ability to see.

In the constantly shifting reality that is the contemporary world, we must keep our ideas fresh by connecting and sharing the many influences around us. The design process in both education and practice is a dynamic one and we must address unique challenges and concerns of the digital era by fostering an ability to think in a multi-dimensional, non-linear manner. Let us proudly display "the rough white paper edges" (Turner 2000) and accept the unfinished nature of the creative process. It is one in flux, in evolution. If we are to develop a society that becomes a home for a vibrant group of citizens, then we must promote sensory training and a reconnection to our physical surroundings. This is essential in educating informed designers of the future.

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