SELF-ORGANIZED DESIGN EDUCATION
A MODEL FOR INTERDISCIPLINARY DESIGN EDUCATION

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1. ABSTRACT

It is obvious that as the boundaries of diverse disciplines are blurring, the role of designers is evolving rapidly. It is crucial for designers to develop a broad understanding of our profession and the surrounding world through interdisciplinary practices. In this paper we introduce *Self-Organized Design Education*, a curriculum that aims to transform designers into innovative thinkers, disruptive technologists, inventors, creative leaders and entrepreneurs within the emerging paradigms in design and technology. Self-Organized Design Education offers student-driven workshops as a process that allows students to tinker and “make as a way of thinking”, which is balanced with regular coursework that focuses on more rigorous research methods. Our goal is to widen designers’ perspectives, empowering them to become today’s problem solvers as well as speculators of the near future (Figure 2).

Our core questions are:

- How should we structure a flexible ecosystem that builds upon student’s intrinsic motivation to pick up the skills needed in such an evolving context? The keywords are self-learning, knowledge management and independent teaching of peers.
- What would a curriculum look like that provides freedom for individual exploration, while maintaining a strong connection to a post-educational world that demands commercially viable products?

2. INTRODUCTION

Today’s design is characterized not only by the physical surface of the product but the whole eco-system behind it. For example, a smartphone exists as a platform that is inextricably interlinked with a diverse range of layers in a bigger system. According to Norman (2010), today’s designers are challenged with complex issues that require understanding in many areas ranging from behavioral science, to sensory and motor systems, and to human cognition. Broad spectrum of skills and knowledge are required from designers, and more than ever, design education needs to evolve (Norman, 2010).

Nowadays, many schools seek to integrate a cross-disciplinary experience into design education. However, in many design institutes, the educational methods are highly experimental and most institutes often fails to provide rich and professional resources from different areas. Another issue is the motivation of the design majoring student; students often come from artistic backgrounds and tend to be less interested in traditional approaches in science and mathematics (Norman, 2010). Designers from most engineering schools also often lack professional training in human behavior or social science (Norman, 2010).

To create an effective interdisciplinary design education system, we seek to provide a platform that can help designers become a unique generalist by building new skill-sets on top of their original professions. We believe a self-motivated educational structure can provide an atmosphere in which designers may approach diverse disciplines in a way that can genuinely inspire not only themselves but other peers as well. The major part of our design curricula has to do with learning by making. The curriculum of our Self-Organized Design Education will challenge designers by pushing the limits of their respective skill set. Such an educational system allows designers to be motivated to learn new knowledge from other areas with more interest as they build an ownership of their studies. Self-organized workshop will allow designers to build this required knowledge upon their existing abilities by inviting guest experts from other domains, which are related to students' interests. Contents from each of the workshops will be digitally archived and will become a valuable asset to future students.

3. CASE STUDIES IN EDUCATION, DESIGN AND TECHNOLOGY

Figure 1. Yuseung Kim (Discoveries in Displacement, Art Center College of Design, 2009): The project evokes people's imagination through diverse interpretations of ambiguous and abstract numbers and words and through images of streaming media. The designer went through user survey and user studies to learn about his research area before creating the interactive installation. Art Center's Media Design Program.

3.1 INTERDISCIPLINARY DESIGN EDUCATION IN ART INSTITUTES

In design academia, there have been many creative approaches towards applying technology and science in design (Auger, 2010). In Design Interactions program at the Royal College of Art, students often have the chance to collaborate with scientists when they explore emerging technology for developing critical design (Auger, 2010; Happy Life, 2010; E.chromi, 2011). Many of their graduate students also create hypothetical products of tomorrow and/or alternative presents that seek to mainly make people think differently (Auger, 2010; Critical Design F&Q).

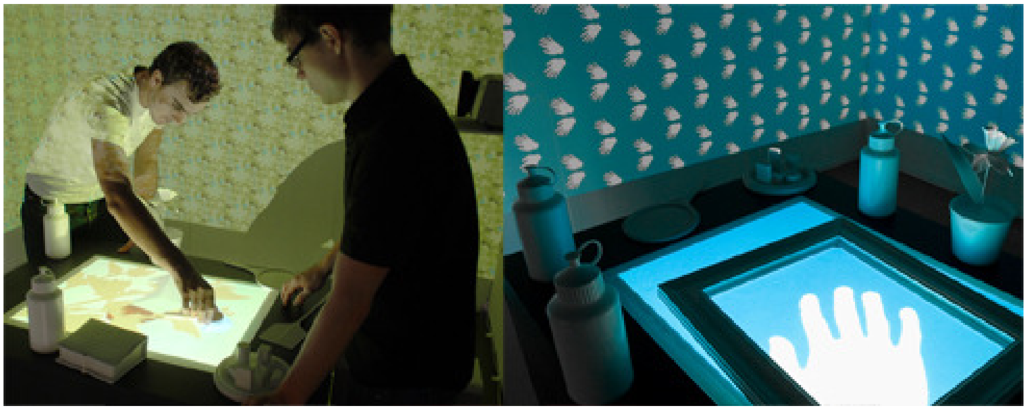

Figure 2. Samuel Luescher (Semiautomata, Switzerland, 2007): An immersive interaction space, emphasizing digital experimentation and collaborative participation. Designed to research how an emerging technology can be employed to produce imagery, this interactive installation was conceived, developed and built by the author, who received help through online forums, open source platforms and another department's fabrication shop.

The Graduate Media Design Program at Art Center College of Design provides a multi-disciplinary atmosphere where students get to work in both studio context and real-world context through different tracks. For example, the program's Media Design Matters class work closely with UNICEF and deal with real social issues, whereas the Media Design Projects track have the students create experimental design to provoke questions using emerging communication technologies (Figure 3) (Media Design Matters, 2011).

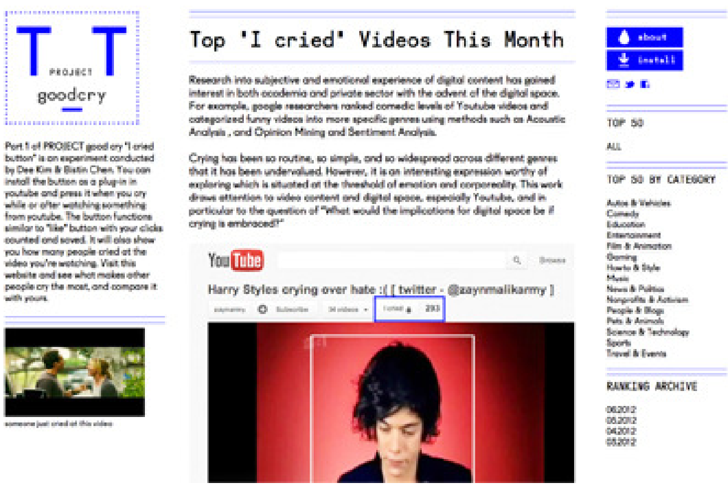

Figure 3. Dee Kim (Project Goodcry, Art Center College of Design, 2012): Project Goodcry's 'I cried button' is an experiment conducted by Dee Kim & Bistin Chen. You can install the button as a plug-in in YouTube and press it when you cry while or after watching something from TouTube. The button functions similar to 'like' button with your clicks counted and saved. It will also show you how many people cried at the video you're watching. Visit this website and see what makes other people cry the most, and compare it with yours. (Time, 2012).

Both the Design Interactions and the Graduate Media Design Program train students to produce insightful results using design and technology in a creative context (Figure 1). However, in the educational process of many art institutes, there is relatively little emphasis on professional training in scientific methods, behavioral science, engineering and business, compared to the program's stress on experimental design methodology.

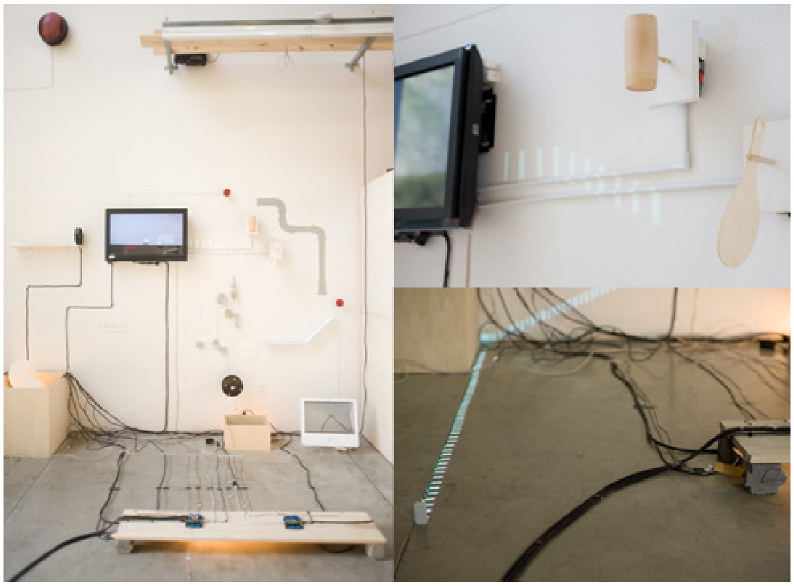

Figure 4. Austin Seungmin Lee (Responsive Causality, Art Center College of Design, 2010) An interactive installation that generates chain of events between physical objects and digital simulations. The project explores how our understanding of movement in architectural space may change in a future of digitally enabled environments. The designer personally devised and engineered the system using physical domino, video shots, pulleys, sensors, and wooden robotic finger. The author went through wood-shop training and used department's custom framework for the programming.

One of the biggest challenges of many art/design schools in approaching technology is fundamentally bridging the gap between technologists, designers and social scientists. Common beliefs many designers have is that the implementation of the technology is solely up to the developer and the designer's role is to produce creative insights and push the limits of the current technology. However, without having a deep understanding of the technology and the broader system around it, the speculative design may not always convey the true creative potential of the technology. Arguably, from a pragmatic point of view, there is a potential of the visionary outcomes produced from the design academia not being suitable to create direct impact in the real world and ending up as an intellectual experiment. On the other hand, the value of aesthetic, meaningful insights and creative components of a design can never be underestimated and these design institutes successfully apply rigorous design practice as a crucial element of their curriculum (Figure 4).

3.2 INTERDISCIPLINARY DESIGN EDUCATION IN TECHNOLOGICAL INSTITUTES

The MIT Media Lab, a research organization focused on inventing technologies that radically improve the way people live, learn, express and play, has fundamentally positioned itself at the cross section of design and technology. Focusing on the "maker culture" the Media Lab has introduced three major facets that are truly unique. Firstly, industry, both design and technology forms a core group that not only supports but more importantly engages pro-actively with the Media Lab. Budding designers are involved in interdisciplinary teams of professionals and students ranging in wide variety of projects having both consumer and intellectual impact. Designers get first-hand exposure of how creative technology can be and technologists get exposed to the meticulous process of design thinking and education. (Figure 5)

Secondly, the Media Lab and the Center for Bits and Atoms have introduced the concept of do-it-yourself shops, the so-called "Fab Labs". Around the world, digital fabrication facilities in more than 30 countries and 50 cities train and expose students at all levels to cultivate the art of programmability of the digital world to the physical world of atoms. Grown from Boston to rural India, from South Africa to Norway, activities range from technological empowerment to peer-to-peer project-based technical training to local problem solving. These initiatives embody the potential to vastly expand the creative powers of tinkerers and usher a revolution in do it yourself design and manufacturing that holds in it the ability to empower even the smallest of communities. At the lab, a class called

“How To Make Almost Anything” provides series of workshops that teach students how to engineer, manufacture, program in a very broad scale. Professionals in the respective domain run each workshop and the students are required to create online documentation of their process of making things (How to Make almost Anything, 2005).

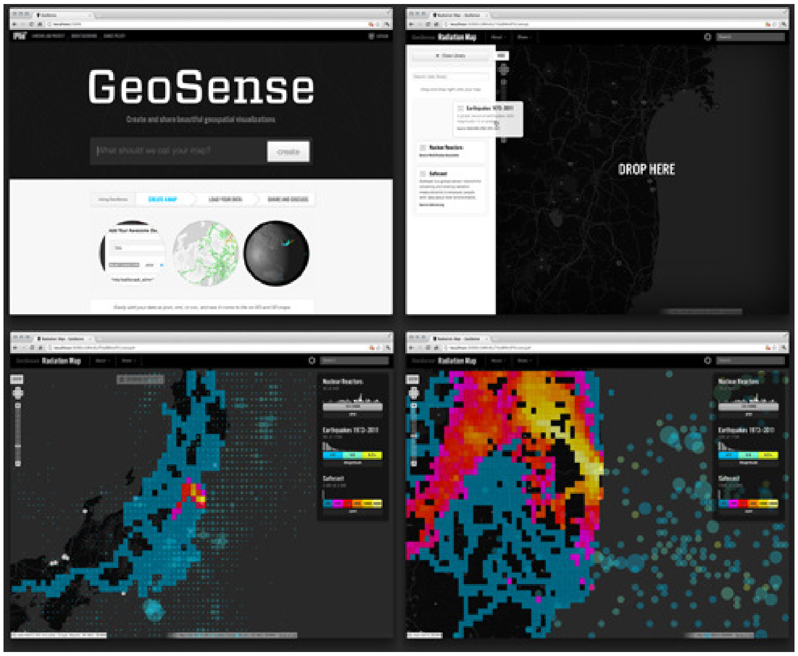

Figure 5. Anthony DeVincenzi, Samuel Luescher (GeoSense, MIT Media Lab, 2012): An open publishing platform for beautiful visualization, social sharing, and data analysis of geospatial data, supporting the comparison and individual styling of massive data sources ranging from 10 thousand to 10 million geo-located points. The designers had to delve deeply into statistics and geospatial database programming to realize their prototype.

Lastly, over the past few years, the Media Lab has supported and sponsored student-led regional initiatives, resulting in workshops and conferences designed to spread the lab’s “learning-by-doing” culture globally. The goal of such workshops is to work together with undergraduate students across various disciplines and identify areas of innovation and mentor them during the course of design, prototyping and implementation of a solution. Having a mix of designers, technologists and liberal arts students from all around the country these workshops initiate a cross-cultural teaching and learning experience for students. Planning curricula, designing exercises both thought experiments and actionable solutions help broaden the horizons and introduce students to diversity and challenges of modern societies. Training local students and teachers to hold such design and innovation conferences at their own schools further helps spread design thinking and technological innovation to the remotest areas.

In today’s diverse and interdisciplinary environments a platform that supports such interplay between designers and technologists is no longer a luxury that few institutions or curricula can support but a necessity. Even though institutions like the Media Lab have tried to interpret and foster these exchanges, many challenges and limitations remain. Starting as a technological university the focus inevitably is weighted towards the “maker”. Fundamental courses on design, including typography and graphic design, do not form a part of curricula. Making such skills a core part would expose technologists to skills that they would have never learned. Moreover, rather than designers joining with an existing skill set it would help deliver undergraduate level training in such basic courses. Industry relations though important and fruitful hold in them a lot of potential but challenges of taking a design and technology to market are still under-studied. MIT Media Lab has shown its potential as an enabling eco-system for a transformational educational system but challenges and limitations remain. Such a model needs constant refinement and re-definition before it reaches its maximum potential.

4. OUR PROPOSAL

We propose Self-Organized Design Education, an educational approach that seeks to combine innovative design education methodologies from both art/design institutes and technological institutes. The reason why we put an emphasis on self-organization is that, in our experience and in that of many of our colleagues, self-learning is one of the most efficient and fruitful ways of learning, and “learning by doing” is a popular concept for good reasons. If confronted with a complex problem, and given and a few pointers on how to go about finding possible solutions, the avid self-learner will not feel coerced to learn skills that seem to have no practical connection to the work she wants to do – the way many pupils (unfortunately) feel during math class – instead, he/she will be intrinsically motivated to learn the techniques that get her closer to reaching her project goal. Obviously, this approach requires a high degree of autonomy from participants, and candidates who are accepted into the program should be able to demonstrate their ability to learn new technical skills independently, as well as their willingness to teach special skills to their peers.

However, efficient self-learning is only possible if there are excellent resources available, which includes the necessary tools and equipment such as software and hardware, as well as good practice-oriented documentation, and lastly the staff necessary to maintain them. Moreover, teachers with industry experience are necessary to define realistic goals, as well as to guide and inspire students.

The ideal “ecosystem” we envision would meet all of these requirements: excellent candidates that are autodidacts while themselves being able to teach small groups; a lab space and workshop area with well-maintained equipment; channels and processes for knowledge management; core staff assigned to take good care of all resources; and faculty that has sufficient industry experience while also allowing students to explore purely hypothetical or “unrealistic” projects. Our proposed curriculum offers core studio courses and workshops. A workshop is a process that allows students to tinker and “make as a way of thinking”, which is balanced with regular coursework that focuses on more rigorous research methods.

4.1 WORKSHOP

With the advent of ever-more sophisticated tools, designers are increasingly interested in picking up technical skills in areas such as creative coding, fabrication, prototype design and probe-based design research. Our program would suggest a range of project-oriented workshops to nurture those interests, but ideally would also allow students to invite external experts of their own choice, provided that a sufficient number of students are backing a request. Since the best teachers for very specific skills are often found among peers, who will be consulted for their advice anyway, we strongly believe that peer-teaching should be institutionalized. Such individuals could then be treated like external experts and adequately compensated for their time, be it financially or by giving them the ability to earn student credit for the extra work they are already doing. In addition, time slots dedicated to peer-teaching as well as a catalog of what students can and want to teach/learn are necessary.
A well-run shop space with top-notch equipment and motivated instructors can unleash creativity and turn laypersons into amazingly skillful technicians, as the “How To Make“ class at the MIT Media Lab has demonstrated for several years. We think this class sets an excellent example that we would like to model this part of the program after. However, participation in that class is very limited due to the limited physical resources, and even though students are required to document their efforts, it is often not easy to reproduce their steps or even find the adequate information.

The scarcity problem would be addressed by defining this way of learning as one of the two main pillars of the program, and consequently dedicating more resources to it. Instead of a very technical, one-semester class, we imagine an ongoing course that focuses less on machinery and more on how technology can inform great design concepts, while requiring designers to produce artifacts that are well beyond the previous scope of their knowledge. To ensure great and usable documentation (How-Tos) for others to follow, we suggest to tie student evaluation to deliverables as well as process documentation on a managed web platform, which serves as an open resource shared by fellow students and the public. Such a platform needs to be well structured and searchable, and obviously it needs to be mature and work well so that users can focus on creating quality content.

4.2 CORE STUDIO COURSES

Core studio courses teach students how to apply design capabilities to different scenarios and deliver projects that can push the boundaries of modern technology in the context of an original vision. Faculty members should include interdisciplinary professionals with mixed expertise in fields such as HCI, media design, emerging technology, architecture, anthropology and design research. Visiting faculty can be selected democratically based on collective research interests.

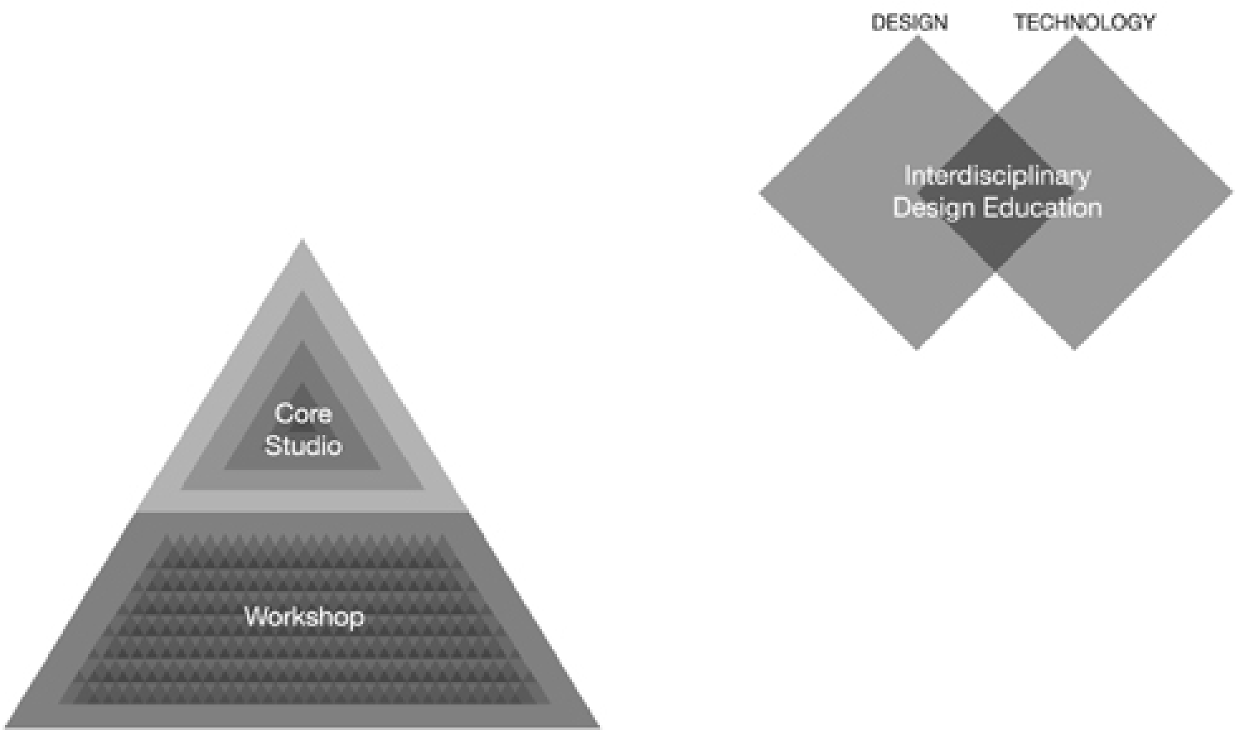

Figure 6. Self-Organized Design Education

While the core studio courses focus on applying idiosyncratic design practices to empower designers to think outside the box, critiques will be driven by vigorous discussion with attending industry experts, students and faculty members. Students are expected to leave their comfort zone and allowed to pursue daring projects, but these critiques will provide certain pragmatism and also explore the value of ideas within economic and technical constraints. The goal is to enable students to communicate their ideas, genuinely inspire, and constantly push the limits in a creative context.

5 CONCLUSION

We believe that the artistic and innovative aspects of design can reach its full potential when the designer gains requisite awareness of complex issues and absorbs applicable technologies from multiple disciplines. Self-Organized Design Education provides an educational eco-system that allows students to self-learn new skill-sets upon their respective professions. Our educational system aims to broaden the student's design horizon through self-organized interdisciplinary workshops and rigorous design practice in the core studio courses. Our proposed curriculum is framed to bridge the gap between the artistic and creative practices in existing design institutes and the scientific methodologies in other academia, to prepare designers to deal with emerging complex issues of the post-educational world. Although Self-Organized Design Education has not been practiced in design educations at art/design institutes, the case study of MIT Media Lab proves the potential of workshop-based courses as an effective way of providing new skill-sets to students from diverse background. Also, the idea of "learning by doing" is applied as the core element of our educational structure and this points towards an active knowledge-sharing environment that is driven by the student's intrinsic motivation.

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