SYSTEMS THINKING AND CONNECTING THE SILOS OF DESIGN EDUCATION

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ABSTRACT

While the design industry is a complex and multidimensional landscape, the current design curriculum lives in stark contrast: linear and compartmentalized. University product design curricula are mainly insular, where studio art is separated from liberal arts courses, despite their close physical and theoretical proximities. While this separation allows students to effectively attain proficiency in skill-sets relevant to the product design discipline, students do not learn how liberal arts education can complement their design knowledge.

These silos of practice stand in opposition to the type of creative processes and collaborations necessary to help solve the issues that humanity faces today. Wicked problems[1] like climate change must be discussed in design education. The solutions to these problems mandate collaboration with other disciplines such as anthropology and/or engineering.

This article is a proposal for new research examining how a liberal arts "integrated" design education may enhance the design students' systems thinking abilities. A more effective design curriculum will need to employ a systems thinking methodology, so a project can be viewed as a part of an entire system of connected concerns. This mode of thinking would not render the designer a generalist, but instead one that is always seeking to collaborate and explore outcomes outside of their typical artifacts. This article will also examine how the current product design education is structured and, despite the differences in the teaching and learning environment of liberal arts courses are different from studio art courses, they could and should work together effectively.

Keywords: Integrated education system, interdisciplinary, liberal arts, systems thinking

1   INTRODUCTION

Design is a deliberate process that aims to find creative visual opportunities to resolve systemic problems. Typically, in the professional and academic environments, these solutions result in two-dimensional and/or three-dimensional outcomes. For instance, in order to design a water bottle, the designer will engage in a process that includes accepting a project, researching the water bottle market, charrettes of ideas, presentations of concepts, and finally producing a finished set of digital drawings for manufacture. In this product development, the designer is in a better position to create a more sustainable and useful artifact, if he or she possesses experience and research about the various stakeholders in the project and information about possible materials that could be used. Typically to address this issue in the classroom, instructors ask the student to consider this example list of question to design a water bottle: "Who are the targeted users of the water bottle?" "What are the existing water bottle designs out there?" "What is the price point of the product (bottled water)?" and "How will the product be marketed?" Recently, in light of environmental, social, and economic concerns, many curricula have added new and relevant life-cycle considerations like: "What kind of material will be used?" "How and where will the materials be sourced?" "How and where will the product be manufactured?" "How will the product be packaged and shipped?" "How will the product be distributed for retails?" "How will the product be interacted and consumed by the targeted users?" and "How will the product be disposed, recycled, or reused?"

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[1]   Rittel and Webber 1973.

In response to the both list of questions above, the designer needs to be more proactive and closely communicate and collaborate with experts from engineering, marketing, and environmental science. However, in order to serve design industry, the academic institution must work to break through the silos of disciplines to engage in more insightful and relevant outcomes in the classroom. The traditional design curricula are not reflective of how design is actually practiced. Design students commonly work in isolation from their soon-to-be professional partners in the natural and social sciences. The current American university product design curriculum is based on a mentor (instructor) and mentee (student) model where projects are assigned (Figure 1), parameters and outcomes are predefined, and students work mostly independently in a studio environment. This curriculum is relatively similar among institutions, and is counterproductive to the profession and society as a whole.

HOW DESIGN EDUCATION is DELIVERED
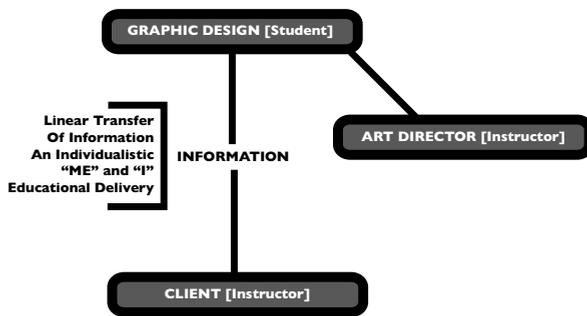
Figure 1. "How Design Education is Delivered" by Bernard Canniffe, Minneapolis College of Art and Design (MCAD)

The world outside of the classroom functions in a very different manner than the classroom insinuates. Unlike school, professionals do not always have one single person to answer to, nor do they have control over the exact scope of a project from the beginning. Instead, there are many layers to a working environment and the projects that are undertaken. In the professional world designers interact with clients and collaborators from the natural and social sciences and most often with those from the liberal arts.

Academics outside of the art and design department/school are commonly referred as "general education" requirements, which consistently diminish their importance in the education of a product designer as they are thrown into a non-descript category. Instead the authors propose that these courses should be relabelled as "integrated education" requirements. Classes compulsory for graduation in languages, math, science, and liberal arts are not regularly embraced enough by design faculty or students nor incorporated sufficiently in the design classroom to more effectively model how the discipline is practiced professionally.

Also, as our society faces daunting issues of resource depletion, global warming, and poverty, the razing of the academic silo model is even more necessary. Working and learning collaboratively in a transdisciplinary classroom is vital to creating a knowledge-sharing educational environment where students from many "integrated" disciplines solve large-scale wicked problems. In order for this occur more seamlessly, product design educators must employ sustainable systems thinking in their classes to unite the interdisciplinary project teams. Environmental author John Muir explains "(w)hen we try to pick out anything by itself we find that it is bound fast by a thousand invisible cords that cannot be broken, to everything in the universe"[2]. There are dozens of considerations that must be taken into account when working on a design project: natural resources, user interaction, marketing, transportation, and, most vitally asking if the artifact is the best solution in the first place. For this to work most effectively, assignments must remove a specific outcome (chair or water bottle for example) from the brief and instead ask for the best solution to the user needs. To discover the

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[2]   Muir 1911.

superlative design opportunity for the problem requires looking at the visual system of how a designed artifact fits into the organization of the environmental, economic, social, and cultural aspects of the product (Figure 3). Analyzing the system can inform the designer and his/her collaborators if their solution solves certain challenges and what will happen to the piece after its useful lifespan ends. It may also indicate to the design team that their initial solution may not be the best suited for the situation.

Figure 2. Example of sustainable systems thinking by Yvette Perullo, Purdue University

2   THE SOLUTION? A RESPONSIVE & INTEGRATED EDUCATION SYSTEM

Design curricula must create and support a more flexible "non-silo" system in which the studio environment is not only populated by product designers, but also students from the natural sciences and liberal arts. Projects should task the student design teams to work on projects that do not include pre-defined deliverables and that attempts to solve not only commercial endeavours but also humanity's wicked problems[3]. The near future curricula must also consider diverse cultural influences and allow open access to more socio-economic classes of students into the academic institution. Without these changes, we will diminish the extent of our future[4]. Continuing a disconnected educational model that simply creates without enlightened thought to the object's social and environmental impacts will limit the future designer's ability to be sustainable as a profession going forward. Author and design educator Tony Fry calls this action "defuturing." He writes "(b)luntly, what unsustainability and associated defuturing actions actually tell us is that the amount of time that humanity has to save itself from itself is very limited." [5]

More effective and relevant design curricula that models industry transdisciplinary teams need to be developed employing a systems thinking methodology where a project is viewed as part of an entire system of connected concerns.   Furthermore, studies on ergonomics, psychology, writing, anthropology, social science, and communication are critical for designers to understand the targeted users in depth. These studies expand designers' scope of knowledge and enhance their ability to think about the bigger picture in which a product lives and dies. It also will allow them to successfully approach a subject matter from a more informed perspective with collective knowledge. The curricula must adapt to include more courses from Liberal Arts combined with studio practicum together. This will challenge design students to learn how to apply their knowledge from liberal arts to their design practices. This mode of curricula would also begin to break through the silos of academia, which

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[3]   Rittel and Webber 1973.
[4]   Fry 2011.
[5]   Fry 2011.

don't exist in the professional environment, and cultivate designers who are always seeking to explore outcomes outside of their typical artifacts from holistic and systemic perspectives. Bringing these new skillsets into the classroom into a design team of other disciplines will increase project success.

Carnegie Mellon University in Pittsburgh, PA is experimenting with a Bachelor of Humanities and Arts (BHA) degree that allows students to combine humanities with design by taking fifteen design courses (81 units) and the remainder (totalling 229 units) [6] outside of the School of Design. This is an intriguing concept that could improve the designer's holistic education, blending personal interests and disciplines. While encouraging, through a degree program, to transfer liberal arts knowledge to the design classroom is a positive step forward; it is still not the model for the interdisciplinary professional world of the product designer. To eliminate the silos of academia, the authors propose that various disciplines from the sciences and humanities must be in the classroom with a more diversely educated designer to collectively tackle systemic societal problems.

Beyond this one example, there are various academic case studies where instructors include readings in the classroom which examine issues of ethnography, psychology, and human factors engineering, however instead of a few disparate required articles, product design curriculum should put more emphasis on including "integrated education" courses in their preferred programs of study. As product designers work hand-in-hand with engineers professionally, they collectively are lacking in their knowledge of the liberal arts. Topics such as ethics, writing, anthropology, and sociology are not necessarily valued by each curriculum outside of only credit hours towards graduation.

3   THE OBSTACLES

For the realization of curricula integrating humanities and studio courses, impediments must be identified, analyzed, and overcome. In most American universities, the liberal arts are situated as separate and distinct colleges and/or departments and are isolated from the study and practice of product design. Their connection with and understanding of the design department and "designing" are often insufficient to understand possible research overlaps.   Complicating the matter further, professors are affiliated to a specific discipline teaching style (lecture versus studio) and not necessarily prepared to collaborate in a more free-form interdisciplinary setting. Embedded in this dilemma are issues with teaching loads and programmatic requirements for student graduation. In order to create an academic environment where faculty members can easily exchange ideas, pedagogy, and research an overhaul of the top-heavy university administrative system is needed. One scenario would allow for more Liberal Arts and design courses to count towards university general elective requirements encouraging interest in enrolment. This could allow for a more cohesive studio environment where two interdisciplinary faculty team-teach. However, from an administration's perspective, when two professors are co-teaching a course, the number of the students needs to be increased to monetize the use of two faculty in one classroom. But, in putting more students into a studio, the amount of personal interaction will decrease, creating a less desirable educational situation. It is clear that more conversation is needed to locate a more integrated and sustainable academic setting for this more practical design studio to exist in academia. The authors recommend creating a survey for faculty in Liberal Arts and product design departments could be conducted asking for input on effective ways to erase the silos of academia. A separate questionnaire could ask similar questions to university administrators. Results should be documented in further articles and tested within interested institutions.

Another possible obstacle to the success of this concept is found in the course requirements for the students in BFA product design programs. The requirements are divided into five different categories: concentration requirement, concentration elective, studio elective, art history, and general electives. Within this compartmentalization, the correct placement of integrated courses must be determined and tested. The curriculum committees of colleges within larger universities and those in smaller art and design schools need to decide how the integrated courses should be counted as either a studio or liberal arts seminar/lecture. They could also conclude to establish another entirely new major that is built upon this integrated curriculum model. This is extremely laborious, however not impossible, as shown by the previously mentioned Carnegie Mellon BHA case study.

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[6]   Carnegie Mellon 2013.

A final identified obstacle is that liberal arts professors and product design professors are accustomed to very different teaching environments. Studio courses are often situated in smaller classrooms with fewer students. Contact hours are greater (five or more hours per week) and studios involve more in-class working sessions combined with individual consultation. Liberal art courses are conversely lectures in large auditoriums that hold more students coupled with smaller discussion sections. Contact hours are shorter or non-existent by the faculty member, how instead relies on his/her Teaching Assistants (TAs) to lead group discussions and grade essays and tests. Moreover, the rubrics and methods for evaluating student learning outcomes are also different. For studio courses, student presentation and group critique hold critical roles to evaluate proof-of-concept and gauge development in the student work, while in liberal art courses student learning outcomes are assessed by tests and papers. In order to overcome the differences, faculty in product design and liberal art courses need to understand the different nature of the each discipline, and collaboratively research for the ways to effectively merge their teaching and evaluating methods.

These obstacles seem to be the most obvious impediments to the success of this paper's proposed changes in product design curriculum and the university silo structure; however, the authors recognize that more will probably emerge as research progresses.

4   CONCLUSIONS AND FURTHER DIRECTIONS

Educational consultant Allan Davies states, "(w)hat teachers think design is determines how they frame the curriculum and how they go about teaching. Equally, students' beliefs about what design is underpin their intentions when they go about learning."[7] The authors propose that it is time for product design educators to rethink how they construct their curriculum by adding the assignments that do not prescribe specific physical outcomes and also ask students to locate and solve complex and systemic problems. Employing a transdisciplinary mindset is critical in this shift in pedagogy. To find the most effective and innovative visual solutions for a system of connected concerns must involve the research and input from not just the natural sciences, but of also the liberal arts. Integrated courses that merge liberal arts and product design will provide a transdisciplinary environment where students can concentrate more on the process of finding and solving problems using their collective knowledge rather than a mode of insular thinking. Academia must move quickly to demolish the antiquated system of discipline silos to one that connects all disciplines through faculty and student research in more assimilated classrooms.

Carnegie Mellon University's (CMU) Bachelor of Humanities and Art (BHA) degree could be an excellent model of a cohesive curriculum that fuses Liberal Arts and studio courses where students are encouraged to develop systems thinking strategies. However, it is unclear if CMU's new degree program will work in the silo structure that still persists within the university, but if it can, it will hopefully serve as a launching pad for further universities to test similar models.

This article is a proposal that will be followed by further papers with case studies of integrated design courses. Prior to the implementation of the integrated courses, surveys to administrators and faculty in the liberal and studio arts will be necessary in order to investigate the potential challenges and opportunities. From the responses to these questionnaires, it is expected that a more effective course of action can be developed, executed, and scrutinized for success by a willing group of peers.

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