Making in Industrial Design: the Necessary Un-Learning Across Design Disciplines

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Introduction

The current beginning design student manages and processes more information than in the past. He or she carries a laptop with a suite of tools that dwarf the capabilities of desktop computers a decade ago. They have smart phones that connect to peers and a digital social network that is shaping and changing our culture inside and outside of the studio. They are beginning their education with an understanding and mastery of a new set of tools that provide unprecedented access to vast quantities of information. The abilities enabled by this access out-scale the dramatic effects of the industrial revolution in the late 18th and early 19th century. This information revolution is more subtle, but it is all encompassing. Design, as a discipline, is usually leading the conversation about change and evolution. In this case, this discipline's students, educators, and professionals are not just the agents of change, but also the subjects.

Where We Are Now

Our current professional world is exceedingly complex, where archetypal professions are struggling to address the more immediate needs of our economy and culture in a larger global context. Because of this, the average emerging design professional is no longer subject to a traditional trajectory when leaving school. They could work in a number of capacities in a broadening field of sub-professions that tap into the increasingly complex skill set of the contemporary designer. In this changing industry the need for expansive flexible tools is evolving on a daily basis. This, along with the changing role of the designer, creates specific challenges to our institutions that are dedicated to educating young citizen designers.

These challenges are further complicated by the tools and affordances embedded in this information revolution. It can create a false sense of knowing, often encouraging a memetic view of objects, space and place. Scott Sampson writes in *Is the Internet Changing the Way You Think*, "it seems likely that a lifetime of daily conditioning dictated by the rapid flow of information across glowing screens will generate substantial changes in brains and thus in thinking. Commonly cited potential effects include fragmented thinking and shorter attention spans, with a concomitant reduction in reflection (let alone interest), introspection, and in-depth thought. " [1]

This information saturation and a predisposition to ways of seeing and responding to the world around us are counter to the vital needs of learning and teaching design thinking. In order to enact the changes needed in the discipline of design, and to respond to the positive as well as the negative intrinsic qualities of this change, educators and students alike will have to unlearn ingrained beliefs and practices in order to learn the needs of the rapidly changing world. In the Industrial Design studio sequence at the University of the Arts, we are using methods and projects to address how beginning design students learn in the midst of such complexity.

The Modern Student

The modern student is irrevocably tied to these new tools they carry. With them come different approaches to learning and understanding. Gone are the days of rote learning, memorization of the facts and nodes that build our understanding of the world. The modern student carries with them an on-call accessible "brain" that makes previous "archaic" methods frustratingly redundant to them. They have been indoctrinated to a type of learning that can quickly see far beyond what the design student was able to see a decade ago. This vision has exciting advantages but is fraught with subtle and somewhat destructive handicaps.

We have found that the students often lack the discipline, focus, and rigor needed to truly synthesize what is being learned. To be fair to the students, the avoidance of the iteration of what they often believe to be "mundane" methods is somewhat understandable. After all, answers to questions embedded in the design challenges we assign are most likely already in the public domain and readily accessible for student consumption. This is the critical moment though, where students must be able to move forward in small, often not well-understood steps, in order to gain their own beginning of a tacit knowledge. Stalling is inevitable in this process, as they often struggle with unfamiliar territory. There is also a falling back to a reliance on others. Faculty should inspire or enable momentum in these critical junctures, these "hitting a wall" moments, so that the student feels capable of challenging resistance felt until there is no more resistance. There is more often than not a "tipping point" and an adoption of self-reliance if successful. These are moments to celebrate by slowing down and allowing the student time for reflection, understanding that this seemingly small step is bound to a bigger underlying momentum.

We are being asked as teachers to make very clear- knowing is not tied to the process of taking in information and regurgitating it. "The ancient Greeks divided thinking into two classes: one, the result of reflection, episteme; the other one, a result of daily living, doxa," [2] For the student today, this doxa involves being tethered by various devices to a larger network of perceived knowledge. Daily living is becoming inseparable from access to data. Students are swimming (and at times drowning) in readily accessible information. The scenario is more likely now that they will not have moments to assess and think on their own. David Dalrymple writes, "Knowledge was once an internal property, and focus on the task at hand could be imposed externally; with the Internet, knowledge can be supplied externally but focus must be achieved internally."[3] This is a defined task we must engage as educators. We must create methods and settings that allow students time to unplug long enough to hear and move forward with their own thinking, seeing and doing.

Current Learning Challenges

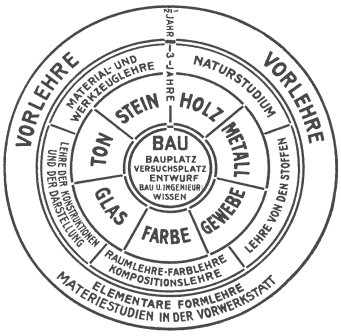

Fig. 1. Bauhaus School Curriculum, 1922

To deal with the current learning challenges, we are reflecting on past solutions to similar large-scale cultural changes in trajectory. One of the well-known responses in design and art education was the Bauhaus school, which was founded in Weimar in 1919. The technological advances at the time in material understanding, manufacturing, and production provided a dizzying context in which to educate a designer. Walter Gropius and the faculty he assembled during the turbulent period of modernization

focused on returning to the crafts, and dissolving barriers between working with material and designing with material. This provided a foundation of core principles in which students could build more stable platforms for later learning (see Fig. 1). [4]

Other examples to pull from are the reaction to current public primary education frustrations in the US and abroad. Parents and educators are re-immersing themselves in the very basic conversation of, "what is education?" as primary public schools are struggling across the country. Progressive and Montessori education, as well as the emerging home schooling movement, offer alternatives to the traditional approach that leans on rote learning. They all borrow from the constructivist and experiential models that emphasize direct, experience-based processes tied to building their own inherent faculty for forming belief, judgment, and understanding.

With the surrounding noise of the information revolution and the sense of not having to work for "knowledge," we are finding it increasingly necessary to create scenarios in which students go through a period of un-learning before they engage with building knowledge. This is based on direct observation of our own curriculum over the past 8 years. Methods were initiated to take advantage and leverage new ways of working and designing that have begun to yield conflicting results. An issue that we are tackling is the loss of individual workspace in our studios, and reliance on design trends that produce more talk and less doing.

A few things we believe

1.Greater access to knowledge does not equal greater understanding.
2. Access to information about methods and materials does not translate to an understanding of methods and materials.
3. It is preferable to help a student establish an understanding of their own process before asking them to contribute to a collective creative process.
4. The process of unlearning is concerned with a development of self-reliance and an understanding that answers given are less valuable than answers learned.
5. Rigor and Iteration are vital to a healthy and productive design process.
6. Play is essential.

Our Process

In *The Craftsman*, Richard Sennett speaks about David Hume's belief: "that the mind enlarges its frame of reference by 'stumbling' on the unexpected, the unforeseen; imagination happens to us." Sennett goes on to distinguish the craftsman from Hume's vision. "The craftsman's mind works differently than Hume imagined, because specific practices prepare the ground on which people might stumble." Sennett also speaks about the need for breaking "fit-for-purpose tools". "Intuition begins with the sense that what isn't yet could be....In technical craftsmanship, the sense of possibility is grounded in feeling frustrated by a tool's limits or provoked by its untested capabilities."[5] So it can be understood that successful practice might include capacities for formatting a platform for discovery, safe areas where accidents are expected. A willingness to provoke and push necessary tools with the understanding of the built-in frustrations with testing and discovery are critical. This encourages the development of a durable post-graduate practice that is capable of growth and evolution.

In the studio, we require students to begin working by hand through modeling and with hand-drawings. It is our belief that the slower process allows time for discovery and understanding. Although we emphasize hand work, when necessary and appropriate digital tools are welcomed. We just push the student to treat the new tool the same way they would treat a new material.

For the past 5 years at UArts, we have resisted introducing CAD (Rhino) and the newer CAD driven shop tools (CNC, Laser Cutter, 3d Printer) until the Junior Year of the Industrial Design curriculum. The reasons for this were heavily debated, and we went through many of the same arguments that we are stating here. The understanding was that by jumping too quickly into production via automated milling and processing, the student would not learn what the more physical means of process and production might yield.

One of the problems we face is that the curve of technology adoption outside of the university is outpacing that within. It is becoming clear that in order to keep up, we need to make consistent allowances for these new tools, keeping their applications in pace with the students' ability to engage fully in understanding the unique moments where "craft" is part of the digital. Victor Weisskopf once said to his MIT students, "When you show me the result, the computer understands the answer, but I don't think you understand the answer." [6] We must be sure that our students understand the answer.

Sophomore Studio

In the first Industrial Design studio at the University of the Arts, we have found it necessary to implement a specific level of un-learning. One of our challenges is that we are a design department housed in an art school. Hence, the students come into our courses with previous experience in drawing (from a fine arts perspective), varied shop skills, and 2D/3D foundation courses. As is the case with most undergraduate design majors, they are extremely eager to 'design' when they finally get to take their first studio. Most students enter the major wishing to design slick products and are disappointed when we issue our syllabus with the following projects: Material Study, Measure + Documentation + Interpretation and SouthWest Corner (Utility + Function).

Project Descriptions

Currently the first Industrial Design studio has three projects that evolve relating to materiality, scale, and user. The first two projects are paired: A Study of Materials and A Hand Drafted Orthographic Projection of a Hybrid Construction based on their material explorations and findings.

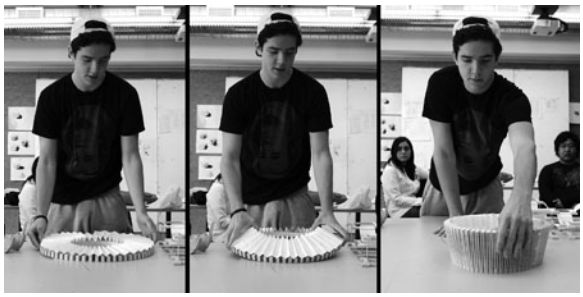

Fig. 2. Hybrid Transformative Model by Chris Santone

Material Study

The Project 1 brief reads, "Each student will fabricate three constructions where the assembly and joining of parts investigates the tectonic and material nature of Tyvek and Wood (see Fig. 2)."

Richard Sennett speaks about the stages of breaking "fit-for-purpose tools" with the intention of achieving, "an imaginative leap, [which] occurs through establishing adjacency. Two unlike domains are brought close together; the closer they are, the more stimulating seems their entwined presence." [7] Our reduced palette of materials and tools encourages the students to go through this scenario in an iterative fashion, developing a confidence in smaller learned moments. By using two separate basic materials, they are able to move from very simple ideas, to two very simple but different ideas, to an interaction, and a beginning understanding of complexity.

A component of this project is to create a hybrid model fabricated from Tyvek and wood in an innovative manner. Although most students have heard of these common materials, there are very few preconceptions that distort the creative

process. We believe that this basic starting point gives each student a structured platform that allows for innovation, play and experimentation. It is also integral to our process that the students learn by making and therefore address the TECTONIC = the art and science of construction or building. We encourage the students to experiment with the materials and iterate in order for the natural evolution of learning to occur.

Measure + Documentation + Interpretation

Project 2 addresses precision, measure, scale, representation, observation, interpretation and technique (see Fig. 3).

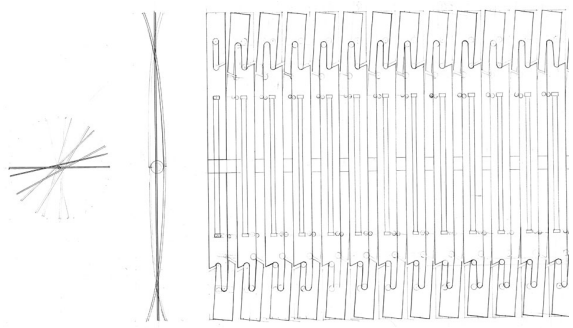

Fig. 3. Tony McGuigan Hybrid Drawing

"Because of the machine's capacities for instant erasure and refiguring, the architect Elliot Felix observes. 'Each action is less consequent than it would be [on] paper … each will be less carefully considered." [8] With this in mind, it was a pleasure to have the following experience with one of our students while in the midst of this project. One day after class we asked him how it was going. He sighed and said: "this drawing is driving me crazy. I can't tell what's what right now, but I'm so thankful that we are drafting by hand so I will know how to be precise in the future when using a computer program."

What was before

With Project 3, in the fall of 2011, the studio departed from and simplified its direction. The course focused on collaboration and teamwork - wanting new students in the major to have a bonding experience. The project was called 'Instant Shelter' and students worked in groups of 4 to 6 students to tackle lofty humanitarian goals in addition to fabricating a tent. The brief involved a series of descriptor words that were used as constraints for the project. i.e. safety, home, transient, etc. Larger underlying objectives included: an understanding of group versus individual process, problem solving by testing and iterating and an ability to take on a larger project by applying a collaborative practice.

Project 3: Findings and Discoveries

In witnessing prior outcomes, we limited the parameters of the project. We emphasized the title 'Shelter' to avoid redundant tent designs. While we were photographing student Material Study projects, we saw the beauty and simplicity of what a shelter could be if the students continued the momentum from their earlier material projects instead of forgetting everything they learned and just jumping to completely new forms. This past fall we refined the project even further to address a user with a specific site focus and limited materials (see Fig. 5).

Insistence that they can do it is imperative, pushing them to iterate until things begin to make sense (see Fig. 4). The attitude of "we are in this with you" as opposed to "all-knowing" teacher helps give each student the confidence and experience to repeat the process on their own in future studios and eventually the workforce. Peter Zumthor states this concept beautifully: "First of all, we must explain that the person standing in front of them is not someone who asks questions whose answers he already knows. Practicing [design] is asking oneself questions, finding one's own answers with the help of the teacher, whittling down, finding solutions. Over and over again." [9]

An Evolving Project / Changes Made

Beyond refining the project parameters, we also discovered some other necessary changes

regarding our course. While we encourage collaborative work at all levels of the curriculum, we observed that in this initial stage, it is premature. In the first studio of a major the students are just learning for themselves what they are good at and what skills they need to improve. When asked to work together on a design problem, they are very timid, and with poor group communication skills they have a very hard time moving a project forward. We also found that the end of the first semester is when we had the highest rate of attrition. This placed uncommitted students with passionate students and created a toxic scenario. In our curriculum for the sophomore fall studio, we need the students to work individually in order to test their own boundaries, skills, learning, and design process. Once they have at least one run under their belts, we find they are better suited for group work in the ensuing studios/semesters.

Fig. 4. Min Soub Sim Utility+Function Project

Fig. 5. Min Soub Sim Utility+Function Project

Conclusion

The re-introduction of more familiar digital means and modes of processing, and understanding may leverage the techne, or the physically tested and understood knowledge, by elevating the design problem and introducing greater contextual scenarios. An ideal studio sequence should be stepped, methodically building on and adding material knowledge and tools as needed to understand the process of iterative making and observing. Our hopes are that through the process of slowing down, reducing the linear sequence of current learning and having the freedom to address issues more deeply, that we can create a new generation of sensitive, competent, and innovative designers.

Notes

[1] Sampson, Scott D. "The Extinction of Experience" in *Is the Internet Changing the Way You Think?: The Net's Impact on Our Minds and Future*. New York: Harper Perennial, 2011. p 279

[2] Narváez, Luz María Jimènez and Fehèr, Guillermina. "Designs Own Knowledge." Design Issues, Vol. 16, No. 1 (Spring 2000). p 36

[3] Dalrymple, David. "Knowledge without, Focus Within, People Everywhere" in *Is the Internet Changing the Way You Think?: The Net's Impact on Our Minds and Future*. New York: Harper Perennial, 2011. p 87

[4] Droste, Magdalena. Bauhaus. Bauhaus-Archiv Museum für Gestaltung. 1990.

[5] Sennett, Richard. The Craftsman. New Haven: Yale UP, 2008. p 4

[6] Sennett, Richard. The Craftsman. New Haven: Yale UP, 2008. p 4

[7] Sennett, Richard. The Craftsman. New Haven: Yale UP, 2008. p 210

[8] Sennett, Richard. The Craftsman. New Haven: Yale UP, 2008. p 41

[9] Zumthor, Peter. Thinking Architecture. Lars Müller Publisher. Baden Switzerland. 1998. p 57