Learning from the Craftsmen

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Introduction

Our institution started as a polytechnic school, a history that informed the pedagogy of our program. While developing the abilities to conceptualize design was always crucial, the pedagogy of our institution tended to emphasize on developing skills and knowledge in putting together a building in logical and feasible manners. Along this line, our program has invested heavily on facilities and infrastructure for fabrications, including shops, tools and machineries. Crucial for the development of our facilities is the recruitment of skilled staffs to manage and run them. This context of our institution led us to enquire possibilities of developing pedagogy for the first year students that would build on the tradition and assets of our institution. We recognized, however, the pitfall of emphasizing training students on technical aptitudes rather than nurturing the abilities in design thinking. Our experiences taught us that such an emphasis would led students to treat a design process as a linear, technical matter rather than a process of explorations and inquiries.

We saw the facilities and the knowledge of the staffs in our shops as a springboard for constructing the pedagogy of our first year studios. We noticed the tendency to consider the fabrication facilities and shops as a means to produce models and other three-dimensional representations of design ideas. In this line of thought, we posed the inquiry of ways to develop generative principles and design intents based on learning processes of constructing things. Thus, we formulated the theme for our pedagogy as thinking-through-making. We discussed and brainstormed our ideas with the staffs of our woodshop. In a way, we consider the staffs as our craftsmen-in-residence. We consider that our woodshop would be an appropriate introduction to the notion of construction and fabrication for the first year students, since it would expose them to the habit and rigor of working with hands. We developed syllabi and exercises with close coordination with the staffs in our woodshop. We recognized, however, that learning craftsmanship in woodworking would take time and the learning process would be much slower. We decided to spread the learning process over the Fall and the Spring semesters. This strategy would allow us to integrate these exercises in wood with other basic skills and knowledge that beginning students in architecture needed to learn and be trained at.

Literature Review

In his book, *The Craftsman*, Sennett referred to his teacher, Hannah Arendt, who differentiated *animal laboran* from *homo faber*.[1] The former was a subject who acted mechanically without much considerations of consequences and meanings of actions, while the latter was a thinking subject who laid out the conceptual basis of actions and their meanings. Sennett questioned this distinction, arguing

[1] Sennet, R. (2008) The Craftsman. New Haven, Yale University Press, pp. 1-11

that *animal laboran* had the possibilities to develop into a thinking subject. Indeed, it had the advantages of developing care and awareness in making things with good qualities that could inform engagements with the social and cultural life, including ways to go about conducting social life. In this line of thought, Sennett argued that the process of making things properly through practice would shape working habits that could eventually inform habits in daily life. This habit would include abilities to address challenges in daily life. In a way, he argued about a development of knowledge through bodily practice or haptic experiences and engagement to the process of making things. He also pointed out the role of language in making sense of knowledge derived from these experiences and developing that knowledge. This development would involve leaps of imagination as one inquired solutions to varieties of problems based on that knowledge. We related our reading of The Craftsman to *The Story Teller* by Walter Benjamin.[2] Benjamin argued on the similarities between storytellers and craftsmen, in which both gravitated toward practical interests. A storyteller told stories that contained knowledge of addressing challenges in life in a way craftsmen would produce artifacts for facilitating daily activities. Stories, and craftsmanship, were a shared knowledge developed over time. However, both allowed for interpretations, as he wrote, "thus traces of the storyteller cling to the story the way the handprints of a potter cling to the clay vessel.[3]" It was the ability to apply the skills and knowledge to address daily problems that Benjamin called wisdom. It was abilities to apply this knowledge in different contexts and varieties of problems.

Relating to architecture, we found a relevant study on Jean Prouve by Hubert Damisch.[4] Damisch discussed how Prouve studied the fabrication of metals, including techniques to bend and fold metal sheets, to fabricate flat pieces and corners, to connect metal elements, as crucial in the trajectory of his design process. Eventually, Prouve would pose the inquiry of how the techniques and procedure in folding metal sheet informed the design of building elements. The implication of Prouve's ways of thinking was on the generative principles of design. The common way of formulating the generative principles started from the overall, big idea that would inform every aspect of the design, including designs of details. This was the essence of the notion of the part-to-the whole relationship. Every part of a design, in its form and appearance, would follow the same logic and principles derived from the general order of the design. Damisch argued that the importance of Prouve's was that he approached design from the other end. For Prouve, the design process started from the explorations of elements, from which the techniques of connecting these elements would inform the overall design.

The exercises

We identified carving and assembling simple wood joints as the entry-level skills for students. Carving included the use of manual and hand-held power tools, while simple joints covered joints without additional elements including lap, butt, and miter joints; and joints with additional elements, including the use of dowels, splines, and dados. We set constraints to facilitate the learning process, that is, the type of woods, poplar, and the dimension of the wood, based on 4"-by-4" tiles. We related the carving

[2] Benjamin, W. "The Storyteller," in Benjamin, W. (1968, 2997) *Illuminations*, New York: Harcourt, Brace & World, 1968, 2007, pp. 83-110

[3] ibid. p.92

[4] Damisch, H. "Architecture and Industry: Jean Prouve, or the parti of the detail," in Damisch, H. (2106) Noah's Ark: Essays on architecture. Cambridge, MIT Press, pp. 231-246

exercises to design by subtraction and the joint assembly to design by addition. In terms of procedure, instructors did not only supervise students in working with tools and materials, but also worked with students during scheduled studio hours in the woodshop to develop their projects. One of the main challenges was maximum capacity of our woodshop that necessitated the scheduling of the students into sessions.

We framed the carving exercises as design of textures that began with documentation of natural and manmade textures through freehand drawings. This exercise introduced the effects of textures in architecture, including the ways they informed our perceptions of space. Students then analyzed their drawings to identify and extract formal features. Over layers of trace paper, the exercise asked students to identify basic geometric elements and to formulate relationship between these elements, or the rules. The findings of elements and the logic of their relationship informed the set of iterations, in which students produce two-dimensional patterns and then three-dimensional artifact made out of cardboard, foam boards, and chip boards. These iterations would serve as a basis for developing wood artifacts in the woodshop.

The first wood exercises started with students exploring tools to identify strengths and limitations of each tool. They document the process and their findings as a series of drawings. Through class discussions, we directed conversations through which students articulate and formulate these constraints, limitations, strengths and opportunities. Students started to conceptualize ways to go about working with those tools. We also asked students to observe phenomena that appeared both on the surface of the artifacts and those of that affected by the artifacts as free-hand drawings to capture the effects that they created, such as light-and-shadow drawings. These observations developed further the previous observations in which students started to recognize and articulate spatial and formal qualities in their work. These series of reflections and documentation also led them to start to see some architectural qualities in textures that they produced on their wood tiles. For example, some students started to relate these textures with topographic features, such as peaks and valley, depressions and ridges. Other students identified varieties of depth on the surface of the tiles. These findings served to inform the series of iterations in constructing wood artifacts. The first part asked students to develop a texture within the confine of the dimension of 4”-by-12”. The replication of the basic module of 4” by 4” tended to relate to the notion of basic elements and rules. The final assignment asked students to develop a wooden artifact within the size of 12”-by-12”. In each step, we asked students to plan ahead before they went to the wood shop, including drawing for the wood texture and which tools that they are going to use. Nevertheless, the working plans were not supposed to be something that set in stone. As they encountered challenges in working with tools and materials, instructors and students worked together to address the issues that would subsequently change the design. The project asked students to document their artifacts through orthographic and parallel drawings. Within the trajectory of the semester, students would revisit this wood project for the final project of the semester. The final project asked students to develop a small structure for human habitation, in which it asked students to integrate their wood texture as the enclosure for this structure.

Figure 1: Students working in the wood shop

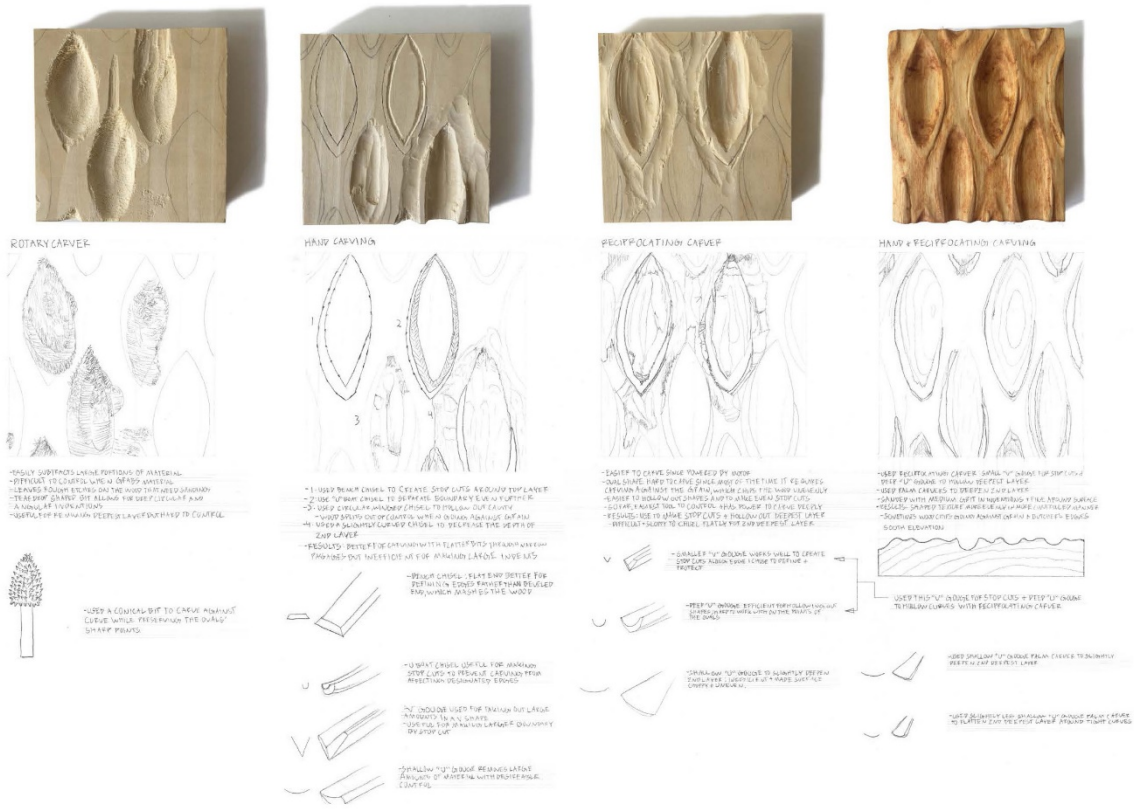

Figure 2: Documentation of tools, student: Kathryn Stapleton

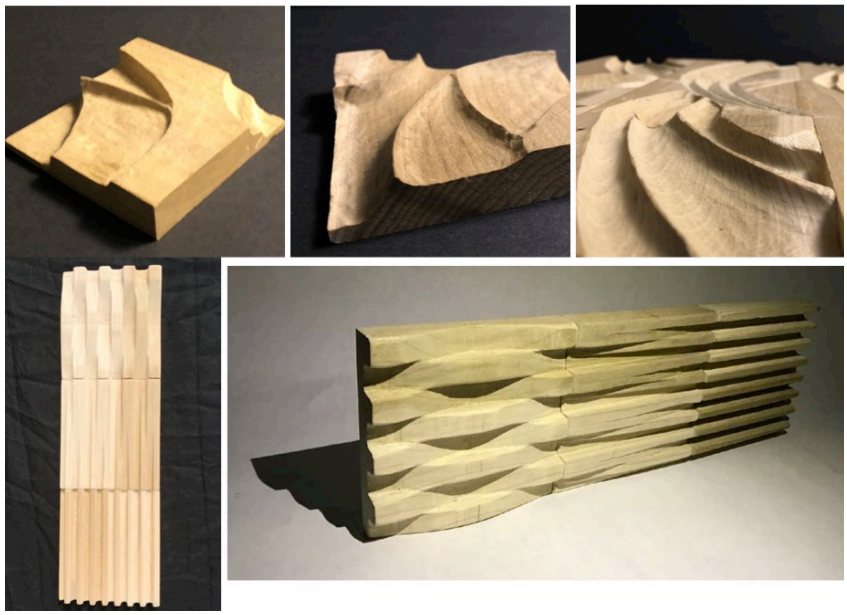

Figure 3: Textures, students: Mathieu Daley (top); Rourke Brakeville (bottom)

We picked up the wood project at the beginning of the Spring semester. The first part of the semester revolved around learning joining wood tiles. The project revisited the set-up of the Fall semester, in which students learned techniques to construct basic wood joints. Similarly, we asked students to document through drawings and reflections of their experiences in constructing simple joints to identify challenges in constructing joints. This step also required them to compare and contrasts, allowing discoveries of strength, limitations, and uniqueness of each type of joint. These findings served as a basis for a process in which student construct a series of wooden artifacts out of four-by-four inches tiles through a series of iterations. Their first task was to connect four wood tiles as a flat surface, in which they should explore the use of varieties of joins and exposed the connections. The next exercise asked students to assemble four wood tiles in orthogonal manners, forming either a box or a W-shape. Out of the reflections and documentations of these small artifacts, students then developed larger artifacts within the dimension of 12-by-12-by-12 inches. The Spring semester revisit and reiterate the rigor of the Fall semester, including the documentation of the artifacts through architectural drawings, the effects of the artifacts through free-hand drawings and photographs, and reflections of the challenges, limitations and findings from the learning processes. Within the trajectory of the Spring semester, the modules of joinery was followed by a module of precedent studies that focused on set of examples of small-scale structures made out timber designed by well-known architects in the world. These studies of small structures served as an entry for students to start to learn about the applications of wood and wood joints in architectural projects. The final project of the semester asked students to synthesize their explorations of wood joins with findings from precedent studies to design a small structure with wood as the main material.

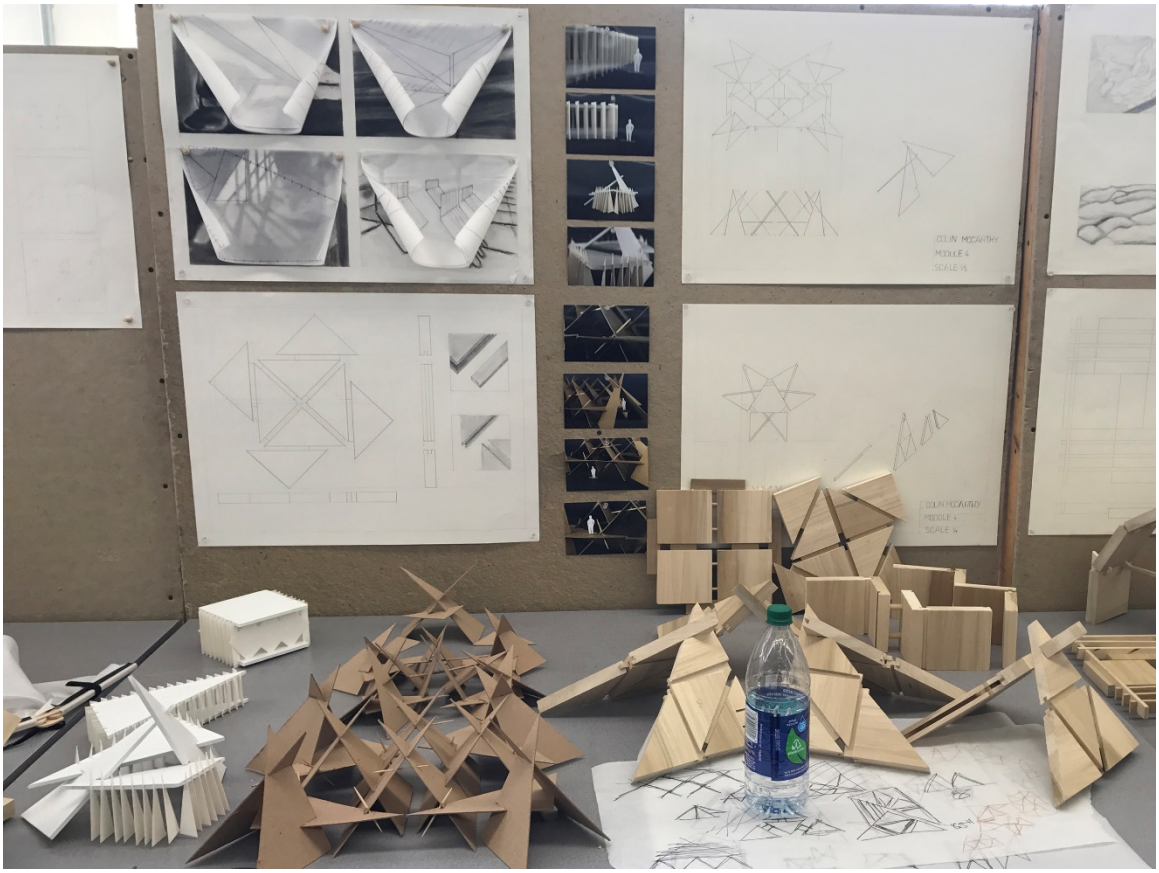

Figure 4: Wood joints, students: Colin McCarthy

Figure 5: Wood joints, students: Sergio Nino de Rivera

Findings

The primary intent of this series of studio exercises was to develop and nurture abilities and skills in generating design from the process of making artifacts, instead of from developing ideas that would informs the production of things. The first implication of these pedagogical inquiries was the effects on the pace of the learning process. It took time for students to learn how to operate each tool properly, got used to them, and got comfortable with the tools. The acquisitions of skills informed the pace of the project. The material, wood, itself demanded time to shape and alter. As a consequence, the projects, both in the Fall and in the Spring semester, proceeded in slow paces. The slow pace of the process, however, allowed us rooms to develop reflections with students on their findings from the process and to conduct conversations during the process to develop the awareness of what they were doing.

Another implication was on the ways the learning process highlighted the sets of constraints of the projects, that is, those from the tools and materials. Students discovered that the wood that they worked with behaved in certain manners. Some basic factors, including the directions of the grain, would affect the ways they could alter their wood pieces. Students discovered that they could carve better in certain directions relative to the directions of the grain of the woods. Even the selections of different poplars would affect their work. Students also figured out the strengths and limitations of each

tool that they worked with. They learned about the specificity of each tool, that each tool was designed to perform certain task. They also discovered that certain tools allowed them carve deeper than other tools. Certain tools allowed them to achieve certain geometries. They also learned that certain tools would work better to achieve minute details, while they would need to use different equipment to produce different levels of precisions. They discovered the limits on which they could cut the woods without compromising the integrity of the artifacts. They found that the precision in cutting was crucial. The exposure to different tools allowed students to figure out the needs to use a range of different tools to perform certain tasks. In other words, they learned that tools could and should work together with each other. In this line of thought, they also discover the dialogue between the tools and the materials. They learned how to operate tools in accordance to the properties of the woods that they worked with

The constraints of materials, tools, and time allowed us to instill the values of preparations. After the first round of exercise in the wood shop, we asked students to prepare a work plan before the class went to the wood shop. This work plan consisted not only drawings and sketches of what they would be performing in the wood shop, but also notes on the type of tools that they would need on executing the tasks. As the project went on, the preparatory documents became more and more refined. We also asked students to bring mock ups made out of cardboard or foam board of the artifact that they would produce in the wood shop. As the process evolved, students also discovered that working with woods required the use of not only tools, but also often the use of jigs to help producing the artifacts. Thus, they would need to discuss with the staffs of the wood shop in advance on the procedure, tools and jigs. Some of the jigs were already prepared, but some would need to be customized. These processes added to the discussion on the values of preparation, which include thinking ahead about what to do and how to do.

The constraints of tools and materials informed the development of design intents of the projects, in which each project became a process that evolved slowly as a result of the dialogue between tools, procedure, and materials. In a way, students learned about the resistance of materials and tools, to borrow the idea from Richard Sennett.5 The learning process centered on the notion of working around resistance. These implied the necessity to improve the way students handle and operate tools. The notion of resistance and the way to work with it also informed the development of the design intents. Students developed the texture and joinery projects based on their understanding of techniques and properties of materials. The depth, geometries, dimensions and eventually the rules for the patterns were informed by the capabilities, limitations of tools and materials. Similarly, the process of thought in developing joints followed the same trajectory. Students learned to manage their frustration by figuring out ways around challenges. On the other hand, students tended to default to the easiest ways of handling tools and materials. Students preferred to work with manual carving tools, as they found that power tools took a longer time to familiarize with. Power tools also often led to unintended consequences, as they could slide over the surface. Similarly, students tended to default to the assembly of spline and dowel joints; as other types of basic joints, half-lap, miter joint, were more difficult to construct and to elaborate.

[5] Sennett, R. (2008) *The Craftsman*. New Haven, Yale University Press, pp. 214-221

In terms of design thinking, the project always asked students to observe their wood artifacts at every step of the process. We asked students to suspend the notion of an artifact by asking them to observe and document through drawings and photographs by zooming-in on their works. The intent was to stimulate students to start to recognize spatial qualities in artifacts that they produced. By zooming in very closely to the surface of the surface, students made association between surfaces of the tiles with the topography of land. Similarly, they started to see rooms inside artifacts of joinery. These exercises in looking and making associations allowed students to develop the sense in spatiality. We asked them to place a cutout figures inside these artifacts to help students to perceive the sense of space as well as to nurture the sensibilities to scales. Studio discussions became a vehicle through which students learned to form the understanding of spatiality through the use of specific vocabularies in architecture. Borrowing from Sennett again, these studio conversations helped students to make a leap of imagination, breaking out of the confined of an object as an object in itself to start imagining an object as an architectural construct with varieties of spatial features.6 In the line of design thinking, the series of exercises with wood allowed us to introduce the notion of rationalizing the process. The working sessions in the wood shop necessitated students to develop methods and procedure, not only in terms of constructing the artifacts, but also in terms of design. They started to figure out the important of geometry in design, including shapes and dimensions. They also found out the importance of regularizing their design, using a limited numbers of elements in generating their artifacts.

Reflections

The impetus of this pedagogical inquiry was to learn from the staffs in our wood shop, that is, our craftsmen. The obvious point was the procedural and technical aspects in executing and constructing wood artifacts. On reflections, we figured out that we learned from them how to work with constraints of materials, tools, techniques, and procedure. The process of construction of an artifact was never a straightforward process, but involved considerations of tools to be used, the sequence of construction, the resistance of materials, and the possibilities of the needs of jigs. In a way, figuring out ways to execute a task would become a design process in itself. In this line of thought, the process also highlight the revealed the extents of the agency of tools and of materials in the process. Constraints posed by tools and materials informed design decisions. It created dialogues between students and tools and materials. We recognized tendencies that emerged out of these dialogues. Some design processes would attempt to impose wills and ideas on materials and tools. On the other end, some design processes would be directed by the strengths and limitations of materials and tools. In the middle, some students would find ways to negotiate and work with materials and tools. These ranges of dialogue with tools and materials brought us back to reflect on the notion wisdom in Benjamin's thoughts. The notion of the abilities of a storyteller to interpret a story seemed to serve as an analogy for these dialogue. It pointed to the developing ability to contextualize the procedural and technical skills and knowledge in limited sense. This level of thinking capabilities seemed to emerge along with the process. The idea of wisdom also related to the attempt to develop the abilities to read spatial features and qualities in object that students constructed. This capability, however, was much more challenging to develop.

[6] ibid. pp. 10-11

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