

Making & Inquiry: Cultivating Process in the Beginning Design Student

James Eckler and Stephen Garrison

Marywood University School of Architecture

"An architect must use round wheels, and he must make doorways bigger than people. But architects must learn that they have other rights... their own rights. To learn this, to understand this, is giving the man the tools for making the incredible, that which nature cannot make."ⁱ

- Louis Kahn

More than anything else, the goal of First-Year architectural pedagogy is getting students to think like designers. This is becoming increasingly difficult as primary education in the United States continues to devalue many of the ways of learning so crucial to architectureⁱⁱ. Today's student is typically one that has only ever been faced with single solution problems solved by formulaic method. That student is one that regards process, discovery, invention, and varying degrees of success with skepticism.

This reality has caused a necessary shift in First-Year design pedagogy – its goals, priorities, and methods for evaluating success. For a long time, First-Year curricula of any architecture program has been a re-tooling of the way the student thinks and observes their environment. This is still the case, but how is it accomplished when a student feels that there is just one correct way to arrive at a predetermined answer and looks to the instructor for step-by-step directions? This demands that First-Year architectural pedagogy respond with new techniques for delivering design content and encouraging self-motivated exploration.

This paper proposes a First-Year pedagogical model that presents acts of making as forms of inquiry. It is in its infancy and has grown and developed along with the Marywood University School of Architecture. Which is just now looking to graduate its first undergraduate class. Like any design initiative this pedagogical model continues to evolve, but

throughout its development it adheres to the core principles and strategies outlined in this paper.

Balancing Technique and Enquiry

First-Year, as it always has been, is burdened by extraordinarily complex and diverse teaching responsibilities. Students leaving the First-Year must be prepared with diverse technical skills for drawing, sketching, modeling, and analyzing spatial conditions. Additionally, they must possess a fundamental sensibility for leveraging those skills in a way that is generative of the architectural idea.ⁱⁱⁱ They must learn to think through the act of making.^{iv}

Successful First-Year pedagogies cultivate design process. To the student, this represents a shift in the way knowledge is acquired. Instead of using technique and methodology to arrive at the correct answer, the student is asked to use technique to test variations heuristically and iteratively. The goal is to discover the scope of possibilities and imagine the results of implementing them.

Students are asked to take the risk of experimentation, often to satisfy simple curiosity. Without the safety net of a single, verifiable solution they are almost guaranteed to fail, over and over again. This is the nature of inquiry in a heuristic design process. It requires that one crafts toward an idea, learns from its inevitable failure, and makes a new version built from the knowledge gained. It is only through such a design process that true innovation might be found.

The breadth of crafting experiences also builds a kind of design intuition such that the student will eventually be able to accurately predict certain outcomes and engage in progressively more complex and sophisticated investigations. Establishing a heuristic

sensibility provides the foundation upon which future design endeavors will be built. It requires instruction in the techniques of craft, but also the encouragement to apply them in ways that aren't conventional.

The Key is Structure... and then the Lack of it

Accomplishing the educational goals described earlier is dependent on pedagogical sequencing. Central to our proposed First-Year model is rigor and structure at the outset followed by gradually relinquishing that control to the students. In the first stage of instruction students are given clear rules to hone skills and techniques of craft and representation. The scope of the project is almost entirely defined by the instructor and the results are largely predictable. This builds

confidence on the part of the student and models a successful design process. In the next stages students are asked to define ever-greater proportions of project scope. Here they are introduced to analytical and interpretive skills and expected to make critical decisions based upon them. The rules established earlier can be broken with adequate justification. As student design priorities begin to emerge assessment is largely based on adherence to their own established goals and criteria. The results are wildly divergent. Students are able to see a much wider range of possible designs and methods for implementing them. The provided opportunity for a cross-pollination of ideas contributes to a growing repertoire of design applications.

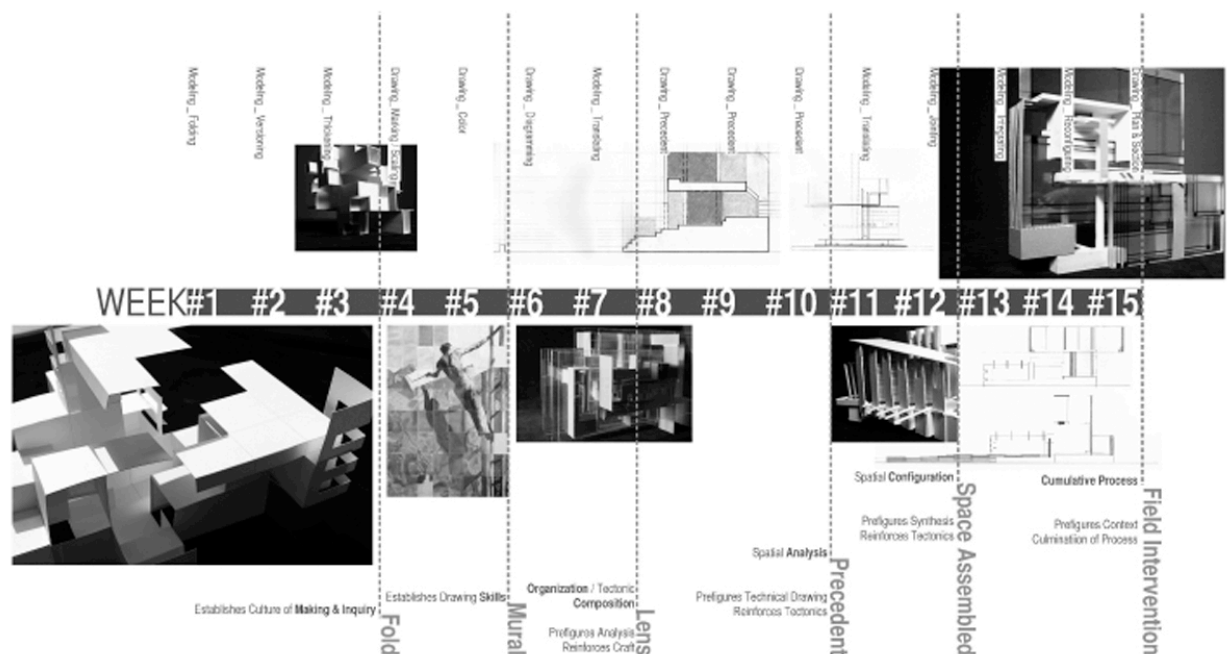


Fig. 1. First-Year, first semester curricular structure. Technical and crafting skill tied to design exploration.

This logic has implications, not only in the course development of a beginning design studio, but also in the larger undergraduate curriculum. In the First-Year when students are most skeptical about this approach to thinking, they are given very rigorous highly structured assignments. During this time they are able to build-up a diverse skill set of crafting techniques (Figure 1). Additionally they are provided with numerous opportunities to experiment with those techniques in the pursuit of newly generated ideas. Buildings are not the goal. Instead of the

extraordinarily complex set of variables necessary to produce a building, they are instead asked to focus on tectonic assembly, spatial composition, and ordering systems. In each subsequent section of the curriculum, students are able to leverage knowledge, technique, and application through process in the generation of gradually more complex architecture (Figure 2). They do not leave the lessons of First-Year behind, nor do they replace them with new lessons. Instead, the goal is to expand upon them,

and find new and more sophisticated ways to examine them^v.

The larger curricular model produced by this kind of pedagogical structure produces graduates that have thoroughly examined many facets of the discipline of

architecture. But, that is not its most important accomplishment. The graduates that emerge from a model like this, one very much dependent on First-Year design pedagogy, are prepared to explore new disciplinary challenges as they arise and continue to evolve as designers.

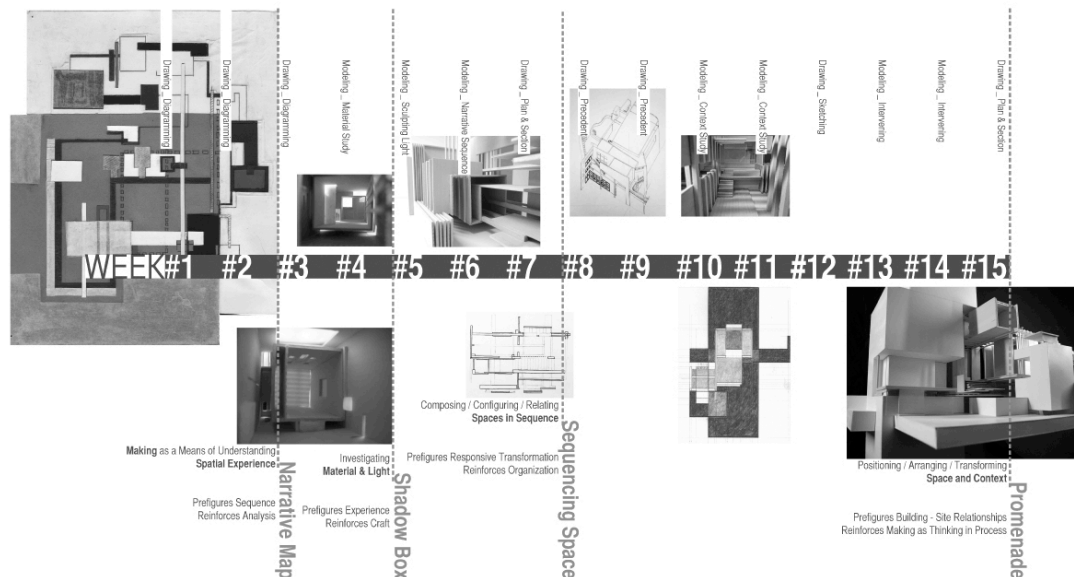


Fig. 2. First-Year, second semester curricular structure. Crafting skills advanced. Student design process more self-motivated.

A Snapshot of our First-Year

In the First-Year at Marywood students are surprised to discover that they will design no buildings. Instead the focus is on space, and the tectonic elements that define and configure it.^{vi} Students focus on the crafting of those elements to precisely affect space. And, they do it in a way that demands constant experimentation with regard to the performance of elements and joints that express their behavior through the way they are built. The road toward cultivating process is begun by dismantling preconceptions and replacing them with imagination.

Fall Semester is highly structured. It begins with a deceptively simple project – The Fold. For this students are asked to construct as many spaces as possibly by cutting and folding paper along a predetermined grid without ever completely dividing the page. Despite its apparent simplicity, it does one

important thing; it requires the student to determine the degree of enclosure necessary to constitute a space. This immediately begins developing their visual sensibility and forces them into a scenario requiring multiple iterations to generate an adequate outcome. Thus, design process is introduced.

As students experiment with various configurations of cuts, scores, and folds the project becomes a vehicle for developing other crafting skills. They are asked to draw different versions using a variety of media and techniques. Organization and ordering skills are introduced as strategies for arranging spaces. And, new crafting techniques are learned as students are forced to abandon the simplicity of cutting and folding in order to add thickness and structure.

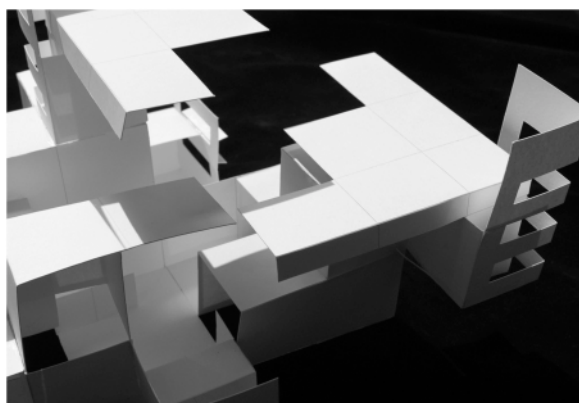


Fig. 3. Fold Project. Making/Defining/Understanding Space

The Fold project is important as an introduction to thinking, making, and the crafting skills required throughout the rest of the semester (Figure 3). It establishes a level of rigor that is maintained throughout subsequent projects.

The rest of the semester is comprised of multiple short projects culminating in the construction of a tectonic shelter^{vii}. The process begins with each studio building drawing skills by collaboratively reproducing a masterwork painting or drawing. That mural forms the basis of remaining study. Once complete students conduct a compositional analysis of it indicating instances of alignment, pattern, edge, boundary, and territory (Figure 4). These analyses are then used as a catalyst for constructing spaces^{viii}.

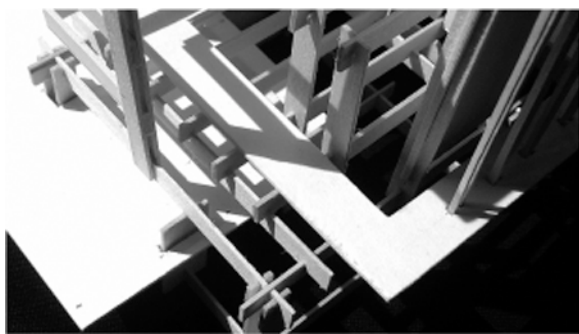


Fig. 5. The Tectonic Shelter. A culmination of design principles and crafting skills in the first semester.

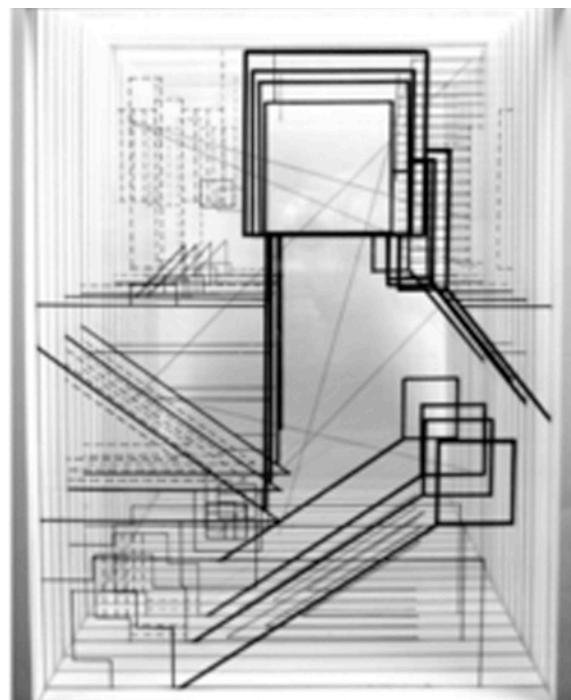


Fig. 4. Compositional analysis of Mural. Later synthesis of information studied.

Students interpret their mural and translate compositional information into spatial information^x. This process requires many versions and reflection. Throughout, students move back and forth between physical construction and drawing. The end result is a tectonic shelter (Figure 5). The shelter is not a building, but a spatial construct that enables students to study issues of spatial proportion and ordering. It is positioned within a field, also derived from the analysis of the mural, as a rudimentary introduction to contextual response.

Whereas the Fall Semester is broken into many small projects that introduce design process and skill development, the Spring Semester is dedicated to applying those skills to fewer, more complex projects. It focuses on building existing skills and applying design process toward inquiry and generating ideas in a more self-motivated way. The curricular structure begins to loosen.

Marywood University's Foundation Design sequence terminates in what we call the Promenade Project. It is still not a building, but it is as close as any of our students have come to designing one. Toward that end the semester is phased in such a way as to

promote more specific material, spatial, and experiential investigations. The students are still concentrating on craft and its ability to foster ideas. However, the nature of those ideas has grown from simple composition and ordering systems to include issues of habitation: light, material, and spatial sequence.

Students begin with an analysis of film and look for ways that filmic information can be translated into spatial information. To do this they are introduced to new techniques for diagramming to build upon those already introduced in the prior semester. Based off of this analysis they construct shadowboxes to observe the behavior of light relative to material, proportion, and assembly (Figure 6). The shadowboxes are motivated by vignette and aim to recreate certain phenomenal conditions observed in the film and analyzed in the diagram.



Fig. 6. The Shadowbox. Students experiment with material, proportion, and assembly toward manipulating the behavior of light and making an experiential environment.

As design tools applied in the film become more clear, and are translated into an architectural language, the shadowboxes are expanded to encompass multiple scenes as a sequence of spaces. The construct is given context. Relationships of movement and transition are not only explored internally as one moves from space to space, but also externally as one crosses from inside to outside. Promenade is understood as the circulation of an occupant from one space to the next entertaining issues of threshold, transition, encounter and discovery. The outcome is

a set of spatial experiences that have been carefully choreographed by the student* (Figure 7).

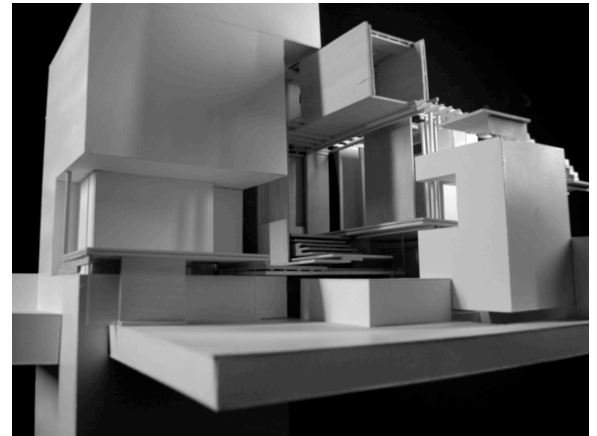


Fig. 7. The Promenade Project. The shadowbox is extended into a multi-spatial, tectonic construct responsive to contextual masses.

Successes and Reflection

"...let us assume that we are equally inspired by our faith in the things we create: you with your thirst for knowledge and I, with a devotion no less great, a devotion, based on experience of forty years, impelling me more than ever to new discoveries."^{xi}

- Le Corbusier

The shift proposed in this pedagogical model is a subtle one. The outcomes of student work may not differ tremendously from other models. The real shift is in priority. Instead of focusing exclusively on representation skills, this model focuses on the application of those skills toward generative process. It is also a model that has proven crucial to our School of Architecture. As Marywood University's School of Architecture is in its infancy our students have very few previous cohorts to serve as exemplars. We do not have either the burden or luxury of tradition. So, in place of the tremendous archive of student work on which other schools rely, we are relying on more introspective approach. It is one that is more focused on the route of exploration than any precious outcome. It based on craft and not product.

Despite the shift in priority away from product – and away from skill training – our students have

consistently produced extraordinary outcomes, as well demonstrated great technical proficiency. The pedagogical model that has guided these students through their introduction to architecture explains a result like this one. When content is layered and integrated students learning is compounded. Craft is not learned for its own sake but rather as a generator of ideas. Ideas are not dreamt, but built up through rigorous trial and error. And, product becomes a

result of ambitiously perfecting craft and its ability to lend clarity to concept.

These are sensibilities that are applicable to every stage of design education. Throughout subsequent studios these skills and motivations will be developed, extended, and built upon in ever more sophisticated architectural proposals. In this pedagogical model design process is not taught, nor is it a result of pure talent. It is, in every respect, cultivated.

Notes

ⁱ Kahn, Louis I.; Louis I. Kahn: Conversations with Students; Architecture at Rice 26; Princeton Architectural Press; 1998

ⁱⁱ Understand Howard Gardener's theory of multiple intelligences gives us insight into the changing climate of First-year design education. With primary education emphasizing the "Logical--Mathematical Intelligence" and very nearly eliminating studies that cater to "spatial intelligence" students are no longer as equipped to "perform transformations, and modifications upon one's initial perceptions." Gardener, Howard; *Frames of Mind: The Theory of Multiple Intelligences*; tenth anniversary edition; HarperCollins; 1983.

ⁱⁱⁱ James Eckler (one author of this paper) presents an array of design principles, analytical techniques, and crafting skills and their potential to foster new ideas and be used in design process. Much of Marywood University's First-Year curriculum is based on the objective to "discover what something can be, rather than identifying what it is"

^{iv} The idea presented by Juhani Pallasmaa that "only embodied knowledge divorced from conscious attention seems to be useful in creative work" lends credence to our goals of linking craft and conception such that the architectural idea is permitted to emerge from the act of making. Pallasmaa, Juhani; *The Thinking Hand: Existential and Embodied Wisdom in Architecture*; John Wiley & Sons; 2009

^v In the same way that Hutchins describes the multi-step structure of ocean navigation, we use the accumulation crafting skills and their various applications to design as a framework for structuring curricula. "In an external representation, structure can be built up gradually-----a distribution of cognitive effort over time-----so that the final product may be something that no individual could represent all at once internally." from Hutchins, Edwin; *Cognition in the Wild*; MIT Press; 1996.

^{vi} The idea that process and experimentation are prioritized over product is underscored by Vittorio Gregotti who reminds us that "...an interior right in interrelations rather than in form for which

simplicity is, above all, a triangulation of the experimental field." in Gregotti, Vittorio; *Inside Architecture*; MIT Press; 1996.

^{vii} Using Gottfried Semper's four tectonic elements aids students in understanding the spatial implications of form without resorting to fantastical formalism. No matter the complexity of form "the original constituent parts can still be distinguished" by virtue of these basic elements. Semper, Gottfried. *The Four Elements of Architecture and Other Writings*. Translated by Harry Francis Mallgrave and Herrmann Wolfgang. Cambridge: Cambridge University Press, 1989.

^{viii} This is the sort of diagram that design can be extracted from that Kwinter refers to: "The diagram is an invisible matrix, a set of instructions that underlies-----and most importantly organizes-----the reservoir of potential [forces] that lies at once actively and stored within an object or an environment. It determines which features are expressed and which are saved. It is in short, the motor of matter, the modulus that controls what it does." from Kwinter, Sanford; Introduction (titled *The Judo of Cold Construction*) to *The Atlas of Novel Tectonics* by Jesse Reiser and Nakano Unemoto; Princeton Architectural Press; 2006.

^{ix} Gottfried Semper provides insight into the extent to which fundamental elements of form influence design at many scales, across the allied "technical arts." Through architecture "we also encounter those simpler works to which the artistic instinct was first applied." This notion is the basis for introducing process using simpler structures from allied artistic disciplines. In this instance we use painting in another we use film. Semper, Gottfried. *Style in the Technical and Tectonic Arts; or, Practical Aesthetics*. Translated by Harry Francis Mallgrave and Michael Robinson. Los Angeles: Getty Research Institute, J. Paul Getty Trust, 2004

^x Here we expand on the understanding and application of tectonic logic to include overarching strategies for bringing cohesion to the architectural construct. Bötticher "distinguished between the Kernform and Kunstform; between the core of the timber rafters and the artistic representation of the same elements" in his understanding of tectonic "as signifying a complete system binding all parts of the Greek temple into a

single whole.” In contrast Semper’s tectonic taxonomy divided the building into multiple built systems and distinguished only between “two fundamental procedures: the tectonics of the frame and the stereotomics of the earthwork.” Frampton, Kenneth. *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*. Cambridge: The MIT Press, 1995

^{xi} Le Corbusier; *Talks with Students*; Princeton Architectural Press; 1999