Intra-Disciplinary Pedagogy in Design: A Case Study for Collaboration and Diversity in a Research-Based Design Studio

"[A]rchitects who have aimed at acquiring manual skill without scholarship have never been able to reach a position of authority to correspond to their pains, while those who relied only upon theories and scholarship were obviously hunting the shadow, not the substance. But those who have a thorough knowledge of both, like men armed at all points, have the sooner attained their objective and carried authority with them."[1]

— Vitruvius, *The Ten Books on Architecture*

DUSTIN GRAHAM ALBRIGHT
Clemson University

CARLOS ROBERTO BARRIOS
Clemson University

DANIEL NEVIN HARDING
Clemson University

UFUK ERSOY
Clemson University

FOUNDATION

Architectural education has an unparalleled responsibility to inhabit a place between the learned and the intuitive. This place of tension is a threshold indicating the bipolar nature of the discipline shuttling in constant flux between theory and practice. Yet, despite this liminal character, design studios are often organized and managed stagnantly under a veil of either simulating practice or appropriating theory. Often, this manifests itself in a studio culture that supports a single project or pseudo thesis directed by a single critic throughout an entire semester, and presented mostly under the guise of being either comprehensive or overly cerebral. In this model of studio, even if the outcome is excellent, the income, namely what this studio added to students' design praxis, often remains foggy and unintelligible.

Could developing a collaborative companionship diversify theoretical constructs and help us cultivate a method that would put into question this polarization without ignoring the professional responsibility of studio teaching? This question was the departure point of our experiment. The collaborative companionship we configured aimed at two basic changes in the traditional studio culture: first, it challenged the profile of the studio critic as an all-knowing master. Several scholars coming from different research areas and academic backgrounds replaced the single critic. We anticipated that the variety in this organization would maintain an intra-disciplinary relationship among faculty members and students, and would help introduce students to the problem of knowledge

fragmentation that current architects face. The second change was in the content of the studio. During the semester, instead of concentrating on a single project, students worked on two diverse projects which intended to emphasize different aspects of architecture. Both projects were based on the same design criteria, the Vitruvian triad of firmness, commodity and delight, and shared the same objective of developing students' skills of critical thinking and decision-making.

We knew well that, to achieve this objective, the dialogue we set up with our students would play a crucial role specifically during the gestation period of each project. Paul Tough's "character hypothesis"[2] and Karl Popper's "falsification theory"[3] were the two basic sources that guided our dialogue with students and helped us organize the studio. Tough argues that, in achieving success, non-cognitive skills of self-control, curiosity, conscientiousness, grit and self-confidence, which compose individual character, are more significant than sheer cognitive skills. And, according to Tough, character is created by encountering and overcoming failure. So the primary question in our minds was how to help students turn obstacles they encounter during the design process into character-enhancing achievement. To show an exemplary case, Tough calls attention to world-class chess players who go beyond typical solutions and pattern thinking by questioning their own "conformation bias." Tough's account of chess players brought to our minds Popper's Socratic approach to knowledge.

To break the positivist myth of reliable certainty in scientific knowledge and to enlarge the philosophical horizon of scientific thinking, Popper invited scientists to recognize the limits and uncertainty of their own knowledge. For Popper, knowledge should never be seen as unquestionable authority but rather as ambiguity ready to be falsified and re-invented. Thus, understood through Popper's view, to be the architect that Vitruvius portrayed as an encyclopedic man does not require one to act like a sophist who knows all; rather, the architect ought to be, as Socrates described, the one who knows what he does not know. To carry over falsification theory into the architecture studio, our primary conviction was that design proposals from students should be handled as falsifiable statements open to criticism. This meant that as studio critics, our primary task was to put students' proposals into question in order to instigate an investigation. This task can roughly be summarized as refuting and enhancing at the same time - to give students both autonomy and support.

To summarize, this studio was not in pursuit of a discipline-specific technical certainty. Its ultimate aim was to teach how to convert ignorance into benefit. The atelier environment should house a praxis that would encourage students to both embrace and question their own cognitive abilities and knowledge base. Rather than spending their time merely thinking about what the critic wants to see, students should focus on their own ideas through personal introspection. They should critically examine the concepts and paradigms upon which they trusted without being afraid of errors and failure. This could be achieved via repetitive actions of testing and research. Namely, we thought that the principles of the falsification theory could be woven into design through a studio structure that demands a more nuanced repetition and cyclical rotation.

1

Figure 1: Threshold Graduate Design Studio.

CURRICULAR CONTEXT

The Master of Architecture program is designed around a six-semester curriculum and consists of two streams of students. M.Arch 1 students enter the program without having a previous bachelor's degree in architecture. These students complete two semesters of foundational studies prior to entering the "Gateway Studio" in semester 3 of the program. M.Arch 2 students hold a previous

bachelor's degree in architecture prior to starting the program. These students bypass the foundation studies and enter directly into the Gateway Studio.

Semesters 4 and 5 of the program offer students options to study off-campus at one of our three "Fluid Campus" locations: Charleston, South Carolina; Barcelona, Spain; or Genoa, Italy. This presents both unique opportunities and unique challenges within the curriculum. Until 2012, the Fluid Campus options fell into semesters 3 and 4. This model sometimes left students underprepared to go out and critically engage with the buildings and places that they observed in their travels. The faculty elected to shift off-campus study to semesters 4 and 5, thereby reserving semester 3 as a highly structured time for rigorous exposure to the tectonic qualities of architecture and the ecological impacts of the built environment.

The new Gateway Studio sits at the center of semester 3 and is paired with a Materials and Assemblies course to form an intensive couple aimed at preparing our students to interact with, interpret, and improve upon their surroundings in a manner that is well-informed and attentive to detail. Semester 6 of the program features the Comprehensive Studio, in which all students are back on the main campus, and again

2

working within a shared setting. This is an opportunity to draw on and integrate the diverse experiences gathered over the previous semesters. Thus, the Gateway Studio and the Comprehensive Studio form a set of bookends in the graduate curriculum.

SETTING

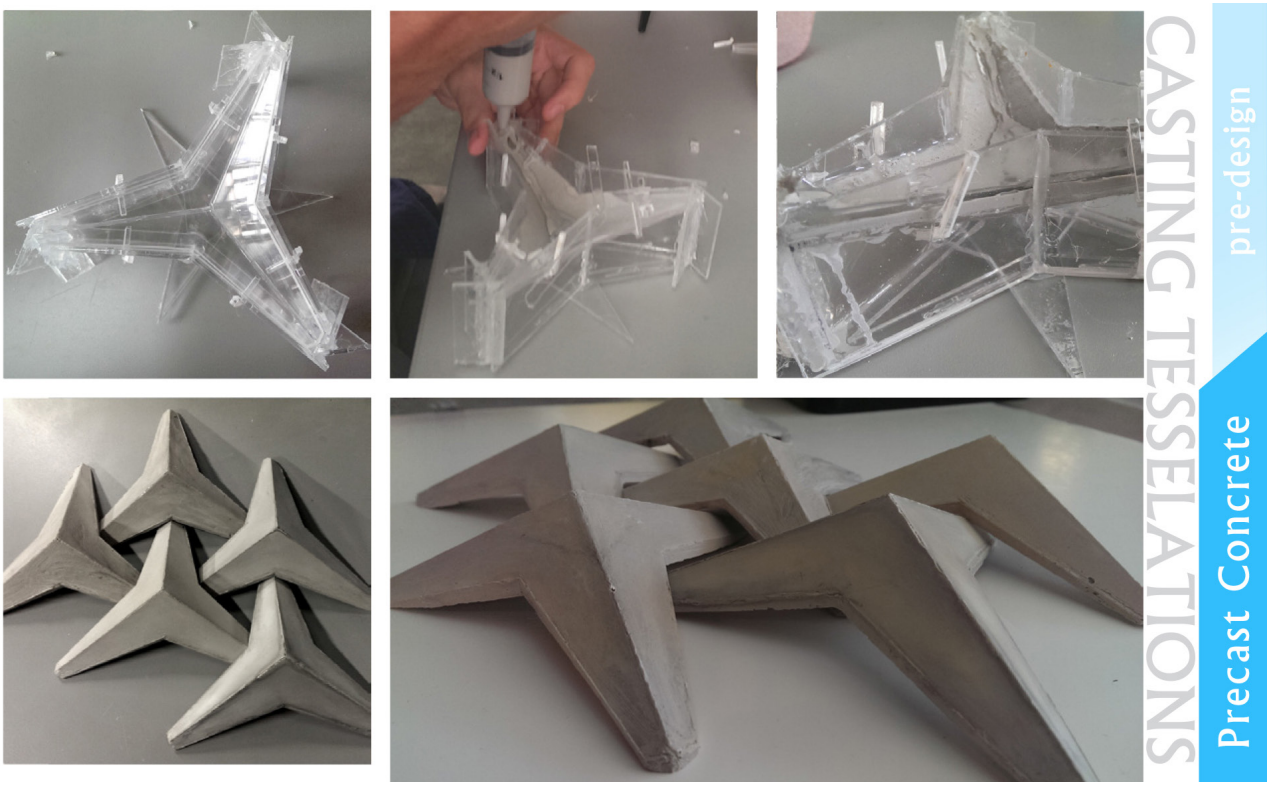
The 2013 Gateway Studio comprised 13 three-year M.Arch1 students and 25 two-year M.Arch2 students for a total of 38. In the past, this number would have been divided into four distinct sections, each with its own faculty member, for the duration of the semester. In this case, however, the students were strategically divided into three groups for the majority of the semester before being reshuffled at the end.

The fifteen-week semester was divided into five blocks of three weeks each. This enabled the four faculty to systematically rotate among the groups throughout the first four blocks of the semester. During each of these blocks, three faculty

Figure 2: Haiku House_ Porous House_Liz Cooney.

were “ON” and focused on a given group of students, while the fourth faculty member was “OFF” and able to work independently on other projects or research. During the final block, the students were re-organized into two groups with each group under the direction of two faculty.

The block format was also established to support two distinct projects during the semester. In our past experiences with students at this level the faculty recognized a tendency to linger noncommittally in the concept-forming stages without testing and advancing their ideas. We agreed that scheduling two projects this time around was ideal because it allowed enough time for depth and resolution without allowing time for indecision. The clear and succinct blocks, paired with the rotation of faculty



and the fresh perspectives it provided, required students to identify their strongest schematic elements and develop them in a focused way. In the future, the decision for two projects could allow for pairings with alternating scales, differing materials, distinctive sites, or some combination. In our case it enabled us to integrate two diverse and ongoing research projects into the work of the studio.

PROJECT 1 involved the design of a small, energy-efficient single-family home. This served as a seed-study and provided design concepts for the School’s subsequent Solar Decathlon Competition proposal to the United States Department of Energy.

PROJECT 2 focused on the material and structural capabilities of precast concrete components with particular applications in mass-transit. At the time, the School was considering the possibility of a series of industry-sponsored precast concrete studios. This project served as a pilot studio and helped formulate research objectives included in our subsequent proposal to the Precast Concrete Institute Foundation.

Figure 3: Tessellated Precast Compenents by Alex Libengood.

BLOCK 1: PROJECT 1: THE HAIKU HOUSE | SCHEMATIC DESIGN (3 WEEKS)
Group 1 + Instructor 1; Group 2 + Instructor 2; Group 3 + Instructor 3

To begin, students were asked to design a 1,200 ft2 (111.5 m2) house for specific sites in our community. There were three sites, one for each of the three student groups. Each one reflected a unique context and topography.

Initial concepts were recorded in the form of kirigami paper models and an accompanying Haiku poem reflecting the spirit of each house. Close site analyses and subsequent measurements of their own private living spaces led to refinements of each student's Haiku House.

BLOCK 2: PROJECT 1: THE HAIKU HOUSE | DESIGN DEVELOPMENT (3 WEEKS)
Group 1 + Instructor 2; Group 2 + Instructor 3; Group 3 + Instructor 4

Following a faculty rotation, students were asked to carry forward the core concepts from their schematic proposals, while rethinking some of the external parameters. The houses were dislocated from their specific sites and reconceived as prefabricated prototypes for a variety of settings in our state. The maximum square footage was reduced to 1,000 ft2 (92.9 m2) and various criteria from the Solar Decathlon program were introduced as parametric design considerations.

BLOCK 3: PROJECT 2: PRECAST CONCRETE | SCHEMATIC DESIGN (3 WEEKS)
Group 1 + Instructor 3; Group 2 + Instructor 4; Group 3 + Instructor 1

Following another faculty rotation, Project 2 required students to research and offer concepts for a new local transit hub that could serve as a high-speed rail stop in the future. Students were first asked to design and cast a modular, tessellated concrete unit, or system of units, for utilization in the transit hub. The modular units provided a tactile component to the precast concrete research of the studio, and offered first-hand insight into the various facets of crafting through forming as well as the iterative nature of mass-producing poured components.

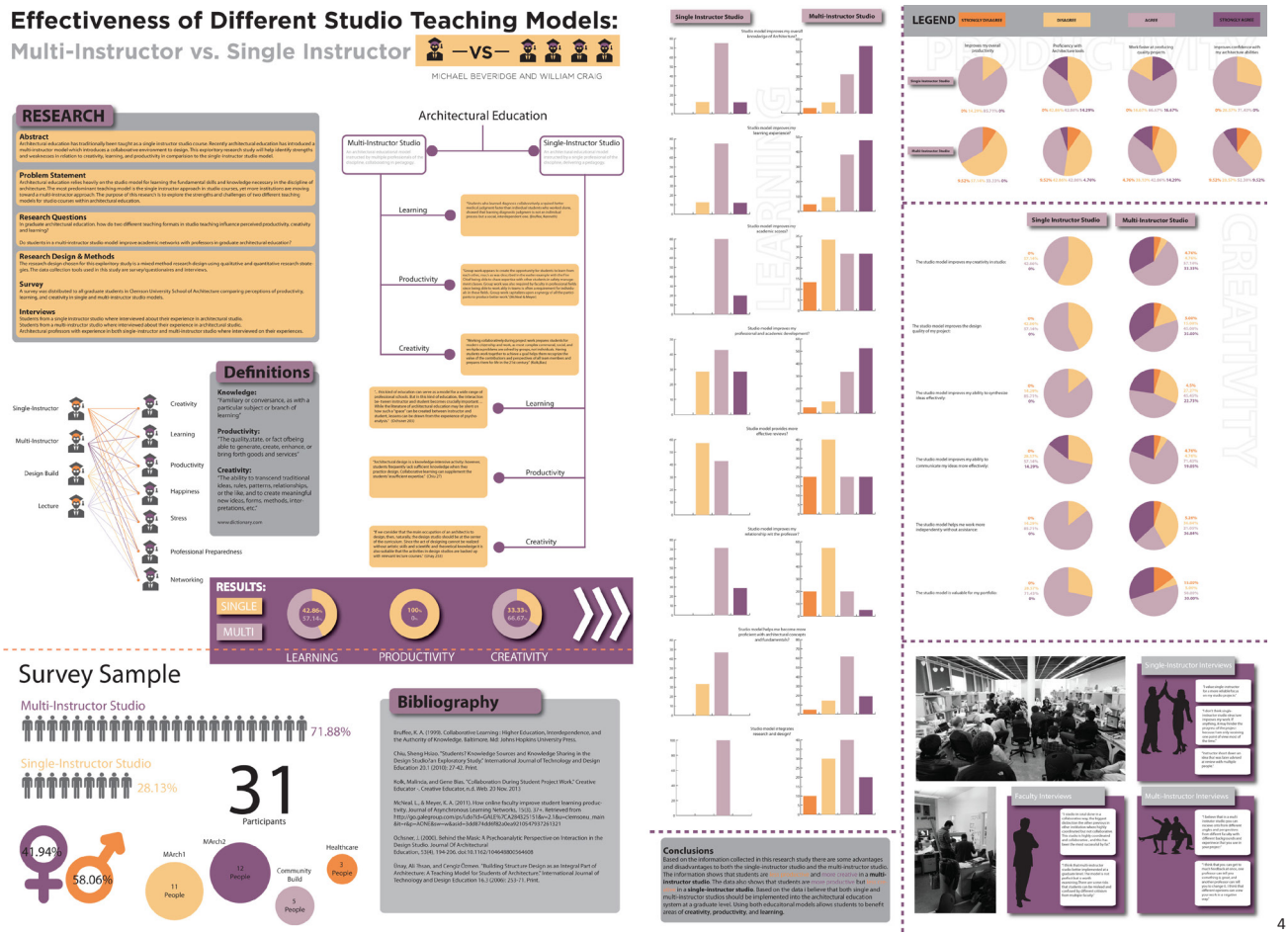
At the end of Block 3, students integrated their precast units into a schematic transit hub design. The faculty identified varying degrees of success in this final step. While some students had moved toward a promising and cohesive building concept, others were still working to unlock the potential of their precast unit designs.

BLOCK 4: PROJECT 2: PRECAST CONCRETE | DESIGN DEVELOPMENT (3 WEEKS)
Group 1 + Instructor 4; Group 2 + Instructor 1; Group 3 + Instructor 2

Following another faculty rotation, students were given the option to develop their transit hub design or focus squarely on advancing their precast unit. Students developing the transit hub worked to refine their floor plans and document wall and roof assemblies. Students developing their precast units reevaluated both geometries and details to streamline production and assembly. They focused on a variety of specific topics ranging from concrete mix design, to reconfigurable parametric forms, to issues of on-site assembly. They continued to model physically through iterative castings with increasing sophistication.

At the end of Block 4 students presented their developed projects to an audience of faculty and precast industry professionals.

BLOCK 5: PROJECT 2: STUDENT CHOICE OF PROJECT 1 OR 2 | FINAL RESOLUTION



4

(3 WEEKS)

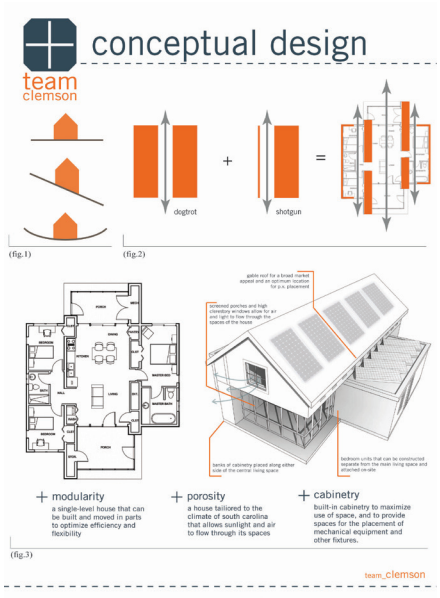
House Group + Instructors 2 and 3; Precast Group + Instructors 1 and 4

Block 5 offered students the opportunity to select either of their two projects for further resolution and a final juried presentation. Those that elected to cycle back to Project 1 (Haiku House) carried with them their experiences from Project 2 (Precast Concrete), and, in the best cases, were able to apply the tectonic thinking developed through working so closely with a particular building material.

RESULTS

In conjunction with the studio, a parallel study on the pedagogical approach was conducted under the supervision of an independent evaluator. Preliminary results of this evaluation showed strongly positive perceptions among students of the effectiveness of this teaching environment when compared with the traditional single instructor studio. The research also revealed that students in the intra-disciplinary studio where more creative and learned more than in a traditional studio setting. Some results in the research hinted at the perception that some students were less productive in the intra-disciplinary setting when compared with having a single instructor. However, this view was contrasted by the critics and final juries, among whom the overwhelming consensus was one of greater productivity in a short period of time. Finally, the study revealed the need for further research on the pedagogical advantages and disadvantages of the multi-instructor model. Overall, both students and faculty felt that this was a positive educational experience that should continue to be offered and perhaps used as a model for design education.

Figure 4: Resarch Poster by William Craig and Micheal Beveridge.



5

Likewise, research products from the studio were developed beyond the term of the semester for the purpose of advancing the ideas and agendas set forth by the collaboration between the faculty and the students. Key ideas developed by the Haiku House served as the foundation for our selection to the 2015 Solar Decathlon by the U.S. Department of Energy. Pre-cast concrete design efforts were recognized for excellence in a graduate student university symposium on research and scholarship. Thus, in addition to the pedagogical benefits outlined in the student study, this experience offers a model for research-centric design studios that support collaborative practice, industry, and design partnerships in the academy.

Borrowing from Ernest Boyer and the notions put forth in *Scholarship Reconsidered*, the ideals and products of the 2013 Entry Studio embodied each of the following: the scholarship of discovery, the scholarship of integration, the scholarship of application, and most importantly the scholarship of teaching and learning.[4] The unique structure of the course and the manner in which faculty interface was formatted with the students required designers to constantly represent and assess their position, shift mindsets, test assertions, and appropriate the feedback from a series of critics as opposed to a singular primary critic. Ultimately, within the context of the curriculum, this threshold graduate design studio served as a unique and positive pedagogical test demonstrating the benefits of short and sharp design problems loaded with research topics. It also provided insight into a unique block structure for co-teaching. The integration of teaching, scholarship, research, and design facilitated the faculty and students involved with the studio to produce peer-review quality work. The products of these endeavors supported the objectives of the program and the curriculum by successfully garnishing grants, awards, and key opportunities for innovative architectural discourse.

Figure 5: Solar Decathlon Proposal Image.

ENDNOTES

1. Vitruvius Pollio. The Ten Books on Architecture. Morris Hicky Morgan. 1914. Cambridge: Harvard University Press. London: Humphrey Milford. Oxford University Press.

2. Tough, Paul. 2012. How Children Succeed. Random House Books: Ch 3 How to Think.

3. Popper, Sir Karl. 1957. The Poverty of Historicism. Routledge & Kgan Paul: Ch. 29 The Unity of Method.

4. Boyer, Ernest L. "Scholarship Reconsidered: Priorities of the Professoriate." *College Teaching*, Vol. 39, No. 1 (Winter, 1991), pp. 11-13.