Iteration in the Public Realm

Understanding the implications on the built environment and the human experience as a result of one's design is learned through experience. As both students and professionals we try to expand our understanding of how design decisions will manifest in construction through precedent analysis and the visitation of built works. We examine the details, reference the drawings and observe how the building performs.

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How does that detail weather? What is the quality of light? What are the implications on human behavior? Ultimately asking if the built environment achieves the architect's intentions. The list of questions becomes greater when one is the author of the work. Seeing the first scratches in the dirt or the framing of spaces allows one to evaluate the decisions made in the studio months or even years earlier. As construction continues more issues and successes are revealed thus informing the next design. The examination of the design manifestation is an elongated iterative process, allowing one to continue to inform and refine an approach to design.

Iteration is a fundamental part of the design process, both in the academic studio and in the professional office. It is through iterative investigation within the design process, founded in research, that students develop the skill set to be critical designers, poised to make a valuable contribution to the built environment. Typically this process is limited to speculative work, i.e. work that only exists in scale representations of reality, where there is a level of complexity and resolve that cannot be obtained. We prompt the students to be projective about the implications of their work, but there are limits to the actual testing and examination of their speculations. Throughout the semester and the curriculum, the continual redrawing / modeling of their design allows for the examination of the proposal with increasing levels of sophistication. This type of iteration based learning can be simply evidenced through the sophistication of a window designed at each level of study. By the time a student completes their education the window is both performative and poetic, provides light and ventilation, view and space, and is integrated to the overall systemic conditions of the building. However, much of this iteration within the academy is within hypothetical projects that have limited connection to construction, clients or public engagement.

The pursuit of an architectural license couples the accredited professional degree (the academy) and the Intern Development Program (IDP) as a means of ensuring

that licensed professionals are prepared for the responsibilities and liabilities of upholding Health, Safety and Welfare. Interns are provided with a framework to see that they are exposed to all aspects of the profession in preparation for the Architect Registration Examination (ARE). Interns are required to satisfy hours within four categories (Pre-Design, Design, Project Management and Practice Management) though it does require that the experience is sequential to a project's development, delivery and execution. At the completion of the program, interns should be able to complete a list of tasks as defined within the current IDP guidelines published by the National Council of Architectural Registration Boards (NCARB) but not necessarily have it inform the design methodology.

Citing the research of Anders Ericsson, Malcolm Gladwell claims in his book Outliers that 10,000 hours are needed to become great at something. Combining the 5,600 total hours required by IDP and an approximation of 5,000 hours in an architecture program (approximately 1,000 hours per year of study over a five to six year education depending on school and student) we seem to achieve the goal of the "10,000 Hour Rule" Gladwell sets out. However, the majority of these hours come within the confines of the studio environment with limited interaction with client or the public users of the spaces being created. It is also quite limited in the number of hours required engaging in the construction of the design with only 360 hours specifically required for Construction Administration and Observation within IDP.

Design-Build courses within the academy seek to provide students a deeper understanding of the implications of their design intentions in a tangible manifestation. Students understand the complexities of connections, physical limitations and the true spatial qualities of their design. They learn how to work with a client, mitigate budget and code issues, and understand the value of scheduling a team's efforts towards a common goal. Ultimately, students are able to observe and learn for future design projects based on feedback from the end users on the final product. However, this process also tends to rely on iteration within the confines of the studio environment, waiting until the work is built to offer an engagement with the community around the actual design and not just its representation. These types of courses are incredibly important to the development of an architect and provide an opportunity for empathy, not just for the construction trades, but for users of the built environment.

Similar to many Design-Build studios, students within the courses I am teaching at Montana State University are engaged in working with non-profit organizations that rely on community support, be they outreach programs, educational institutions or governmental agencies. Within this context, teams of students conduct site analysis and user group meetings to understand the desires, limitations and opportunities for each site. Once this criteria is established, students begin real time prototyping within the public realm to test their theories. Sketches of proposed tactics are constructed using easily manipulated materials like cardboard, plywood, dirt and existing furniture. This method allows for manipulation and alteration while working with the public, removing the lag created by working within the studio to refine ideas. Additionally, it creates opportunities for engagement and ownership of the work by the community during its development, in hopes of establishing greater care and sustained value by the public of the student's final installation.

CASE STUDIES

The following are case studies from two different courses offered at Montana State University.

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ARCH 292 | 451 | 543 (CO-TAUGHT WITH INSTRUCTOR BILL CLINTON, MSU SCHOOL OF ARCHITECTURE)

This course developed with Instructor Bill Clinton was a result of two major changes to Cheever Hall, the building that houses the School of Architecture, the Dean of the College of Arts and Architecture and several general purpose classrooms. Cheever hall is the only building within the Creative Arts complex (Art and Music each being in their own buildings) that contains any significant public space for students. It is also the building that sees the most non-major student use due to the larger number of general purpose classrooms and the Dean's office. During the summer of 2013 Cheever Hall underwent seismic retrofit and accessibility renovations resulting in the opportunity for more student owned space on the upper level. At the same time, a new program for the University was in development through the Dean's office. The Design Sandbox for Engaged Learning (DSEL) was launched as an initiative and was in need of a space. It was determined that a current student lounge on the lower level of Cheever would become the first home for this new innovation lab. This combination of events created the opportunity for students to become the authors of these new student spaces.

During the 2014 spring semester a vertically integrated group of 12 architecture students began the masterplanning process for the new student lounge on the upper floor of Cheever. The students began the documentation process of measuring the space and developing the code research that would be necessary to present to facilities and the fire marshal. They also began observation of how the space was being used with the random collection of furniture that had accumulated in the space. Rather than working over the existing conditions drawings to develop design proposals, we tasked the students with the reconfiguration of the space utilizing whatever furniture could be found within the building. Over a few week period the students reconfigured the lounge and study areas to test design ideas for the space. Students in the course observed how their actions impacted the student use of the reconfigured spaces.

After a few weeks of the space changing on an almost daily basis, a user group workshop was held to gain further input from the student body on what had been successful and what did not work. The students also prompted their peers with their observations and intentions for the types of use to occur in the space and how it could be zoned. As a result of this workshop the students articulated a zoning and flow diagram and determined the performative needs for the design of the space.

Over the next few weeks the space continued to be transformed through an iterative design process. The existing furniture was retrofit with cardboard to test ideas in the public space. These ideas were translated into drawings to develop a more accurate set of dimensions based on material choices. These drawing in turn generated plywood mock ups that were deployed in the space to further vet the design and garner student input.

Ultimately a final set of construction drawings and a budget were generated for approvals by facilities, the fire marshal and Nancy Cornwell, Dean of the College of Arts and Architecture, who funded the project. The first phase of the project was then put into fabrication during the second half of the spring 2014 semester and was installed over the summer. The first phase to be implemented was a series of work tables along a busy corridor adjacent to the general purpose classrooms. Glass tops and erasable markers were included as part of the design to provide a collaborative work surface which has become a venue for student comment and

Figure 1: User group workshop with students.

critique of the design. This venue and the proximity to the studios continues to allow for the students to observe the implications of their design.

The second phase of this project began in the fall of 2014 with a new group of six students. After a review and understanding of the masterplan for the entire student public space on the upper floor of Cheever Hall, this new group of students began testing ideas in a similar fashion for the larger lounge area. Through a similar daily reconfiguration of the available furniture the students found that the installation from the previous semester altered the student user's needs for the space. The new findings redefined the previous intended use for the space resulting in a much more flexible design. The current student's efforts, through the funding of the Dean, are a combination of purchased furnishings and the fabrication of their design. This entire effort will be completely installed by the end of 2014, but will continue to provide feedback to the students who participated in the project.

Another project that was part of the spring 2014 course was the design and fabrication of a conference table for Cheever Hall located in a conference room that was converted from a slide library. The square nature of the room is not ideal for a conference table that needs to accommodate groups of 12 - 20 people without creating a vast amount of unusable table and separation between users. The programmatic desires for the room also included much smaller meetings of three or four people as it is the only private meeting space in the building.

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Student's began this investigation in a similar manner, creating background drawings, understanding code and accessibility issues and observation of meetings within the space. As the code and accessibility constraints were much greater given the confined nature of the room, design began on paper outlining the zoning for the space. Once these parameters were determined the students began reconfiguring existing furniture within the space to observe user's behavior. This generated competing ideas among the students about the best resolution for the space. Quick cardboard options were created to further the design discussion.

As a result of these conversations a consensus was generated and a series of plywood mock ups set on temporary frames were installed in the space. Over a few weeks the students continued to alter the shape of the working surface to best meet the needs of the users through observation and conversation. Over the second half of the spring semester the final table was fabricated and installed during finals week. The conference room is separated from the graduate design studio and the public corridor by glass walls on either side, providing an extended opportunity for feedback to the students involved.

ARCH 551

There are three studios within the graduate program in the School of Architecture at Montana State University. Architecture 551 is defined in the course catalog as "Advanced Architecture Studios that are classified as experimental or theoretical design studios. These studios may be Design-Build in nature, place specific or theoretical and are intended to give a student an experience that is outside the traditional realm of Architecture." The course also carries the National Architecture Accrediting Board (NAAB) Conditions of Accreditation Student Performance Criteria (SPC) learning objective A.11, Applied Research: Understanding the role of applied research in determining function, form, and systems and their impact on human conditions and behavior.

I have taught this studio on three occasions during my time at MSU and have utilized terrain as a means of creating a student experience that moves outside

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Figure 2: Mock-up of student study booths.

Figure 3: New student work tables designed and fabricated by students.

of the traditional, though this probably should be perceived conventional, realm of architecture to create an understanding of the role of applied research. Within these studios students are challenged to reevaluate their approach to design when the traditional language of architectural elements is removed from the equation. Projects in these studios focus on larger systemic conditions associated with the landscape that cannot be solved through buildings. The projects engage the public through terrain based placemaking incorporating client / user needs and the systemic forces acting on and around the site(s). The students must engage economic implications and work within the policies of the place. The most significant of these being the EPA criteria for reclamation work of the Superfund sites that define the city of Butte, Montana where two of the studios were based.

While an important part of the studio is the knowledge base created by the students through interviews and research, I want to focus on the Design-Build portion of the course that generates a new agency for the students. Students spend the first part of the semester working on a series of short projects to develop the understanding and skills needed to successfully manipulate the landscape to be performative. Through these exercises they learn how to survey, grade and engage systems as part of the design process. They are also challenged to design these terrains as places for human occupation and understand the implications of their design within the larger systemic context.

There are two week long projects that the students complete during the semester that takes them out of the studio environment to test their ideas in a public realm. The first project involves the students working in pairs to create a place within the landscape that creates a place for two people to engage the landscape without instruction. An area of campus is defined as the site and students are provided with a collection of hand tools, no heavy machinery is allowed, to execute the work. There are no drawings generated during this process and the students work in an iterative construction process to test and evaluate their designs, reworking the dirt until it meets the criteria. The students and others passing by provide input on the designs as they are in process, constantly evolving over the week. At the conclusion of the week the students then create a topographic and experiential survey of the site to document their design.

The second project was a collective studio effort to make a gathering space for the community, in one case a reception space for a school event and the other as a reading group discussion area for the School of Art graduate studios. The students began with site observation and analysis and moved into proposed strategies to satisfy the program by staking out the site. As construction began, this time including an excavator and skid steer along with the hand tools, the students evaluated and altered the implementation based on user feedback. Knowledge gained from the first soil manipulation exercise and in-situ critique of the progress guided the iterative design process. The sites were then engaged by the intended users with the students to further evaluate the design.

Unlike the first case study, this Design-Build iteration within the public realm was itself part of the larger iterative design process. The students engaged in the fabrication and evaluation of terrain analysis early in the semester to then inform the projective implications of their designs for reclamation sites on the Butte Hill. Through the collapsing of the time associated with the Design-Build, students were able to internalize this medium of design, new to all of them, and reduce the lag of feedback from testing and evaluation. The students were able to understand issues

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Figure 4: Terrain manipulation for two by Casey Bennett and Jimmy Swanson

WORKING OUT | thinking while building

associated with slope stabilization, erosion and the limitations and opportunities associated with place making through terrain that significantly improved their designs for the community of Butte, Montana.

CONCLUSION

A common theme of these classes is the scale of the project. The critical stance made was that the iteration process engaging the public must result in a finished project within the 16 weeks of the semester. Additionally, there was a desire to keep the size of the class to a number where each student would be able to have an authorship voice within the process. Both of these parameters limited the scope and scale of the work in deference to iterative prototyping / installations that engaged the public as often as possible.

Another goal for some of these offerings was to create a vertically integrated group of students, embracing the talents that come from a more diverse collection. This has been successful in creating a richer dialogue within the school, but does present issues with the first and second year undergraduate students. These students have tended to hold back during the design discussions and are more inclined to wait for instructions from the upper year students. We have also sought to expand beyond the School of Architecture to make the group more interdisciplinary. The current class efforts on the DSEL space include a group of three graphic design graduate students and one faculty member from Graphic Design. These dynamics are something that requires attention among the students which does provide opportunities to discuss peoples roles within a group and eventual office setting.

The value of Design-Build courses within the academy play a significant role in expanding the breadth and depth of the student's understanding of architecture as they work towards licensure. These courses at MSU are grounded within that framework of understanding through making and seek to reduce the lag between design and construction. Through prototyping in public, the students are able to gain real time feedback from the end users allowing for an increase in the cycle of iteration. By doing this, students also learn how to distance themselves from the work and have a critical position on what they have made. Like many of their first designs within the program, the first thing they construct can only be seen as precious, and there is an inability to be critical. The courses also establish a methodology of iterative design through multiple mediums and scales, not giving hierarchy to any form of ideation.

Through the establishment of a framework for the projects based on engaging the public / end user in the iterative prototyping in-situ process, the learning feedback loop for students is accelerated. This pedagogical approach also increases the learning hours associated with the implications of design and construction, something that is limited within the "10,000 hours" of a student's / intern's training. It also increases the engagement with end users / clients, creating an empathetic approach to the designer's efforts, and hopefully future projects. Though these projects are small in nature, they have generated a new discourse among the students who have participated in the course that goes beyond construction as a means of execution, but that it becomes an integral part of testing ideas with the user, not in the isolation of the studio.

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Figure 5: Terrain manipulation for reading discussion and social gathering space.