Pedagogy of Practice

The complexity of practice is increasing...

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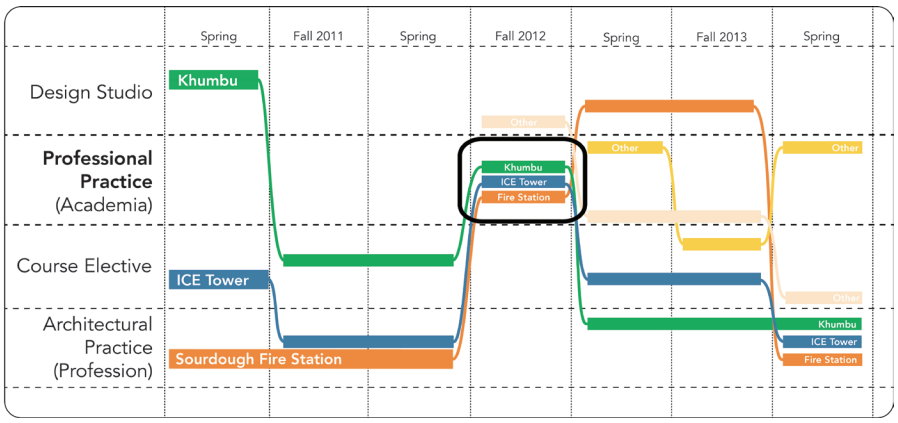
ABSTRACT
The day-to-day practice of architecture must navigate within a system of contexts often replete with competing values dictated through external forces by clients and patrons to effectively execute the work. This requires the process of design and construction to respond to constant tactile adjustments made by the demands of clients, codes, budgets, etc. to address the landscape of contingency. Every project, decisions are made about quality of materials versus reality of budget and time constraints or owner-prescribed values and requirements versus site and building code constraints. Engaging these conflicts defines the profession of architecture.

So can architectural students confront these conflicts within their own education?

What is the role of professional practice in architectural curriculum?

Professional Practice curriculum plays an essential role in addressing conflict in the practice of architecture. The course introduces students to the comprehensive field of practice, existing within a broad range of social, organizational, economic and professional contexts. The course is typically taught as medium to large size lecture course, with little opportunity to critically engage the complexity they will be thrust into following graduation and limiting its effectiveness as an intersection between the academy and architectural practice.

The community design academic experience has become valued pedagogy within architectural curriculum. It provides students irreplaceable life lessons: real world decisions have consequences and create a thriving environment for architectural education where innovative solutions address normative problems. The scale and complexity of many community design projects result in a field of shifting priorities necessitating design agility. Effectively integrating these types of real-world projects into a professional practice course can better position the curriculum as a crossroads between architectural practice and academy.



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This paper will present a unique approach for the Professional Practice curriculum, which effectively integrated "productive conflict" from three community design projects. The School of Architecture is engaged in three to five community projects, at one stage or another, in a typical semester. The type of project, scope of work, and stage of development inform whether a design studio, topical elective, or Professional Practice is the appropriate educational/service context. Many times community projects begin in one context and shift platforms through their different phases. In all cases, projects integrate or are bridged to design professionals. For the Professional Practice work presented in this paper, students were immersed in the setting of an in-progress, project defining conflict. Each conflict defined a different point during the project timeline (Figure 1). They guided community discourse by creating and presenting alternative project approaches that moved the discussion along. This created an environment of deliberation that generated new perspectives, added to the flow of argument, and often revealed previously unconsidered issues and solutions. This emergent process benefited students by situating classroom knowledge in a dynamic environment of social complexity and political exigency. Ultimately, the projects operated as a type of joint venture and/or bridge with actual architectural/construction work completed outside the school of architecture.

INTRODUCTION

An AIA Foresight Report in 2013 on the changing context, business, and practice of architecture revealed that the complexity of practice is increasing. In the global economy, new markets are emerging. They are becoming economically powerful, requiring earlier and more thorough collaboration as the new norm. There is a need for evolving models of practice, embracing the short-term revolution of social, mobile and cloud-based technologies. Firm hierarchies are shifting; changing expectation of younger talent demand a "mentor up/ mentor down" approach of mutual benefit.

The role of the contemporary architect is multivalent, defined by social, cultural, political and financial constraints. Practice must navigate within a system of contexts often replete with competing values: quality of materials versus reality of budget; and time constraints or owner-prescribed values and requirements versus site and building code constraints. The new context inherently includes more diversity and consequently, increased conflict as varied values, interests and agendas come together. The traditional responses to complexity are to not confront the potential conflicts. Teams stigmatize 'conflict' in lieu of a 'common goal' philosophy. Resources are optimally distributed to meet everyone's needs leading to a culture of compromise but not necessarily fulfillment.

So what are the benefits of embracing the issue of conflict? Can practice begin to approach conflict as something of assets rather than a liability?.

Figure 1: Diagram representing the timelines of three community design projects and how they were itegrated into the Professional Practice class

Engaging these conflicts define the profession of architecture. Increased collaboration increases the possibility of conflict. This should give us pause and reassess a 'split the difference common-good strategy' in favor of mutually beneficial win-win opportunities. The specific contingencies that a conflict engages reveal meaningful issues and are a measure of social engagement that various design alternatives could have. Conflict seen as opportunistic and as a productive social concept is a positive and empowering interpretation of the real-world dynamic that can happen in architectural projects.

So can architectural students confront these conflicts within their own education?

Conflict is not an established area of engagement within architectural curriculum. Typical design projects are developed which minimize conflict to clearly reveal specific design objectives. However, in contrast to the traditional design studio community design projects are opportunities to engage the contingencies that confront many real design projects.

Community Design programs have been established in many architectural programs throughout the country. They engage community/university partnership approach with a range of community groups and non-profit organizations. These programs are popular for students and valuable to architectural curriculum because they build the capacity within a School of Architecture to define problems with an interdisciplinary lens, encompassing a broad spectrum of design challenges relying on a beneficial exchange of knowledge and resources in a context of partnership and reciprocity.

What is the role of professional practice in architectural curriculum?

Professional practice curriculum for NAAB accredited architectural programs should be a nexus between architectural education and practice. The course introduces students to the complex condition of contemporary architectural practice and varied roles and responsibilities of the architect. Often positioned at the back of the curriculum, it operates as a synthesis of integrated design for students to command the knowledge required to begin their career in the architectural field.

COMMUNITY DESIGN AS PROFESSIONAL PRACTICE

Professional practice education can benefit greatly from the integration of community design projects into the learning objectives. Through a participatory community design process, students learn how to tailor their talents and skills to existing contexts and client groups. Students are immersed in the community and the reciprocity of people and place. This type of knowledge requires students to become active participants in the learning environment in their education experience rather than passive recipients. With community design projects, students engage a comprehensive material world. They discover the language of clients and craftsman as very different from their own. The scale and complexity of the projects is greater than students can complete on their own and requires them to engage collaboratively in the process, making it an irreplaceable life lesson: real world decisions have consequences and create a thriving environment for architectural education where innovative solutions address normative problems.

An opportunity was envisioned to merge the real-world challenges of community design project with the Professional Practice course at the School of Architecture at Montana State. The 2012 spring semester professional practice course was organized around three community design projects: The Sourdough Fire Department Fire Station (SFD); The Bozeman Ice Tower (ICE) and the Khumbu Climbing Center (KCC). The class was divided up into teams and assigned one of the following projects (each encompassing a different phase and unique conflict within the design-construction process). The team followed their project throughout the semester, learning about, engaging with, and completing tasks (assignments) that

correlate with the project's respective phase. A collective knowledge approach was used: each team was required to give presentations to the other students in the class, explaining what they were working on and what they learned. The three projects covered during the semester emphasized the role of the architect as a systemic thinker and creative collaborator.

SOURDOUGH FIRE STATION: PRE-DESIGN PHASE)

Knowing how to build is a matter of science and technology, but knowing what to build is a question of morality, ethics, and aesthetic responsibility. The pre-design phase of a building project is about defining the problems one must ultimate solve. Project definition, program development, and developing design strategies for fundraising become some of the architects' responsibilities. However, in architectural design studios students are traditionally given the design problem to solve yet seldom given the opportunity to develop it.

The Sourdough Fire department is one of two fire stations in the Sourdough Fire District and one of five that form a consortium of emergency response units in the Bozeman, Montana area. The Sourdough volunteer fire station specifically serves a 15 square mile area encompassing approximately 5,000 residents in 1,400 homes and is developing rapidly. This increased resource projection in the district would have a significant effect on emergency response. Upgrading the Sourdough Volunteer Fire Department services would ensure the best in protection for responding to emergencies in the community.

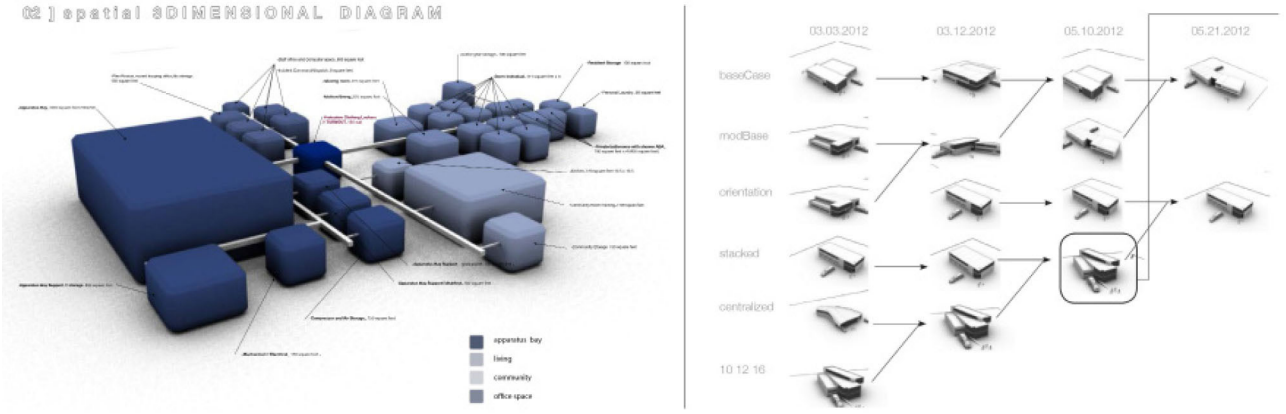

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Figure 2: Programming Diagram (left) and 'Versioning" design process (right)

Despite the need for resource improvements for the district, the community had rejected two previous mill-levy votes in the previous 6 years. A community design project emerged from which to work with design students in the professional practice class to develop a new design proposal for another mill-levy vote.

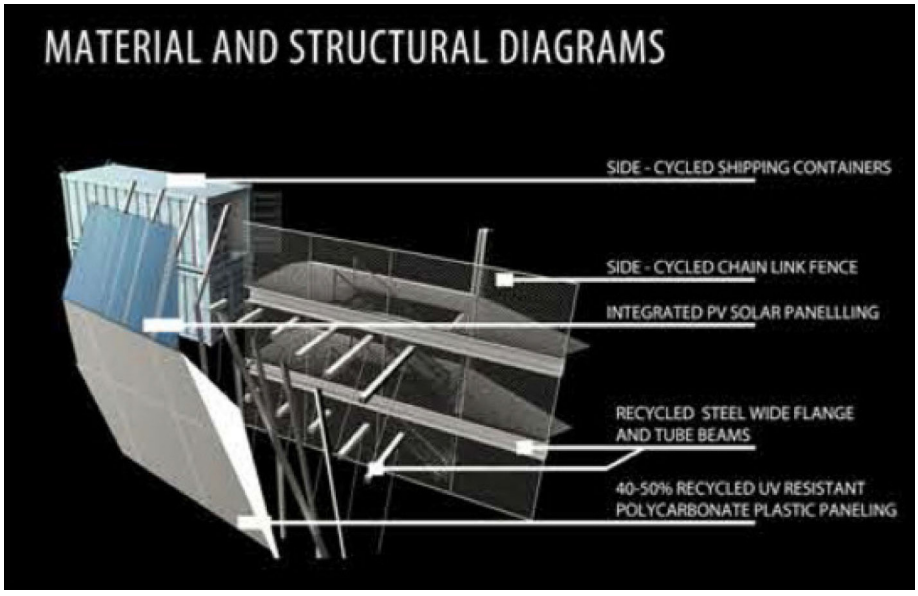
The Sourdough Volunteer Fire station project would serve as an opportunity for professional practice students to engage in the pre-design phase of a real-project. A successful approval by the voters in the up coming election was the real-world challenge. The pre-design phase completed by the students included project feasibility study, precedent research, and project programming for a new 10,000sf station. The design included a 4-truck apparatus bay, dormitory and living facility for fire fighters and large community/training room. The team of students completed a schematic design, including the site planning, and energy analysis. A key challenge for the pre-design was working with a defined budget, so students worked with a contractor on the cost estimate tracking the cost for the construction of the new station.

The schematic design phase used a 'versioning' strategy, which is a non-linear process where versions are created, and then interrogated on series of design and performance

criteria, resulting in the emergence of new versions superior to the previous iteration (Figure 2). This process was critical to the concept of engaging conflict because it propagated a wide range of design scenarios. This process shifted discussion from 'building as product' to 'building as medium for performance'. Design factors used for analysis included building efficiency (function), truck access and maintenance, etc. Using Rhino and BIM software such as Revit, the iterative process began with a base case solution with additional iterations developed improving on the design. Ecotect analysis software was used to explore energy performance. This design strategy helped students to effectively communicate to the users design issues from which to compare and arrive at an optimal solution. The project was presented to the community and later approved by the voters in November of 2012.

THE BOZEMAN ICE TOWER (ICE): DESIGN DEVELOPMENT PHASE

The ICE project is an 85' high climbing tower to be constructed on the County Fairgrounds in Bozeman, MT, it is in the design development phase. The original schematic design is the winning scheme from a national design competition created and organized by the School



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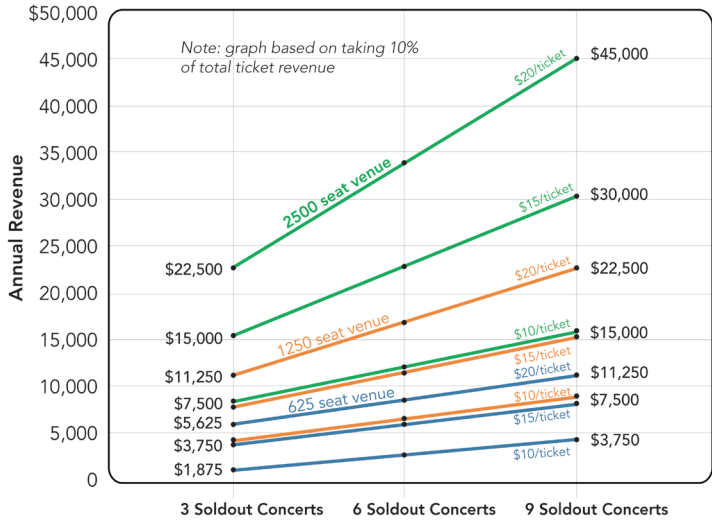
of Architecture in collaboration with the Bozeman Ice Tower Foundation (BITF), a non-profit formed for the project. The formal concept of the tower is a triad of stacked shipping containers, an interior core of platforms, and a sub-framed skin for freestyle climbing (hand-holds and farmed ice in the winter). The skin, not developed in the competition entry, became the initial focus of development and documentation for the student team.

The "architect" for many projects is an assemblage of various experts: strategically selected, integrated and managed to meet the performance criteria of the project. Students researched potential team members through a comprehensive multi-disciplinary lens. They recognized that the design, to be successful, would need to function in a system of contexts: conceptually, as an inspiring activity; economically, as a component of a business plan; structurally; and operationally, as a facility requiring maintenance. This broad realization guided the selection of the integrated team. The students worked with owner-builders of a local climbing gym, world renown mountaineer Conrad Anker, an ice-farming expert, and a structural engineer.

As is the case with many real world projects, an unexpected twist changed the trajectory of the project. In the first design development progress presentation by the students to the

Figure 3: Bozeman Ice Tower - detail development of the climbing wall skin.



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county commissioners and the public, the program of the project, a climbing venue with an integrated outdoor event center, came under intense opposition. A small, but vocal, group of neighbors objected to the increase in events that the new outdoor performance venue would attract, citing increased noise disturbance.

The original winning design entry had proposed a multi-program approach to create an economically sustainable facility, one that would not require taxpayer support. Since the community opposition came at the beginning of the semester, students were able to recalibrate and collaborate with a team of Business School students in an entrepreneurship course offered at Montana State. The architecture students and business students worked together to complete a project proforma and cost-benefit analysis (Figure 4). The research supported the need for a hybrid programmatic approach to the project and concluded that the outdoor event venue had the least risk and highest potential for economic success. In addition to economics, the architecture students enlisted the help of acoustical engineering students to complete a sound survey of the surrounding area. The economic data and acoustic survey helped re-orient the community dialogue.

At the same time that programming became the main issue, students continued with development of the climbing skin. Team members used two strategies for the skin development: multiple iterations of computer modeled visualizations and real-life mocked-up prototypes of climbing surfaces installed at the local climbing gym, tested by gym members (Figure 3). The success of these approaches depended on the students' ability to clearly communicate ideas, comprehensively represent context and creatively illustrate opportunity to people, traditionally outside of the design development phase, with different competencies.

Diagrammatic visualizations of various design modifications which abated noise were correlated with actual performance data to further community discussion on the project programming. Students worked with community members and established a design, review, and consideration process that integrated community members as team collaborators, creating a new "think tank" to develop a win-win approach. The project is currently in the final fundraising phase and scheduled to be constructed within the next two years.

Figure 4: project proforma and cost-benefit analysis.

KHUMBU CLIMBING CENTER (KCC): CONSTRUCTION DOCUMENT AND ADMINISTRATION PHASE

Identifying and resolving problematic issues are a valuable part of the construction phase. Through skillful coordination with the builder, the building design becomes a physically

constructed and occupied reality. The Khumbu Climbing Center (KCC) project is a climbing and community center in Phortse, Nepal, it is currently in the document and construction administration phase. The specific phase of construction for the KCC project was the fabrication of the primary floor trusses and framing and roof trusses.

A graduate of the architectural program was in Nepal during the course semester working on the construction and acting as the owner's on-site representative in coordinating the various trades. Students conducted weekly conference calls via Skype to monitor progress, follow up on construction changes and receive additional requests for information. The cloud-based project management software, "Basecamp", was used for documentation organization, storage, and issuance.

An important design concern in architectural practice that is not critically addressed in most architecture school is calibrating the complexity of the construction and detailing of the building project with the skills of those of the builder. This requires a deep understanding of the contractor and tradesman capabilities, knowledge of the design intent and dynamic appreciation of insight from expert tradesman doing the work. The construction administration phase is a unique opportunity to integrate real-time feedback loop design improvements. This particular project exaggerated the need to clearly understand the issues associated with construction such as tolerances, material compatibility, changes in material availability, and means and methods of construction. In more progressive architectural projects, standard construction methods of detailing are challenged, increasing the need for collaboration during the construction phase. In addition, this ambiguity increases the responsibility of the architect to navigate and be involved in construction coordination.

The floor construction for the KCC was designed to be light-gauge metal framing, a departure from the traditional wood framing done in Phortse. Floor and roof trusses were designed as hybrid wood and metal constructions, again, a departure from pure wood trusses. The non-standard designs represented a progressive move in material usage, responding to the fact that the last leg of material transportation involved "Yak and Back" portering to Phortse (Figure 5). The new constructions reduced cargo weight (and associated resources) by more than 60%. In order to implement these new constructions, students created "Ikea" type documents that graphically conveyed the information, requiring little or no words to understand the intent. The floor framing for the climbing center was completed in Phortse during the course of the semester.

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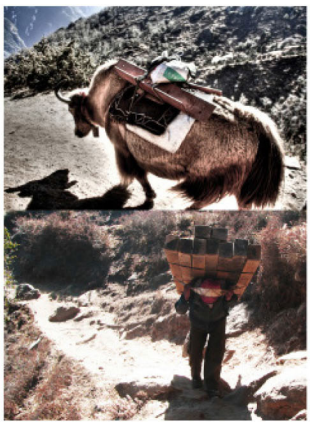

Figure 5: Framing Plan for Khumbu Climbing School (left) had to consider Yak and Back transportation (right)

CONCLUSION

The day-to-day practice of architecture must navigate within a system of contexts often replete with competing values. This requires the process of design and construction to rely on constant tactile adjustment made by the demands of clients and consultants, with constraints of codes and budgets to address a landscape of contingency. Engaging these conflicts defines the profession of architecture. Without a strong architectural presence the authority of the designer diminishes.

Professional Practice curriculum lies at the intersection between the profession of Architecture and its academic partner. The pedagogical significance for students is learning the many and often conflicting values of the actors. If Professional Practice curriculum is to be a harbinger of architectural practice then it must seek out opportunities to engage architectural conflict and create paths of mutual benefits for the constituents involved.

The innovative pedagogical approach at Montana State provided students a unique educational opportunity to engage an iterative community design / architectural practice model, where real-time information and context feedback were embedded into core learning objectives. Each project had a unique issue, which provided an opportunity for the professional practice course to engage as part of the larger curriculum. The Sourdough Fire Station Project had to overcome two failed bond-issue votes directing the goals of classroom to explore financial considerations to public funding and how to effectively disseminate the values of a new station to the residents. The Bozeman Ice Tower began with resolving the technical conflict of the climbing wall envelope before public opposition lead to a radical shifting of social responsibility. A business model of the project was re-envisioned, augmenting the project program and expanding the vision to become a year-around multi-activity community venue. The conflict for the Khumbu Climbing Center was in the ability of the students to merge disparate values to complete the construction documentation and administration. The ethical values of the architect of introducing new materials and building techniques to meet the earthquake design requirements had to balanced with the traditional cultural values of the community by revising the design to adopt local recourses and use of yak-and back modes of transportation to the site.

Integrating a community design model into the professional practice course enriched the learning experience. It engaged practice on a parallel level, as opposed to a hierarchal level that happens in internship.

So where does it go from here? The Professional Practice model was developed to be repeatable. Searching for specific opportunities to engage the inherent conflicts that exist in the complexity of design projects. Community design projects open students to a field of values and shifting priorities requiring tactics of agility and the inventiveness of the designer.