THE AGENCY OF MAKING AND ARCHITECTURE EDUCATION: Design-Build Curriculum in a New School of Architecture

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Abstract
Developing a curriculum for Canada’s newest school of architecture in forty years created the opportunity for a commitment to new pedagogy that would address changes and needs in the profession, particularly in the Northern context. The tri-cultural mandate of the school (First Nations, Francophone, Anglophone), and the desire to create a complete design-build curriculum aligned with the community’s commitment for change and the location of the school in former historic buildings downtown. The design-build curriculum means that in each studio year the cohort will design and construct at full scale a project relevant to the context of the school such as the ice fishing huts completed this past year. Optional design/build workshops in the summer in Europe allowed for additional experimentation of construction methods in other specific northern contexts. This paper outlines the larger and specific contexts for the design of the design-build curriculum, the processes of the first year of implementation, the agency of making both for the student and instructors and concludes with a discussion of the trajectory of design-build in the school.

Keywords: Design-build; Architecture education; Curriculum; Pedagogy; Northern design

INTRODUCTION: DESIGN-BUILD AND ARCHITECTURE EDUCATION PEDAGOGY
The author of this paper is an active participant, observer, educator and critic of the design-build approach to architecture studio education. The focus of the paper is to describe and critique the experiences of design-build in the specific context of a new school of architecture – the cultural and geographical context of which clearly shapes the mandates of the school. An outline of the school’s pedagogical vision of ‘learning by making’ frames the design-build exercises undertaken in the past year with the founding cohort including the construction of ice fishing huts and participation in international design-build workshops. The author’s agency as an active participant is drawn upon to underscore perceived constraints and opportunities in design-build exercises.

CONTEXT OF THE NEW SCHOOL OF ARCHITECTURE
‘Place’ and the Canadian Context
The advance of architecture for northern Canadian climates has certainly gained momentum in the past decade with publications such as Up North (Rochon, 2005) and 41° to 66° Regional Response to Sustainable Architecture in Canada (McMinn & Polo, 2006) and the work of a few architects. However for the schools of architecture in Canada, building in the north has not been a priority. At best it may be a topic considered in an optional studio or isolated research. Designing for the cold is certainly paramount in the north, but this is far more nuanced with significant considerations for cultural, historical and specific needs of northern communities. This holistic strategy of what the north is foregrounds the entryway for the curriculum of the new school of architecture at Laurentian university, beginning in first year with the studio theme of ‘place’ which is the place of the school in the city of Sudbury.
For Sudbury, it all begins and centers around the unique geological configuration of the area that geologists agree resulted from a meteorite colliding with the surface at this location 1.85 billion years ago causing the restructuring of the geology and formation of a high density of ore bodies (Saaranin, 2013).

The oldest human presence in the area revolved around the settlement of the First Nations tribes with archeological evidences dating back to 9500 years ago (Saaranin, 2013). These tribes lived nomadically on the land, adapting to gradual and fierce changes in climate, fauna and resources including the abundant forests in the area.

The 17th century arrival of European explorers, missionaries and traders in the Sudbury region largely revolved around the growing fur trade and logging industry that exploited the abundant resources. The expansion of the railway through the logging camps resulted in the accidental discovery of unknown whitish metal locals initially called kupfernickel or ‘Old Nick’s copper’ because it was devilishly hard to smelt (Hayes, 2010). The discovery of the highest concentration of nickel ore in the world signaled the drastic shift not only in the identity of the place but of the landscape. The original open-bed roasting yards used to smelt the ore to extract nickel resulted in the denuding of the landscape by consuming lumber for the fires and releasing sulfur and other toxins that blackened the rock surfaces of the area. By the 1960s the landscape was largely blackened rock with little vegetation or life. The efforts of researchers at Laurentian University and the government’s support to reduce sulfur and re-green the landscape began over thirty years ago with significant visual change to the city, now replanted with ten million trees. There remain, however, significant areas not replanted and with the blackened rock exposed (Ross, 2008).

With over three hundred lakes, several industries including mining, health care and the university and colleges, the 160 000 people of the City of Greater Sudbury located at 46˚ latitude is still an important crossroads into northern Ontario. With a temperature range of -30˚ C to zero in the winter months (with wind chill factors reaching -50˚ C) and 5 to 25˚ C in the spring and summer months, climate is a serious matter for consideration for any kind of construction. For most residents, life in this northern town involves ample time spent outdoors in activities ranging from hunting and camping, swimming and canoeing in the warmer seasons to skiing, skating and ice fishing in colder seasons.

**Foundations and Location for the New School**

A community movement began just over seven years ago to establish a design school to infuse the city with much needed design culture and reactivate the dwindling population and businesses of the downtown core. The original steering committee imagined a school that would weave together the expertise and qualities latent in the city’s aboriginal history, Francophone culture, industries and natural resources.

Capital support to establish the school came from the community, industries, government and Laurentian University. The downtown location of the school revitalized two historic buildings (the former market and former CP telegraph buildings) and current construction of two new buildings will complete the facilities. The first cohort of seventy students was admitted in the fall of 2013.

The tri-cultural mandate of the school to actively include first nations and francophone culture is reflected in the curriculum and pedagogical structure of the school and framed in a larger design-build approach in the education of the students.

The growth and development of this nascent program witnessed in the first year are discussed in this paper. Although specific and particular in the conditions and aspirations, the relevance of creating a school that attempts to amalgamate real circumstances of context underscores the possibilities of design-build curriculum developed in several influential programs previously and continues to gain momentum as a crucible of pedagogy and community involvement.
DESIGN-BUILD AND ARCHITECTURE EDUCATION

A survey of design-build programs that were especially influential on the conception of the new curriculum is, for the most part, North American centered. Of note are design-build or ‘live’ projects carried out at schools of architecture in the United Kingdom for a number of decades (Brown, 2012). However, it is prominently the work of Steve Badanes from Jersey Devil and Neighborhood design-build, Samuel Mockbee and his work with Rural Studio, Richard Kroeker and Brian Makay-Lyons in Freelab and Ghostlab, respectively, at Dalhousie University among other works of hands-on exercises.

Steve Badanes and ‘Jersey Devil’

The design-build exercises led by Steve Badanes were pivotal in architectural education in the United States with an intended radical departure from established modes of studio education. Fueled by frustration of the commercialization of practice as a student in the late 1960’s Badanes and others began the ‘Peoples Workshop’ to tackle social justice issues in architecture by building small-scale projects. Later, Badanes formed ‘Jersey Devil’ with John Ringel in 1972 and was joined by Jim Adamson in 1975 (Piedmont-Palladino & Branch, 1997). The Jersey Devil collective reached out to impoverished communities with design-build projects often involving students in architecture programs. Badanes and Ringel teach design-build studios at Yestermorrow School in Warren, Vermont in the summer. Additionally, Badanes teaches ‘the Neighborhood’ design-build studios every spring at University of Washington in Seattle. As well, he co-founded a design-build program based in Mexico with University of Washington professor, Sergio Palleroni which ran in winter semesters (Palleroni, 2004) and has run numerous other international design-build workshops with architecture students. (Piedmont-Palladino & Branch, 1997). Badanes noted in a recent article the resurgence of architecture education demand of design-build exercises that are community service minded (Badanes, 2008). In these workshops Badanes has led architecture students to engage with the construction process with limited budget and time frames. His focus with students in these workshops has remained on the process with an emphasis on the development of construction skills, community involvement dialogue and group design abilities (Badanes, 2008).

Samuel Mockbee and ‘Rural Studio’

Another key figure initiating design-build in architecture schools in North America was Samuel Mockbee. Mockbee became a professor in 1992 at Auburn University School of architecture in Alabama and was inspired by his previous work renovating homes for the impoverished. He co-founded the ‘Rural Studio’ with D.K. Ruth, the Director of the School. Mockbee’s desire in founding this studio was ‘to express moral principles and ideas for fairness through the creation of buildings of profound beauty’ (Moos & Trechsel, 2003). Leading students into real-world design problems, two studios were run. Second year students had the option to spend part of their studio in groups of fifteen and in fifth year, thesis students spent the entire year in groups of three or four, taking on a project from inception to completion. Rural Studio began with creating houses in Hale country, Alabama, a place of extreme poverty and developed into construction of other types of community buildings. Projects were often built with a limited budget and employed the use of recycled materials such as worn-out tires for chapel walls, windshields for the roof of a community center, and other material reconstitution (Dean and Hursley, 2005) that inspired students to innovate construction processes and form. Although Mockbee passed away in 2001, Rural Studio has continued and more than eighty houses and civic buildings have been constructed in Hale country since Rural Studio’s formation (‘The Rural Studio’, n.d.).

‘Free lab’ at Dalhousie University

In Canada an important center for design-build education in architecture schools was formed with the ‘FreeLab’ at Dalhousie University in 1991. Freelab was initiated by Richard Kroeker and a number of like-minded Dalhousie professors to create ‘an integrated experience in a sparely
staffed summer term’ (Macy, 2008) as design-build workshop for students. Since the program’s inception, over one hundred labs have been completed in the summer terms lead by Kroeker, Brian Makay-Lyons (who calls his labs ‘Ghost’) and other Dalhousie professors and guest lab leaders from across Canada and abroad. Each of the Freelabs pursue an idea that originates from research or practice or community need and takes students and their professors into various areas of the Maritime provinces in Canada, as well as to international locations including India, Botswana and Mexico. In Christine Macy’s text ‘Free Lab’, that traces the labs from 1991-2006, she cites the influences coming from Ball state University, the work of Steve Badanes, Samuel Mockbee and Sergio Pallerioni. Macy notes that the design-build ethos ‘reverberates’ throughout the school’s curriculum (2008), because the Freelabs are vertical studios with students from different years working together.

**Impact and Context for the new School of Architecture**

All of these proactive programs were outside the traditional academic curriculum and all empowered students with an experience of learning that involved physical construction as well as cooperation in some form with a local community. In some cases the design-build exercises were optional or carried out in the summer or part of a particular studio throughout the year, but all had a critical bearing in the local or international communities that were the location of the workshops. Terrance Galvin, the Founding Director for the new School of Architecture at Laurentian University in Sudbury, was charged with designing a curriculum that integrated the natural resources with industry potentials and local cultures together. This has been accomplished by using design-build for all of the studio courses, with each studio year highlighting a particular aspect of the region and reinforcing alliances with the community. Galvin himself, having studied at McGill University and University of Pennsylvania for his graduate work was familiar with the work of Badanes and Mockbee. As well, Galvin taught and directed the School of Architecture at Dalhousie University for four years where he was involved in many Freelabs directly and with the work of those who ran other Freelabs during his time there. Galvin’s field research in architecture for the past two decades in vernacular strategies led to work with NGOs and research institutes enabling numerous students and faculty to engage in community projects in Peru, India, Thailand and Mexico.

The influence of these labs and research in the creation of the new architecture curriculum is clear, however, as will be outlined, the design-build program envisions a step further, with a required design-build program to be carried out in each studio by every student, every year. The design-build projects increase in scale and in community involvement throughout the years and the curriculum allows for extra curricular design-build workshops in the summer in international locations as lead by particular professors.

**PEDAGOGY AND CURRICULUM WITH DESIGN-BUILD AT THE NEW SCHOOL**

The design-build approach is a fundamental aspect of the curriculum development for the new school. It is a compulsory component of every design studio, fully integrated into a radical studio culture. The design-build studio is supported by a first year course called ‘Design Thinking’ that exposes students to the notion of ‘design’ in broad terms.

The focus of the studios is the integration of local cultures (Francophone and Indigenous) connections to community, local industries and natural resources using design-build as a method of responding appropriately and providing hands on learning. As the first new school in the country in over four decades, development of a new curriculum is an opportunity with respect to content, however, the consideration of a new studio culture is integral to its success. The studio culture of the new School promotes an alternate approach, based on the American Institute of Architecture Students (AIAS) 2002 report, which summarized critique from over five thousand students in the United Sates in architecture schools regarding studio culture. The report concludes with a list of fourteen concerns and an appeal for proactive change by students and
professors to address underlying problems in studio culture that have not changed in a century. (Koch, et al., 2002).

To various degrees all of the concerns raised were carefully considered in the new curriculum with a focus on four points in particular regarding design studio: learning process, collaborative design, celebration of work and engagement of community.

**Teaching design process and collaborative design skills**
The design-build exercises are latent with pedagogical opportunities, and as an integral component of every design studio, the focus is on learning processes and teaching students collaborative design skills. The AIAS report noted that architecture schools in North America generally lack exercises that teach collaborative design skills, and in most schools, collaborative work is limited to pre-design exercises such as site or case studies.

Beginning architecture education with group design at the new School set the tone for the rest of the program but importantly prepares the students for the reality of architecture practice where design is rarely individual and more often collaborative. The focus on process of design connects well with this. As well the emphasis is to teach students design thinking skills to reconcile the requirements of the project program and environmental context with budget and materials available.

As an instructor it is important to guide creativity and to encourage students through iterations of design ideas. Using sketch models is the most effective method of idea development and round table discussion of work with students is integral. Rather than traditional professor-centered critique of the work, the instructor facilitates discussion of all ideas and the natural grouping of students pursuing similar ideas work together. Encouraging iterations of sketch models is vital in teaching students the skills to reflect (or respond to) comments and criticisms in developing their designs. The quality of space imagined is always at the forefront rather than the cobbling of individual ideas, and the groups are constantly directed to take ownership of every aspect of design. In 2013/2014 semesters the students designed ice-fishing huts with 1:10 scaled models. The units of locally sourced lumber and salvaged materials (such as doors, windows and hockey puck board) are scaled and represented in the model. In the following semester the students constructed the huts at full scale.

The concentration on the small project program and ultimately small construction allows for the expansion of skills related to hand-held and mechanized tools and on the quality of craftsmanship during model and full sized construction.

**Community Involvement and Celebration of Student Work**
The involvement of the community in the first design-build project is intended to allow for the free flow of ideas and the celebration of the work that was presented and sold to the community as detailed below. This emphasizes to the students the reality and the importance of the dialogue of design.

The design-build projects for all of the studios in the curriculum are intended to relate to the specificity of the context of the city and the community and to respond to local considerations of climate and culture. The first year design studio theme of ‘place’ brings students in contact with an important local winter activity, ice fishing (see Figure 1). Having researched qualities of the natural, historical and built environment of the city, students are asked to engage this ‘place’ with the construction of a specific and small type of portable space, an ice fishing hut, which is in local demand.

Regional experiences with the techniques of ice-fishing are outlined (see Little, 1975) and followed by visits to local ice fishing communities and discussions with locals who ice fish. Additionally, there is the regular participation of First Nations elders in studio who communicate their experiences and material knowledge of construction, motivating the groups of students to approach the small program in a direct manner. As well, the insights of acclaimed First Nations architects Douglas Cardinal and Étienne Gaboury who presented in the School’s inaugural
lecture series in 2013, inspired students with their varied and specific approaches to design in Canada.

![Image](image.jpg)

Figure 1: Ice Fishing on frozen lake in Azilda, City of Greater Sudbury
(Source: Author).

Clients are an important part of design-build projects but as this was the first design studio that students ever participated in, pedagogically it was important for instructors to focus on the skills of collaborative design and representation in a neutral manner open to innovation and exploration that may not have been possible with predetermined notions of clients. That said, however, the intention and result of the projects was to auction them to community members, who were, for the most part, intrigued and excited about new approaches and purchased the huts.

The work was celebrated in several stages. At the completion of the first term the, 1:10 scaled models of the ice-fishing huts were displayed in the school exhibition open to the public (see Figure 2).

![Image](image2.jpg)

Figure 2: Scaled models (1:10) of Ice Fishing huts in end of term review
(Source: Author).

During construction of the huts, which took place within the school’s workshop and in the platform exterior to it (see Figure 3), the public nature and location of the school meant that the ongoing work was the subject of the local media and interest.
When the full-scale huts were completed in the first half of the second semester, an event was coordinated and was hosted by the local science center, Science North, an important landmark in the city located on Ramsey lake. All of the huts were displayed on the frozen lake and then around the science center for the public to explore.

Following this, the students presented their ideas in the main hall of the science center and the individual huts were auctioned. The base bid was the cost of materials and the proceeds were placed in the design-build fund of the school to sustain future exercises. The event brought members of the ice fishing, arts and education communities together and was successful in reinforcing connections with the School. At the conclusion of the academic year, student work
was exhibited to the public, including the large-scale photographs of the complete huts on Lake Ramsey.

OPTIONAL SUMMER DESIGN-BUILD WORKSHOPS

Within the curricular structure of the school the students spend summer semesters (May-August) on paid co-operative placements, first beginning with hands-on industry positions such as construction and by third year in architecture office placements. Pedagogically this parallels the educational model in studios with the first two years of studio focused on analogue representation, modeling and construction leading to the inclusion of digital fabrication and presentations. During the summer there are also optional short design-build workshops, as opportunities are available, led by particular members of the faculty. This past summer two design-build workshops were available including one in Germany and another in Norway. Along with co-op, the design-build workshops provide students with the chance to apply their recently developed skills in new specific contexts and gain further insight in the potentials of design through physical making.

Heavy Timber Design-Build Workshop in Dinkelsbühl, Germany

Eight students participated in a three-week design-build workshop in Dinkelsbühl, Germany led by one of the studio instructors, Randall Kober. Collaboratively the students constructed a heavy timber framed tool shed located next to the historic city wall. The focus of the design-build workshop was to read drawings to produce mortise and tension joints in heavy timber using hand held tools, this was an approach to timber design the students had not been exposed to as the ice fishing huts were completed in light frame timber construction. The students rotated jobs on the site, which prolonged the process but allowed each to participate in the different facets of construction.

Difficulties such as constructing in the rain, limitations of space and availability of hand held tools were overcome through this rotation of jobs (see Figure 5). Students were assigned to measure and complete as-built drawings of adjacent historical buildings to further their understanding of the unique context that emphasizes predominately locally sourced heavy timber construction.

Design-build installation in the Bergen International Wood Festival, Norway

The author led six other students to participate in the Bergen International Wood Festival in Norway. This biennial festival brings participants of different disciplines and expertise from over a dozen countries around the world to celebrate wood with large-scale installations constructed in a prominent location of the city. The festival often coincides with another local festival or celebration and affords a conversation in wood construction that pushes the limits of material and expression.
Participation is limited to accepted proposals and the first year students’ prepared designs before hand that established the quantity and types of wood required. With their accepted design, the students arrived in the city with their own hand held tools used in the academic year (chisels, pull saws etc.) and rented local power tools and spent five days (six to eight hours a day) in intense collaborative construction.

The design was modified during construction: partially because of more potential for expressive design realized onsite and partially to respond to problems of the increased weight of the wood from the final two days of continuous rain (see Figure 6 and 7). The Laurentian University School of Architecture students were the youngest participants in the festival and their design-build experience developed from the ice fishing huts helped prepare them with design thinking skills to interchange roles in construction and importantly, to alter their design during the construction process. The international experience of new conditions and limited resources coupled with the public nature of construction enabled the students to communicate ideas to each other, to accept problems in construction and to move forward with solutions.
CONCLUSIONS
Teaching design-build is an education process for the professors themselves, who are continuously learning from previous experiences in order to modify curriculum to improve learning process. This would not have been possible without the candid and open conversations and debriefing between all of the professors and staff involved. This enabled the reflection on the successes and the areas of concern. For the second cohort of first year studio, which began fall 2014, introductory exercises were slightly shortened to allow for a staged submission of the 1:10 models of the huts in first semester. The first stage of the model will be submitted and reviewed earlier to allow for recalibration in design and full construction drawings completed detailing all of the required materials. This additional step is intended to streamline the collection of materials, minimize waste and remain within budget so that the construction process in the second semester is more efficient and allows students to interchange roles throughout.

The design-build curriculum at the new school of architecture envisions a continued study and experimentation of form related to context. The themes for the following studio years include ‘landscape’, ‘northern building’, ‘comprehensive construction’, ‘craft and community’, each with design-build projects that will relate to the conditions of the immediate Northern environment and with increased scale, such as: sauna construction, round room for indigenous ceremonies and gatherings, park pavilions and other projects as the opportunities and alliances with the community grows.

The enabling qualities of design-build in architecture education underscore student capacities to relate to their context and community. Design-build can be an empowering avenue of architecture education for students especially when situated in a context whereby the local community is also empowered. This approach to designing and making pushes the boundaries of what students can accomplish with limited means and time.

Rather than being result focused, as is often assumed in most design projects, the rough qualities, the difficulties, the failures are all important crucibles of process learning. In many ways, this is the true goal that educators cannot lose sight of – that design education is experimental, difficult and constant both for students and educators.

REFERENCES

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