

Micro-Design-Build: A New Gateway to Design-Build Education

Micro-design-build projects provide students with a tangible, hands-on opportunity to engage with the physicality of architecture---without requiring the investment of time, resources and energy typically associated with studio-based design-build courses. In reducing the scale of the design-build experience, tiny projects bring experiential education into reach for the most challenged programs.

INTRODUCTION

In design-build education, the value of selecting a project program of a manageable scale should not be underestimated. Yet, the “small scale” projects of a typical design-build course---park pavilions, tiny houses, bandstands, footbridges and bus shelters---still demand extraordinary institutional investment. The complexity of these programs requires a comprehensive approach involving instructor expertise, teaching time, and material resources. design-build educators well understand the challenges unique to this landscape, as they juggle the exigencies of permitting, material costs, structural engineering, project timelines, ongoing maintenance, and even their own liability.

At the same time, dozens of architecture and design schools lack the capacity to host design-build programs, even as the concept of design-build increases in popularity. Often these programs lack shop facilities, space in the curriculum, or dedicated instructors. Even seemingly small issues, such as liability and insurance, may prove a barrier to entry for these programs.

Micro-design-build projects provide students with a tangible, hands-on opportunity to engage with the physicality of architecture---without requiring the investment of time, resources and energy typically associated with studio-based design-build courses. Such short-term design-build efforts produce a more limited set of pedagogical outcomes, but even small projects can yield valuable results. For instance, small-scale explorations introduce students to new tools and design techniques, lay the foundation for meaningful community engagement, and may even result in a beautifully-crafted and useful product. The micro-design-build model offers up a new set of methods, challenges and pedagogical opportunities that could be particularly useful for today’s resource- and labor-constrained design schools. For these programs, the micro-design-build model provides a pedagogical tool that is useful as preparation for, or in lieu of, longer and more committing design-build experiences.

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Micro-design-build offers an alternative to the traditional design-build model, and is informally practiced by instructors at many institutions. In reducing the scale of the design-build experience, tiny projects bring experiential education into reach for the most challenged programs. At the heart of this paper is an intention to identify the structure and form of micro-design-build education, and to demonstrate the ways in which it might act as an alternative to more complex initiatives.

THE ROOTS OF DESIGN-BUILD

Architectural educators have long defended the role of experiential education, most notably in their conception of their curricular mainstay: the design studio. Similarly, students recognize the value of researching and learning through experiential means, intuiting the need for hands-on model building and material investigation. design-build courses, which call for the real-world investigation of an architectural idea and the dogged commitment to seeing that project built, provide an even more extreme focus on experiential education than the traditional design studio.

Historically, design-build efforts in the academy have been most closely associated with the testing of new ideas, technologies or materials. For instance, when R. Buckminster Fuller taught as a visiting lecturer at Cornell University in 1957, his many hand-built models failed to provide convincing proof that his structural innovations would actually work. Using students, he proceeded to build a full-scale Geoscope on the campus, to test and ultimately prove the validity of his scheme (Cornell Daily Sun, 2).

design-build has also been used by educators as a means of teaching students basic fabrication skills. Even the Bauhaus, with its belief in the importance of factory-aided production, popularized the concept of exploratory product design and fabrication, from ceramic craftwork to furniture production. Over the course of the last century, many Bauhaus-inspired design schools have developed full-scale furniture or luminaire assignments to provide students with a critical awareness of materials, connections, and ultimately use of the tools themselves. Meanwhile, art and design schools with residency programs have historically used students to create on-site housing units. One of the best examples of this tradition comes from the Pilchuck Glass School in Washington State, where incoming students were once tasked with designing and building the dwelling that they would inhabit for the duration of their program. In the past, schools such as Aprovecho, the Rural Studio and the Yestermorrow Design Build School have also incorporated student and intern-led design build projects into their campus planning.

Figure 1: The eco-pavilion at City Park in New Orleans, a joint design-build effort between buildingstudio and the Tulane City Center.

DESIGN-BUILD EDUCATION TODAY

Today the role of design-build has moved from the margins of design education to the center. Once considered a practice that might bolster and support other studio or scholarly efforts, design-build has matured into a fully independent course type: a respected intellectual exercise of its own. And at some universities, design-build course content has even begun to displace more traditional studio curriculum, in effect undermining the sanctity of the training style that has been in place since the Beaux-Arts days.

design-build has also proven itself to be a particularly effective method for delivering public-interest design services within the context of higher education. The community engagement projects initiated by the Rural Studio, the University of Washington, the Remote Studio, and the Tulane City Center stand out as exemplary models for this ongoing work. (Figure 1)

Even these preeminent programs, with a long track record of expertise and a proven model for success, exhibit the same problems faced by fledgling programs across the nation. One major criticism is that many of these larger endeavors must necessarily be drawn out across the arc of a school year, which can prevent students from participating in both the design and the build components. Other top programs require that students commit full-time to the project, at the exclusion of other academic or social outlets. All of these programs demand an extraordinary investment of resources: in most well-established design-build programs, dedicated staff must manage the program logistics, community relations, fundraising, liability, shop space and use, safety, maintenance, and the list goes on.

SMALL-SCALE DESIGN-BUILD

Drawing from this academic tradition, architectural practice also supports a robust history of design-build. Indeed, small-scale design-build has long been considered an accepted and relevant form of inquiry to the profession. For instance, full-scale mockups on large job sites, test assemblies, and custom components reinforce the notion that design is an exploratory art. Additionally, these built prototypes become one-offs, or custom production, which help to sustain and support the creative autonomy of the designer.

Exhibit design and production is also a deeply-rooted part of architectural practice, and a small-scale, physical means of testing ideas and products (Bonnemaison and Eisenbach 2009). The American Institute of Architects occasionally supports this connection, with programming such as the annual Descours event in New Orleans. Finally, artists and architects routinely blur the line between exhibits and architecture, such as in Andrea Zittel's A-Z Comfort Units, her prototypes for the A-Z Rough Desks and even the A-Z Homestead Unit (Morsiani and Smith 2005).

This scale of architectural investigation, particularly when applied to an educational setting, offers new modes of inquiry and accessibility. Micro-design-build occurs at a scale that makes it possible to carry out the work as a course elective, or a weekend workshop, or perhaps even a drop-in event. The projects tend to involve a modicum of investment, in terms of time, money, space, and even curriculum displacement. Moreover, if planned accordingly, it can be achieved with minimal tools and building expertise.

Elizabeth Grimaldi, Executive Director of the Fleisher Art Memorial in Philadelphia, has developed one of the most elegant examples of this type of design-build. Lacking resources to commit to a more permanent design-build project, but still



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interested in providing architectural explorations for the youth in her after-school design program, Grimaldi decided to limit her students' building materials palette to hundreds of one-inch by one-inch dimensional lumber boards (no cuts or alterations) and thousands of zipties. With just these two building resources and a grassy site, her students fabricated an exquisite full-scale farmer's market stand. While this is an extremely lightweight version of design-build exploration, it served the creative purposes of the group's assignment without extraordinary time, labor or resource demands.

Many other schools employ similar dressed-down versions of design-build. At UMass Amherst, landscape architecture students participate in Parking Day annually, by transforming a metered lot in an urban area into a 10-hour garden. At Tulane University, students organize the school-wide Architect's week, which brings in visiting architects to coach the teams of students who will deploy small-scale design interventions across the campus by the end of the week. The School of Architecture and Planning at MIT will often seize time during Jan-term to send a cohort of designers to another country for public-interest design-build engagement. And of course, many design schools take advantage of the Jewish Sukkot to create whimsical or innovative contemplation huts.

Despite their size and scope, these small-scale design-build ventures serve as a comparable form of experiential education when framed appropriately. If they include structural, spatial, formal and material explorations, these programs can be as rich as any larger design-build experience. They also can act as a gateway design-build course, recruiting new students who otherwise wouldn't feel be attracted to a full-fledged design-build experience, or opening access to individuals outside the design disciplines.

Figure 2: Students present their Cart Coops to the community at a chicken coop building workshop..



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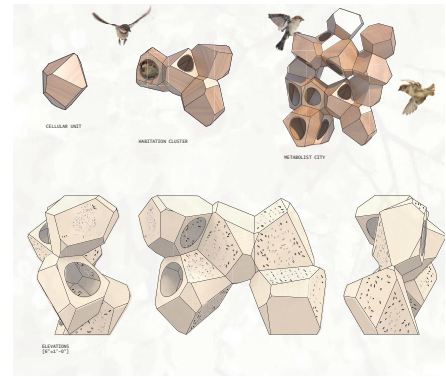
CASE STUDY: CART COOPS

During the Fall Semester of 2010, 12 first-year Tulane University students with no prior agricultural or construction experience designed and built mobile chicken coops using salvaged shopping carts. Over the course of two separate work days, the teams of two students learned the basic principles and requirements of chicken coop design, developed initial design schemes, mocked-up their designs on salvaged carts, and then built their coops. Each of the coops was constructed for less than \$50 and all were donated to local growers through the New Orleans Food and Farm Network, a local urban agriculture non-profit organization.

This community-based design-build experience was advertised as a one-credit service-learning elective for beginning design students. Students developed their own distinctive designs, while building their understanding of food security, community advocacy, urban farming, construction and sustainable urbanism. They worked alongside a community partner and ultimately presented their work at this neighborhood venue. The Cart Coop design-build project presented freshmen students with a tangible, hands-on opportunity to engage with these issues of local food production and food security as well as wider issues of disaster preparedness and the materiality of consumer culture. In researching, designing, and building the coops the students were invited to explore, intellectual and physical, a new critical engagement with the city. (Figure 2)

CASE STUDY: BEE HIVES

During the Fall Semester of 2011, eight first-year students with no prior agricultural, architectural or construction experience designed and built four original beehives in an effort to improve urban food security. This assignment was a community service project for their introductory architecture course, requiring teams of students to design and build apiaries using materials salvaged from the urban environment. Students learned the basic principles and requirements of hive design, developed initial design schemes, mocked-up those designs, and then built hives to be donated to a local urban beekeepers. Along the way, these students shared their findings and projects at a teach-in they led for middle school students from the Edible Schoolyard



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Figure 3: Student hives were made out of recycled materials, and installed in gardens to test.

Figure 4: A student's presentation board of bird units, which he fabricated. Image: Adam Castelli.

New Orleans. The final designs ranged from a tower of buckets that unpacks for access to honeycomb to a traditional top-bar hive whose planted pallet sidewalls provide in-house pollen.

At the root of this design elective was an intention to help repair the divide between farm and table, and to invite productive creatures back into the fabric of the city. During the course of the semester, students investigated a series of urban farming strategies that simultaneously utilize under-appreciated urban elements and inspire food security; these hives allowed teams to put their own solutions to test in the real world. (Figure 3)

CASE STUDY: URBAN BIRD HOUSES

As an introductory assignment for a design studio in the Spring Semester of 2013, twelve students were tasked with the challenge of designing and building a dwelling space for urban birds. This assignment was the first phase of a wood competition design studio, and provided students with useful insight into the physical properties of this material. Their task was to investigate wood products--- to test, push, innovate and expand their conceptions of this material--- by designing and building architectural birdhouses. In so doing, students learned the basic principles and requirements of nest design, developed playful and creative design schemes, mocked-up those designs, and then built these physical objects, to be deployed in urban areas. At the end of the studio, these design ideas and projects were displayed in an exhibit on urban bird habitat in Philadelphia, PA. (Figure 4)

Nidification efforts, whether by animals or humans, offer striking parallels to the constraints and opportunities found in human habitation. However, as an introductory design assignment, urban bird habitat also presents a program so simplified that material and tectonic inquiry can move to the forefront. When pressed to design for a bird, rather than a human, students found that they were suddenly freed from formal expectations around tectonics and material use. Rather than develop forms using traditional construction methods, the students experimented with weaving, folding, dipped wax constructions and intricately carved elements (Holden, 1970, 15).

The project also presented these students with a tangible, hands-on opportunity to engage with the issues of urban habitat depletion and human-animal interaction. While helping students to hone their design and construction skills at a very small scale, they also explored the theory that would frame and support their larger studio experience. This included considerations of biodiversity, the impact of urban development, leftover and underused wastespaces in urban areas, the ecological services provided by birds including pollination, fertilization and pest control, and human attitudes towards wildlife in cities.

CONCLUSION

Micro-design-build projects can be considered a pared-down alternative to their heavyweight counterparts. In reducing the scope, scale, budget and parameters of the project program, these design explorations can become quicker, more flexible, and more keenly responsive to the immediate needs of students and educators. Moreover, these efforts can be used to either augment or facilitate the development of the growing number and surprising diversity of design-build programs in the U.S. (Dean 2005, 8).

In doing so, micro-design-build projects could fill an important gap in architectural curriculum, adding a new route to design-build education today. While these

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small-scale exercises interface readily with academic institutions and may offer course credit, they could also provide a non-traditional academic experience---one that blends experiential education and architecture in a context that might not otherwise be institutionally available.

Micro-design-build projects provide a comprehensive view of the design process, and while small-scale, students gain experience with design, material characteristics, construction, and budgeting. The small size of these projects allows for students to quickly realize a final product, in teams or alone, while honing the skills needed to build a more complex structure. In doing so, students gain concrete experience at every stage of the design-build process, which can then be applied to other types of building projects.

Micro-design-build projects give students an opportunity to cut their design-build teeth on easily achievable projects. Such a limited project scope allows them to stretch themselves creatively, perhaps employing new tools, technologies or programmatic ideas in a relatively low-risk environment. This method is no replacement of design-build pedagogy, but rather a supplemental or alternative model for this emergent discipline. Joining the longstanding philosophical tradition of design-build education, micro-design-build provides another vehicle to repair what Brian Mackay-Lyons considers “the disconnect between head and hand in many architecture schools”(Mackay-Lyons 2008, 136).

ENDNOTES

1. One example of this erosion of the classical studio sequence is at Tulane University, where students enrolled in the urban|build program gain studio credit.
2. Immersive, study-away programs, such as the Rural Studio, the Remote Studio, or the Yestermorrow Design Build Semester, provide students with a full-time design build experience. While these programs offer a comprehensive approach to design-build for serious students, they have limited class sizes and student access.
3. Nest building efforts. Discussed in Chris Chester's Providence of the Sparrow.
4. According to Dean, in 1992, there were just 8-10 university-based design-build programs, while today there has been a four-fold increase.