All Hands on Deck: Instructors as Collaborators and the Modified Dynamics of Design Build Interaction

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Abstract
In beginning architectural education, design-build studios offer uniquely challenging, but beneficial, learning opportunities. Because of the elevated expectation that the studio activities will conclude with an occupied environment designed and built primarily by students, students and instructors have to bear new responsibilities and apply a broader range of skills towards the project. These new responsibilities require responsive pedagogical adjustments.

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All Hands on Deck: Instructors as Collaborators and the Modified Dynamics of Design Build Instruction

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Building Parameters:

In beginning architectural education, design-build studios offer uniquely challenging, but beneficial, learning opportunities. Because of the elevated expectation that the studio activities will conclude with an occupied environment designed and built primarily by students, students and instructors have to bear new responsibilities and apply a broader range of skills towards the project. These new responsibilities require responsive pedagogical adjustments.

This paper will discuss several intentional shifts in the teacher/student relationship that were implemented by the authors (an architect/professor and a landscape architect/professor) during a recently completed design-build project for graduate-level beginning architecture students at Iowa State University. The project, an outdoor performance platform and seating deck created for a local non-profit community arts social club, was programmatically simple but had restrictive project conditions (e.g., a tight budget, a compressed schedule, and challenging site conditions) that made it a complicated endeavor (Fig. 1).

As might be expected, very few students had any professional design or construction experience before the course began. Their inexperience, coupled with the project conditions and elevated expectations for their impending responsibilities were a source of initial apprehension and timidity in some. Certain students erroneously assumed that their relative inexperience, compared to the instructors, would (or should) limit their participation in the project to that of an implementer or laborer. These sorts of concerns are common before a design-build course begins, but if they are left unchallenged, it can have an adverse effect on student engagement and learning.

To counteract those concerns, we made certain changes to the traditional studio environment and activities to better reflect the collaborative, productive, and effective learning environment that we desired. Specifically in our interactions with students we shifted certain traditional teacher/student roles towards a more collaborative learning environment based on shared goals and cooperative activities. The paper will show examples of these moments throughout the scope of the project and how these changes positively impacted student learning and project delivery.

Design Build & Curricular Motivations:

A review of contemporary design-build surveys in architecture and engineering programs suggests that design-build is a relatively common pedagogical practice that is adopted for many reasons by different academic programs (Gaber, 2014). Alt-
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Though most design-build courses generally attempt to de-
mystify the construction process and to link student design
activities to a physical outcome, there is no universal pedagogi-
cal motivation. Each program, or course, typically develops a
pedagogical emphasis that is extracted from the inherent limits
of the different project circumstances. Or alternatively, these
motivations influence the internal processes by which the dif-
frent projects are set-up and the courses are taught (Canizaro,
2012).

At Iowa State, the primary motivation for including a required
design build project at the end of the first year of a graduate-
level architectural education was based on the simple idea that
beginning students could learn more effective ways of designing
and documenting projects if they spent time building one. For
the last 11 years, the modest budgets ($2,000-$5,000), com-
pressed schedule (8 weeks of a part-time summer studio), and
small class size (8-16 students typically) have limited our projects
to highly refined, small, and simple projects with a relatively
conventional range of materials and assembly strategies—
primarily for supportive public institutions. Time has passed, a
pedagogical purpose has emerged from these constraints that
now resonates throughout our curriculum. “Building” isn’t
taught as a means to an end, but as a central skill that could be
applied to other design problems. Simply put, design-build
doesn’t just produce a project, it teaches a process.

Design/Build/Test & Repeat

Fig. 2. Different study models were developed to explore the shape of
the stage and the layout of the benches.

At this stage in their education, many of these beginning design
students are simply not prepared for the elevated challenges of
design-build coursework, and they require a modified pedagogy
that acknowledges this. In addition, the skill level of each stu-
dent varies from students who have worked construction to
students who have not lifted a hammer or cut a piece of wood.
They all share a common value that the design process can
empower them to learn the value of building to realize ideas. If
design-build instructors don’t teach specific skills that incorpo-
rate “building” as a central part of the design process, research
shows that students are more likely to become disengaged with
the design process, limit their participation in course activities
for fear of failure, quickly defer to other perceived figures of
authority for decision-making, and ultimately compartmentalize
themselves in a limited role as simply an implementer (Shep-
pard, Jenison, 2012).

To improve student learning, increase engagement, and devel-
lop critical skills during the studio, the authors/instructors felt
that it was important to establish several pedagogical policies
before the class started that would be implemented and ap-
plied to instructors and students alike. We knew that the haptic-
learning activities that teach design-build skills have also been
shown to motivate student learning and improve retention and
understanding of physical behaviors of structures (Inshook,
2011). Not surprisingly, we would encourage them to learn by
building. We decided to create a framework of required class-
room activities that taught the design/build/test (DBT) meth-
od—a tested method that utilizes student’s ability to ideate,
fabricate, and evaluate their work (Elger, 2000). From the first
exercises onwards, we would encourage our students to use
multimodal tools to continually build, test, and assess their work
at increasing scales of refinement to improve their ideas (Fig. 2).
By the time the final construction process occurred, it could be
presented as a simple extension and refinement of the skills and
processes they’d been practicing already. Instructors would be
able to participate in this design process as needed but as col-
aborators and not primary authors of the design.

Because students would ideally have several built iterations
of their work available for review, we hypothesized that we would
be able to have a more complete means of assessing their work
in ways that are different than a traditional studio. We wanted
to make sure that everyone involved with the project would
have a voice—not just the instructors, so we would establish a
“show me, don’t tell me” policy, born out of the collaborative
practice model experience of both professors.

If an idea was proposed collectively by anyone, it could be eval-
uated openly and honestly without fear of retribution or penal-
ty. However, anyone criticizing the idea (a teacher or a student)
must be willing to propose an alternative. We felt that incorpo-
rating critical evaluation skills into the DBT process allows for
honest and productive exchange of ideas, and as a result, assessment would become a central part of the studio culture. We knew that in practice we'd be criticizing the work of students, the work of each other as instructors, and that we'd have to be open to student criticism of any work we propose to the group. This would shift the perception of our traditional roles as instructors, but we felt that it was an important concession to the collaborative design environment we desired. Unfortunately, it wasn't the most time-productive decision as we soon learned once the project began.

Open-Ended Beginnings:

Our first main challenge was finding, and defining, a project scope that fit with the course constraints and matched our curricular goals. As part of his work with the Community Design Lab at ISU, Professor Rogers had worked with a local nonprofit, the Des Moines Social Club (DMSC), on the re-design of an exterior parking lot that was to be converted into an outdoor performance venue and gathering space. In anticipation of outdoor performance events, the client had already built three large, skewed concrete walls in the corner of the courtyard and wanted to add a permanent stage in front of the walls to complete the project. The client was open to the idea that the final project could include additional projects proposed by the Community Design Lab project such as seating, shelters, outdoor display areas, and/or community garden spaces.

Because we wanted to create a collaborative design environment, we felt it was important to include students in the initial design stages of problem definition. We presented the stage as the primary project goal but invited students to speculate about how other additional project components could be integrated into the work. To help define this scope, on the first day, students were asked to find provocative examples of similar outdoor environments or elements. Although this decision was a catalyst for some helpful initial research, we soon found that the scope's open-ended nature was a problem because we simply couldn't make any immediate progress. Instead of building consensus around a refined proposal, this exercise actually expanded our options.

After a week of work, the student proposals were mostly sprawling collages of precedent-inspired elements. We realized that students simply didn't have the professional experience or perspective necessary to see how these design decisions also had ramifications on their classroom activities. For the good of the class, we exercised our authority and decided, even among some dissent, that the final project scope would simply be an uncovered stage and seating platform. Interestingly, exercising this authority didn't seem to harm our role as collaborators but instead provided the necessary voice of authority and professional guidance that was needed in the studio. Some students already felt a sense of uncertainty about their activities before the class began and so they all seemed to appreciate the certainty that came along with this decision because they could move past the traditional studio exercises they had been doing towards more design-build specific explorations. It was a reminder that we could be collaborators without being peers.

Finding Resources for Larger Scale Explorations:

The three existing concrete walls that were to serve as the background to the stage and seating had a peculiar orientation in the courtyard and to each other and there wasn't a clear solution as to where the elements would be placed within this context. Students realized that defining the final size, materials, placement and use of the project left many open-ended questions that they could explore. As the scale of project shifted towards these more refined design questions, the students again returned to their precedent studies as a source for additional information about materials and assemblies. They were now looking at these projects not for inspiration but information that could be used to translate their design ideas into more tangible proposals.

Student-directed research may seem like an unremarkable process, but it is a very critical component to cultivate in a design-build studio because it puts the student, not the instructor, in charge of finding and incorporating critical information into the project. It is natural to have students look towards instructors as their central resource for information because of their relative expertise, experience, and role in the classroom. If the instructors become the primary source for answering questions, the students will be less likely to explore for answers themselves.

Certainly instructors should provide mentoring and reactive feedback when issues are brought to them. However, the instructor also needs to know not to become the primary source for information or answer, when not to interfere, and how to resist the urge to over-teach (Malmqvist, 2004). The danger in having instructors provide too much information is that students will stop searching, stop learning, become disengaged and become implementers not collaborators. The most productive way for design build instructors to suggest ways of working together is to join the design effort as a team member to develop drawings, models, full-scale prototyping, etc., direct students
towards primary sources of information (resource books, consultation with engineers), and at certain points simply join in the construction process.

![Image](https://via.placeholder.com/150)

*Fig. 3 Instructor and students testing out seating arrangements on the full-scale mock-up taped on the floor outside studio.*

**Instructors as Active Collaborators & Provocateurs:**

As the project developed we frequently provided "just in time learning" instruction about how certain tasks could be completed if their initial efforts were unsuccessful (e.g., "frame it this way, try this material," etc.). Promoting self-discovery and collaborating doesn't mean abdicating responsibility to also provide instruction. Design is collaborative effort involving participants with various skill levels and finding different resources to test and improve your project (peer to peer feedback, feedback from engineers, or even from instructors) is an important part of the process. But it’s still their project design. We regularly drew with them, built with them, critiqued each other, and became active participants in the process—particularly when the project was at a critical stage of development. However, we didn’t want to be the authors of the design. They needed coaches and editors and we happily filled that role. Our "show me, don’t tell me" process allowed for our contributions to be placed alongside student-produced work and received public criticism. Sometimes, our combined expertise as instructors was just what the project needed.

At one critical moment half-way through the course, student progress was somewhat stalled—the DBT process seemed stagnated with conventional plans and sections that seemed more concern with technical acumen than occupation or experience. The students didn’t seem to understand the scale and arrangements of the elements that they’d proposed or the potential consequences for how it would be used. We reminded ourselves that we were there to teach them a process of design. From experience we knew that confronting the design at 1:1 scale is an experiment best performed during design and not after construction, so we took a tape measure and several rolls of tape to an open floor area outside of their studio and created a full scale mock-up in plan. We grabbed remnants of old boxes and nearby chairs to use as stand-ins for our proposed seating.

We used the design dimensions and layouts proposed by the students (warts and all), and upon completion, called the students out for our most important "show me" moment (Fig. 3). Students assessed the project not as an abstract image, but as an occupied space—walking on and sitting "in" the parameters. This activity ignited the studio activities and conversation. Within moments we had made major adjustments in the scale and geometry of the project (it was too big, too big, they felt), reduced the number of proposed benches, and they developed a new idea for the geometry and use of the benches designs that was previously unexplored. Within 12 hours, two bench prototypes were built, a 3D framing plan was drawn, and the first realistic budget was produced. The concerns about starting construction quickly faded to enthusiasm for the process and the proposed design. This was so effective, that for the remaining week before moving on-site, we frequently returned to the space and populated it with actual prototypes. Seeing the stage footprint in a space at full scale encouraged students to occupy it and assess it for its size, height, edge detail, seating height and other physical design attributes. This skill of 1:1 proved valuable as overall design questions materialized about when the stage was not being used as a performance platform. They realized that with the right bench design and configuration, users could sit in multiple seating configurations and interact with each other (and the stage) in ways that dramatically improved the project and created a unique project aesthetic.

**On-Site Experts & Confident Conclusions:**

By the time the crew arrived on site, different students had gravitated towards "ownership" of certain parts of the project: final dimensions and layout, structural framing, perimeter benches, decking, and seating. Because they had collaborated together throughout the process in an open way, there was a good deal of trust established between everyone. As instructors, we continued to reinforce this trust by modeling the desired behavior. For example, on the first days on site, Prof. Whitehead, who has years of experience in construction, asked...
the small group of students in charge of layout and framing to lead the initial efforts—the site was strangely sloped in two directions and the student’s guidance helped us level the platform relatively easily (Fig. 4). We grabbed our tools and worked alongside the students, consistently asked them "what’s next?"

Fig. 4 Student led construction effort for deck framing.

This process repeated itself over-and-over in the next two weeks of construction as several components of the design needed to be adjusted in the field due to unforeseen site circumstances (Fig. 5). At each time, the students would immediately suggest alternative solutions—the “show me” method frequently meant immediate alterations to the final project.

Although we maintained quality and safety standards, the construction process demonstrated to students that they had a real agency in critical decision making about design, project management, and construction. The students managed the tools, the material deliveries, the distribution of labor, and kept a close enough eye on the construction management that we finished under budget and on time (Fig. 6).

We continued to work alongside the students every day on the site, modeling a work ethic and enthusiasm, and providing guidance for how things should be built smartly and safely (Fig. 7). Few students needed nudging to participate fully—the greater challenge was asking the students with the highest level of construction competency to allow less experienced peers to take over.

Fig. 5: Because of the skewed geometry of the deck and back walls, the detail for the deck edging was worked out in the field.

Fig. 6: Final Performance Stage from rooftop terrace.

Building Culture:

Ultimately, we found that the experiences and interactions we went through on-site were accurate reflections of the process we had taught off-site; specifically the collaborative and iterative efforts to design, build, test, and improve our work. By continually participating in collaborative design processes and consensus building alongside their instructors throughout the process, students developed more confidence in their ability to generate ideas and make decisions when they received the support of their teachers and peers. Ultimately when the work shifted onto the site, students had developed a collective expertise about the project that enabled them to continue to make design decisions in the field and to assign construction tasks to everyone—including the instructors.
But along the way, this required specific adjustments in the pedagogical process and the student/teacher relationship. Instructors needed to maintain dual complimentary roles as experienced critics ultimately in charge of protecting the project interests, and as a senior-level project collaborator that offers drawings, ideas, encouragement, and sweat equity of labor in support of the project. Because the instructors intentionally pulled away from providing all the answers and resources they needed to develop the project, the students learned more—despite their inexperience and the elevated expectations.

Now that the project is complete, several students have visited the project and seen it in use (during a community yoga event, concerts, or simply just a lunch crowd)—they’ve reported positive feedback, as have the clients (Fig. 8). But the legacy of the project hopefully also exists within their memory as a formative educational experience that they will return to during many of their subsequent projects. We hope that through this experience they not only emerge as stronger designers, but they learn how to be good collaborators, leaders, and instructors within their practice—willing to shift their roles and responsibilities as needed.

Notes


