Design-Build Gone South

Educational Design-Build has a broad spectrum and takes many diverse forms including the studio-based practice model, elective-based experimental installations and building technology pedagogies. Common to all these interpretations is the dimension of reality, arguably its most unique and valuable contribution to the academy. Reality introduces conditions, constraints and opportunities comprised of people, materials, fabrication processes, environmental conditions, gravity and use.

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Studio-based practice models are particularly demanding endeavors with challenges and values closely associated with professional practice. These issues include project planning, funding acquisition, legal authority, contracts, clients, liability, and the physical realization of design products for use by actual users; done for the purposes of education, service and research. Educational Design-Build projects are typically student driven; the principle pedagogical objective and benefit, but also a condition that introduces inefficiencies that make their undertaking more challenging than if they were delivered exclusively by a team of professional architects and contractors. These Design-Build endeavors often fit awkwardly within the greater academy, which traditionally teaches design within the safe cloistered confines of the university. The greatest difference between hypothetical design studios and Educational Design-Build is the greater risk and potential for consequences beyond faculty and student disappointment.

Upon completion, Educational Design-Build projects are commonly published and promoted with cover shots of finished projects in the best lighting, featuring the most innovative and finely crafted details. Students are shown swinging hammers and gathered before projects illustrating their camaraderie as they beam with a sense of accomplishment. Use and value are often captured with imagery of celebratory events filled with community members. These projections are truths and effectively illustrate the positive dimensions of educational Design-Build. But these truths are typically incomplete. As stated by Stephen Verderber in his upcoming paper, *Constructing An Evidence-Based Framework to Document and Advance Design-Build Within the Academy and Beyond*: "The inner profundities of educational design/build remain under examined: it remains a stepchild, a somewhat remote area of the curriculum hampered by a magic realism syndrome—whereby completed projects are presented at academic and professional conferences as if they fell from the sky—often with scant reference to the immense challenges encountered."[1]

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Figure 1: Fence Removal by Students on Day 1 of Design-Build; June 2013.

These immense challenges constitute the other realm of truths, the underbelly of Educational Design-Build. The term "Gone South" relates to a compass rose, which depicts north as "up" and south as "down." It apparently evolved in the early part of the 20th century as a colloquial expression about an amount or item decreasing or going "down" in value.[2] This paper presents the rarely disclosed ways Educational Design-Build (EDB) projects go south. It is organized about four conceptual realms: *management (in lower case)*, *Construction Calamities*, *Testing the Hypothesis*, and *What Are We Selling?* Each is examined through a principal experience layered with issues of pedagogy, collaboration, innovation, project delivery, promotion, performance, and value.

management (lower case)

When management is secondary to design and construction, schedules, budgets, and tasks are still coordinated but they become like Potemkin Villages. They are facades, which give comfort, define space, and serve some function, but at times are paper-thin. Balanced and serious attention is often not devoted to budgetary estimates, balance sheets, and financial matters. Inadequate planning can lead to problematic purchasing practices (violating university policies) or settling on the readily available yet poorer performing product. On the other end of the spectrum, micro-management by faculty defeats the necessary patience and tolerance, and student ownership over the entire process wanes.

Housing | 2013: The first survey should have been a clue. The neighbor's chain link fence was shown to exist on the property just purchased by the University for an upcoming Design-Build project: a market-rate infill home. Our financing agency told the faculty not to worry. They would take care of it. It was understood that the portion of the property on the other side of the fence would be sold to the neighbor. Fast-forward one-year…On the first day of the summer design/build course, the faculty and students met the neighbor on site and it was decided by all parties that the fence could be removed. The fence was quickly taken down, hauled off site, and disposed of. Fast forward one more year…after the infill home was completed and occupied by the new owner, the calls started coming. "Where's my fence?! I told you I wanted it put back up." Although the University was no longer technically liable for the property since it had been sold to a private homeowner, architects are always connected to their projects and feel a certain responsibility to all parties involved. And the reputation of the University was on the line. The faculty attempted to reason with the neighbor by telling him that the new homeowner was planning to put up a new fence. But he wanted his old chain-link fence – now in the bottom of a landfill. Two more calls came culminating in a message received by the lead faculty from the neighbor:

> "…just talked to my attorney, we just need to get this resolved…Please get in touch with me, if not I will file suit."[3]

The faculty frantically notified the University attorney and financing authority representative. No response was forthcoming. The faculty prayed that lawsuits would not be filed against the University. Even if they were baseless, a lawsuit could end the twelve-year history of the Design-Build program. Finally the homeowner appeased the neighbor by building a new fence. Disaster averted.

What are the lessons from this near-miss? It sounds obvious, but all verbal agreements and instructions need to be received in writing. What would that have actually required? More time. Although faculty feel constrained by the confines of the semester and their eager clients, for the advancement of learning, the protection of

liability, and the quality of design and construction, schedules should be extended. EDB projects should not have to meet commercial deadlines based on profit margins. Education is necessarily inefficient and faculty members have a responsibility to put the safety and learning of students first. Secondarily, the reputation of clients and universities must be protected through careful and thorough documentation and expert consultation along the way.

CONSTRUCTION CALAMITIES

> "Probability wise, near misses aren't successes. They are indicators of near failure. And if the flaw is systemic, it requires only a small twist of fate for the next incident to result in disaster."[4]
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> — Ben Paytner

Playground | 2011: A fifth-year architecture studio undertook the challenge to design and build a 4,500sf custom playground for a local community outreach organization. The design was conceived around three principal components: a shallow canyon, bound by two faceted concrete retaining walls traversed by steel climbing frames. Following the relatively uneventful excavation of an estimated 375 cubic yards of earth, grading and pouring of the footings, the team was therefore confident as work commenced on the first of the two retaining walls.

With little construction experience, the student team in charge of the design and delivery of the walls had successfully transformed the design into general formwork specifications and shop drawings, proceeding with takeoffs, material and tool acquisition, CNC routing and a 4' long test section. Despite this yeoman's effort, they failed to adequately detail the corners of the formwork where one facet transitioned into another. This condition was left to trouble shoot on site throughout the night, preceding the 7am pour. The pour of the first wall went off without a hitch, near perfection; validating the studio's perception that they could address unresolved issues in the field.

The next week was spent assembling the formwork for the second, more complex, retaining wall. The formwork had been designed and fabricated to accommodate fiberglass ties perpendicular to the surface of the wall. But the surfaces on the central section of the wall were not parallel; the ties would not be able to bind the two sides of the formwork. It was too late, the concrete plant was closed, the order could not be cancelled and the concrete would be en route before the office opened. The studio decided to shore this section externally with compressive bracing instead of internal tension.

On the third pass, the creaking sounds began. The site became a chaotic battlefield. Lumber was flying from scrap piles; to miter saws and hand held circular saws, to the formwork where students shored weaknesses as they appeared. It was on the fourth pass, the hydrostatic pressure overwhelmed the formwork, the additional shoring proved futile. The concrete oozed from the base of the form, overtaking the feet of nearby students.

The team, at first paralyzed with astonishment and disappointment, rallied to isolate the failure and preserve the integrity of the adjacent wall sections. They scrambled, collecting all available objects; stuffing them into the formwork and securing them with rebar and scrap lumber. The tops of the adjacent walls were troweled and steel embeds placed while the central formwork was dismantled and the setting concrete waste was shoveled and wheelbarrowed to a roll-off.

The studio was determined that the disaster not be concealed but rather celebrated;

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Figure 2: Concrete Blow-out, Student Reaction and Aftermath; November 2011.

the design of the playground would change as a result, but for the better. This portion of the wall would assume a different language, stand as a compositional anomaly and a monument to the event. The wall re-design, formwork fabrication and pour cost the project almost $2,500 and the instructor and four students their thanksgiving break.

Occurrences like these are not unique to EDB projects, they happen in professional projects big and small; things are sometimes overlooked. But in professionally delivered projects there is an expectation of experience, acquired over many years, through many projects and problems. In the end the instructor hopes this event was an effective yet costly educational exercise in due diligence, accountability and consequence. Without doubt, this event is indelibly etched in the minds of studio participants. But whether this journey into reality and uncertainty has any genuine long-lasting effect, is yet to be known.

The knowledge acquired by the team of students on this journey through reality, is rooted in first person experience and therefore earned by and reserved for them alone. For the next project the faculty practitioner will be the constant, aware of phenomena such as the "paradox of the close call" and perhaps better prepared to guide the next group of students. Regardless, the experience of failure, big or small, lies in wait.

TESTING THE HYPOTHESIS

> "There are things we know that we know. There are known unknowns. That is to say there are things that we now know we don't know. But there are also unknown unknowns. There are things we do not know we don't know."[5]
> — Donald Rumsfeld

Educational Design-Build affords students the challenges and opportunities inherent in negotiating reality and beyond, and the consequence of performance. In common with professional practice we aspire to define the *knowns* and be prepared to navigate *known unknowns*. But irrespective of the breadth and depth of our due diligence, the *unknown unknowns* are inevitable.

Bus Shelter Prototypes | 2010: A fifth-year architecture studio was charged with developing a prototypical modular system design for regionally specific bus shelters. The project was prompted by the observation that local bus riders typically await their buses standing behind the bus shelters, adjacent buildings, trees or utility poles rather than in the shelters as they seek reprieve from the seasonally high temperatures and intense sunlight endemic to the region.

The studio performed thorough pre-design research in order to properly define the problem and identify the opportunities, strategically maximizing the *knowns* and minimizing the *known unknowns*. They met regularly with representatives from the transportation authority to seek their experience and insights. The studio surveyed over a hundred bus riders and recorded interviews with another thirty. They developed precedent studies of the eight types of bus shelters adopted by the regional transportation authority. This involved observation of use, dimensional surveys, digital modeling and simulations; assessing solar performance, rider-driver visibility, watershed, structure, materials and methods, circulation, ergonomics, accessibility, amenities and maintenance.

The studio developed the prototypical system design, comprised of three planes calibrated to maximize morning and afternoon shade. The system design was adapted to site conditions representing the four cardinal orientations. The project concluded with the construction of four shelters, each rendered in a different material palette.

Upon completion, the hypothesis of design was tested by the forces of use. *Knowns* included the solar performance, which was generally effective yet imperfect, but exactly as predicted by digital simulation. *Known unknowns* centered on the inclusion of opaque vertical screens that provided shade from the morning and afternoon sun. Despite supporting the designs, the transportation authority posited that shelter occupants would lack situational awareness and feel uncomfortable from a security standpoint. Post-occupancy inquiries of bus riders have not supported this concern.

Unknown unknowns occurred in all four shelters and ranged from long-term homeless occupation, shelters becoming late night party sites and breaking the fall of a 50-foot tree toppled in a storm (shelter was unscathed). But one shelter in particular held a unique destiny. A couple months after completion the elderly gentleman whose house was adjacent called the city to complain that the afternoon sun was reflecting off the shelter, through his window and turning his kitchen yellow, a color he didn't like. His children and grandchildren followed suit with repeated calls and the squeaky wheel succeeded in having the city repaint the shelter a color other than yellow. Eighteen months later he called the city again to inform them "college kids were fornicating in the shelter" and "people were urinating behind the shelter".[6] It took almost a year of calls but the city finally yielded and large openings were cut in the opaque shade screen. All has been quiet since, it is assumed that the fornicators and urinators have found greener pastures; and the bus riders make do, as they always have, with less than adequate shade.

The *known unknowns* are teachable moments.[7] Analyzing post-occupancy of buildings and structures is critical to student and faculty learning (not to mention architectural practitioners). Time should be afforded between EDB projects for this analysis to occur. Contrary to the popular belief that every class of students needs its own, new project, the completion or correction or renovation and the analysis of a previous classes' projects can be more meaningful than a greenfield project and may be embraced by the students for its relevancy and importance.

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Figure 3: Post-occupancy Evolution of a Bus Shelter; December 2010, October 2013, September 2014.

WHAT ARE WE SELLING?

> "Appreciate...the clients and users of our buildings - those who had to endure a method that precludes easy compromise."[8]
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> — Peter Zumthor

Homeless Shelter | 2003-2005: When designing exterior improvements for a homeless shelter, a university design/build program was given great latitude by the client. The client trusted the faculty and students and they wanted to establish a long-term service-learning relationship with the University (even more than the actual improvements). It was the theory of the faculty that following a quick master plan, with some client input, the best way to create a catalyst for further donations, support and improvements, was to begin building immediately – what the faculty termed "accelerated fabrications."[9]

Design freedom and independence was also gained because the students were funding or getting donations for the projects themselves. The accelerated timetable, low accountability to the client, and limited budgets justified improvisation and ad-hoc-ism in the designs. When the client saw the models and later the built works they appeared to love the improvements and in fact the homeless residents of the center utilized many of the improvements. There was an incredible amount of media and public attention drawn to this feel-good story: apparently well-off

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Figure 4: Meditative Garden and Performance Space, Outreach Center, Lafayette, LA, 2005.

Figure 5: Ms. Yoshonna's House, Habitat for Humanity, Lafayette, LA, 2013

architecture students learning how to build in the real-world, while giving back to their community. As they say, it was a "win-win" for all involved.

However, important questions have to be asked and may serve as a warning to future Educational Design-Build practitioners. Were these improvements really needed? Did the improvements fulfill the programmatic requirements? Due to the low-budgets and ad-hoc materials did they create a long-term liability for both the client and the University?

In *The Power of Pro Bono*, author John Peterson, points out that designers typically go into a project thinking that their designs can make the environments of their clients better.[10] Although this may be the case in many instances, sometimes design does occur in a vacuum without considering the existing environment and its positive attributes. Another typical perception of designers ingrained through years of studying historic precedents, is that innovation and novelty are the best solution to a problem. Peterson, cuts this down to size when he reminds, "If the design does not respond to the particular needs of a community, it isn't good design."[11]

Habitat Houses | 2011-2014: In the case of affordable housing, David Hinson discusses in *Designed for Habitat* that student designers typically believe that bigger is better.[12] Larger volumes with higher ceilings make for a better home. However, evidence from some homeowners runs contrary to this. On one of the author's recent projects for *Habitat*, a homeowner stated in no uncertain terms, with tears in her eyes, I don't want that "weird ceiling" with exposed trusses, "I want a flat ceiling."[13]

The aesthetic values and prejudices of architectural students often do not align with their Design-Build clients. Although exposed concrete floors and metal siding connote modernity, honesty of expression, and utility to students, many clients see these same materials as cheap, cold, and inhumane. So although our student designers must learn to challenge their client's preconceptions, pro bono clients must be handled very gingerly since they may be forced into a mode of unwilling acceptance.

CONCLUSIONS | OPPORTUNITIES + RESPONSIBILITIES

> "The idea of failure has taken root in many design thinking circles, the premise being that failure teaches us how to rapidly redirect toward a solution: One idea fails, and we try something else. In fact, failure is a misnomer. To fail would be to walk away from the problem entirely. What occurs within an iterative process is a series of manipulations, drafts, deliberate "poses," strung together, inseparable, and codependent, toward the moment at which the final generation is ideally suited to the context of the problem. At that moment, we build, knowing that failure in the real world is not an option, nor has it ever been part of our process in the true sense of the word. We push and pull and tweak and erase and reorient so that we may produce the best version of our ideas. We do not fail; we commit to incremental and constant improvement."[14]
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> —Emily Pillotan

Educational Design-Build is not a simulation. It is reality. In fact, in some cases it is hyper-reality because it imposes constraints on design and construction not found in the real world. For example, hyper-realities such as the logistics of moving a Solar Decathlon home 2,000 miles and setting it up in four days. Or pro bono design freedoms not often encountered in an architectural for-profit practice. Or designing and building anything in eight weeks! These are unique and valuable opportunities for students to learn design in the pressure-chamber of hyper-reality. As Pillotan implies, true failure is not an option, but in the best of EDB scenarios there are the opportunities for near-misses, time for numerous design iterations, and space for reflection.

With opportunities come immense responsibilities. EDB would not exist without educational goals and objectives. Faculty members have this responsibility. To be educational, students must learn. They can learn from conventional practice(s) or innovative practice(s), but there must be critique, conversation, and reflection for learning to occur. Although not necessarily required for vocational skill acquisition, research is a component of higher-education. This is both an opportunity and a responsibility. The topics of research are infinite. What makes it research however, is a thorough scientific process of hypothesis, experiment, and analysis. Finally, a major responsibility of universities is to help improve our society and communities by setting an example of best practices through community outreach. This is a major responsibility of EDB. We must do it better than mainstream practice.

For students, professional ethics and maturity constitute major challenges and responsibilities. No longer are they allowed to only address their whims in hypothetical design. Actual humans are guinea pigs in EDB. Health, safety, and welfare is not an abstraction, it is required. But also professional attire, communicative skills, collaborative respect, and compassion are in the forefront. Student responsibilities have consequences which make them infinitely more memorable and salient than traditional studio projects.

Design-Build Gone South is not "magic realism"[15], nor secrets and lies, but instead the endeavor to assume responsibilities, seize opportunities with consequence and accountability. Far from failures they are the "near-misses" and proving grounds of our future designers and leaders. When the authors set out to write this paper it was their intention to develop a prescription for best practices for EDB practitioners to avoid pitfalls and disasters. Unfortunately, such a universal list cannot be made due to the breadth and diversity of EDB. It is the very uncertainty and risk of EDB, which makes it alluring to its practitioners. If there were a formula for success neither student nor faculty would learn and no one would be motivated to attack the arduous enterprise, which is educational Design-Build.

Practice, particularly in the academy, should not be an isolated silo experience; it can be optimized if we share and discuss with brutal honesty the trials and tribulations in hope that we can learn not only from our own mistakes but those of the collective. After all, what is prima facially perceived as a failure or a decrease in value may very well be the most effective and valuable dimension of Educational Design-Build.

> "Ever tried. Ever failed. No matter. Try Again. Fail again. Fail better."[16]
> — Samuel Beckett

ENDNOTES

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