2014 ACSA FALL CONFERENCE
October 16-18, 2014
Halifax, Nova Scotia

WORKING OUT

thinking while building

ABSTRACTS

2014 ACSA FALL CONFERENCE ABSTRACT BOOK
WORKING OUT: thinking while building
October 16-18, 2014
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BUILT WORKS 1

IMAGINARIUM - ARCHITECTURAL FORM AT PLAY

Nik Nikolov, Lehigh University

The Imaginarium is a small, kid-size building made in response to the 2013 Annual Playhouse Design Competition organized by the regional chapter of the American Institute of Architects. The competition promoted design and architecture in the region and the entries were open to the public to use with the start of the 150-old traditional Christmas festival. In late December the entries were auctioned to raise funds for the Pediatric Cancer Foundation of the Lehigh Valley.

The playhouse was designed and built in less than 3 months by architecture and product design faculty and undergraduate Architecture/Engineering dual-major students. The collaborative team was interested in expanding the idea of play beyond something that is either learnt or unlearnt. The resulting design is a mysterious faceted crystal-like house which resisted the common strategy applied to children-bound creations - to create small versions of big things (princess castle), or big versions of small things (mushroom house).

Ideas of public/private space were of particular interest - how privacy is cultivated, inhibitions and self-awareness are imposed and assimilated. Can architecture simultaneously provide prospect and refuge? While asking these questions the team drew inspiration for the initial designs from a variety of cinematic and literary sources.

The form of the final design was generated in 3d computer modeling software which allowed for quick modifications in the design, iterative simulations, and prototyping. Components were then moved to various software applications so they could be laser-cut or CNC-routed by local commercial fabricators. All the final assembly was done by hand. Materials used were 3/4" plywood, 1/4" two-way mirrored acrylic and laser-cut 18ga steel joints.

The effect produced by the two-way mirrored acrylic is such that during the day you can see out, but no one can see inside. At night a photo sensor turns on a light inside and the effect is inverted - the house is completely transparent to the outside observer and completely mirrored to the inhabitant. The playhouse turns into a place where a kid can see everyone but no one can see them, only to have that same idea flip directions at night. New games and ways to play with this effect are easy to imagine.

The designers were surprised to find just how interactive the completed playhouse really was. As the resulting reflective-transparent effect started to materialize during construction, it became a psychological game of perception. Standing inside at night the user has no idea if anyone is looking at them from the outside and yet they are immersed an infinite space of reflections.

The project revealed the great potential of student-teacher collaboration. Long after the project was 'done' the students continued coming by to see if they can do more.

OBSERVATION TOWER: BUILDING AN UNDERSTANDING OF SITE AND PLACE

Michael Zebrowski, Johnson State College

Observation Tower is a small scale design/build project. Each undergraduate student individually designed, constructed and temporarily installed a human-body scaled structure in downtown Geneva, NY. Learning objectives associated with a design/build project such as: material exploration, budget, construction drawings and process were placed secondary to developing an architectural construct drawing, as Robert Irwin states "all of its cues from its surroundings." Irwin describes a work of this making as "site conditioned/determined" and goes on to assert that in order to achieve "this requires the process to begin with an intimate, hands-on reading of the site."[1] Precisely inline with the prevailing methodology of design/build practice.

Students were asked to intimately explore and observe downtown Geneva in order to locate the site for their Observation Tower. They were seen "pacing first this way ,then that, doubling and then tripling back again before stopping to appraise a view, a deliberative process that involved a long, slow pirouette through 360 degrees."[2] This dance required documentation and by taking photographs of particularly interesting sight lines and relationships between the built and natural environment students began "the process of recognition and understanding" and learned how it "breaks with the conventions of abstract referencing" in regards to site and place. Via analysis, the resulting photographs set the stage for the development of a full-scale viewing device aimed at demonstrating to the general public a heightened sense of visual reality in the public realm specifically for their proposed site.

In addition to the views and relationships evident through site analysis, forms and structural language were drawn from observation and incorporated into the design of the physical tower. With a modest material budget of one 1x4x96 pine board, one 24" x 48" sheet of 1/2" plywood and one 12" square mirror students began their design process through drawing and modeling. Ultimately a working construction drawing was developed and utilized in the fabrication shop as the guide to processing the kit of parts from the material budget.

Once completing the process from observation to analysis to synthesis each student's Observation Tower was installed in the proposed location for the course of one day. The process explored to this point now became a cycle. Through full-scale realization students were able to observe first hand how their ideas regarding site could manifest in their architectural constructs. This also allowed for the observation and documentation on how the general public, through their own observation and analysis "actually perceive or fail to perceive "things" in their real contexts."

Observation Tower took advantage of typical learning objectives associated with design/build while building a hyper-sensitive understanding of site and place. The hands on learning process and realization of a physical construct offered both the students and the general public a new angle and perspective for viewing their familiar city.

1. Irwin, Robert. Notes Toward a Conditional Art. Getty Publications. 2011.
2. Pollan, Michael. A Place of My Own: The Architecture of Daydreams. Penguin Books. 2008.

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BUILT WORKS 1

REFRAME X FRAME: A MICRO PAVILION BY THE DESIGN BUILD COLLABORATIVE

Patrick Peters, University of Houston
Cheryl Beckett, University of Houston

The Design/Build Collaborative is an initiative led by two faculty working against the silos of the university system to merge the allied but distinct disciplines of architecture and graphic design through design/build experimentation. Over a period of successful collaborations, these faculty have developed projects that serve to encourage the public to: celebrate place, learn about environmental issues, incite activism, build community pride, and bring about solutions for sustainable living. The work of the interdisciplinary student teams merges structure, message, and placemaking in an invitation to engage in positive action.

In 2013, the team designed and constructed ReFRAME x FRAME Micro Pavilion to pursue these goals while expanding on its collaborative process.

The ReFRAME project originates at the intersection of two problems, a scarcity and a surplus of material. The first is a need for an efficient, affordable and versatile system of transitional housing units. The second is an overwhelming surplus of office cubicle frames in the commercial interiors industry. ReFRAME seizes on the opportunity of these two problems by repurposing excess and abundant by-products of office space churn while addressing current urgencies in very different parts of the world. The result is a transportable temporary housing model made from recycled office cubicles that may be quickly assembled on site in a distant setting.

Allsteel, known for its award-winning workplace furniture, approached the faculty with its environmental challenge. As offices downsize, upgrade or change location, they replace their office furniture and cubicles. Although warehoused and resold, most of these cubicles never get reused and eventually enter the waste stream. The goal for Allsteel was to put the material to good use as alternative building system.

The test case for this premise would be provided by an invitation to showcase the micro pavilion within an international Art in the Park celebration. Houston's premier urban park was marking its centennial with a public art program. ReFRAME's location offered excellent exposure to promote the premise of cubicle frame reuse.

ReFRAME x FRAME successfully merged the various goals together. Constructed almost entirely from repurposed office cubicle materials, ReFRAME serves as a validation for the use of office cubicles in structuring transitional housing units which, unlike most relief structures, are intended to last 5 years or longer.

Displayed as a prominent destination in Hermann Park, the 200 SQ FT semi-permanent is a fusion of architectural ingenuity and graphic elegance.

The graphic elements communicate effectively the complex multi-layered concept while also establishing the brand for the structure. From the long view across the lake, the structure has the quality of a lantern. Up close, its layered patterns of translucent Coroplast are internally lit to reveal the underlying metal frame structure. To further engage the public, the 200 SQ FT open-air structure houses an artist's sound installation that is activated by sensors as the space is entered. The dual role, as art pavilion and as prototype for disaster relief housing are enhanced and explained through the integrated architectural and graphic elements.

THE BEST OF BOTH WORLDS: PREFABRICATION MEETS ADAPTIVE REUSE IN STREETS OF AN AFRICAN METROPOLIS

David Dewane, Catholic University of America

This paper examines the theoretical framework for a futuristic library developed for Accra, Ghana, which is currently moving from design to construction. The project is an unapologetic agent of globalism that captures and embraces the speed and tangled complexity of the African metropolitan condition in the 21st century. The architectural tactics of our team combines the efficiency, speed, and glamor of prefabrication with the grit, flavor, and resilience of adaptive reuse.

The project has gone through a prolonged period of incubation, including rigorous academic interrogation; professional documentation in architecture and MEP systems; and creation of a business model that strategizes for locally sensitive scaling-up. Indeed, the library in this case is understood – as it has been historically - as a physical and psychological entity formed by culture within a social landscape. A generic sandbox of tools and opportunity dropped into one of the most protean environments on earth: the African street.

The project's ambition is to be experimental and provocative. Providing a library with unprecedented quality of access to the global pool on knowledge is the starting point. The project will only prove successful if it hurdles past access and moves into the more mysterious and fantastic realm of production. Is it possible for a library to open empty and auto-construct a collection? Can generating local content for a local audience be profitable and ethical? How can architecture achieve this? How can physical space transcend the functional in favor of the performative?

We have begun down the path. The planning is done and construction will begin on campus this summer and ship to Ghana in the fall, where our prefabricated component will be mashed-up with a former nightclub, flipping an old piece of the city fabric with a new opportunity for the collection, storing, sharing and generation of knowledge .

BUILT WORKS 2

GOOD-FAST-CHEAP: DEMOCRATIZING DESIGN BUILD

Marc Anthony Manack, University of Arkansas
Frank Richard Jacobus, University of Arkansas

GoodFastCheap is an alternative design-build model that privileges speed and efficacy in an effort to break down barriers that may otherwise prevent a majority of students from participating in design-build projects throughout their academic tenure.

Good in these projects refers to a social agenda; an effort toward a social good. But the definition of good is also repositioned in a way that accepts Fast and Cheap as having positive connotations in their ability to deliver agency to the students; empowering them to act. The good described in the projects below allows a greater number of students to partake in the process of design-build; more student participation equals more good.

Acting fast requires that we accept a variety of scales and let time become a more definitive design driver. For instance, we may begin with a constrained amount of time as the ultimate design driver and ask what is possible within this time. This develops a resourcefulness in our students that helps them conceptualize alternative practice models wherein every material encounter in the world becomes ripe for speculation as a project. If students and faculty embrace GoodFastCheap as a design-build model then the waiting game is over; no more waiting for a grant, a sponsorship, a donor – engagement in the process can begin immediately.

Cheap embraces materials that may typically be thought of as waste. This is not new to design-build but we embrace this part of its history unabashedly. Historically there are pleasures in the cheap being masked by our current educational model that overemphasizes the expensive. Cheap is all that some people can afford, so good designers need to learn how to make cheap appealing.

This paper will discuss three projects that have been built within the academic setting that embrace the principles of GoodFastCheap described above. The first project discussed involves the reuse of falling barn materials which were harvested for a series of design-build efforts focused on a hybrid assemblies that created multiple spatial installations and eventually a unique piece of furniture for a social agency.

The last two projects we discuss in the paper emphasize a rethinking of fast and cheap as the ultimate good in an increasingly democratic design process. The first of these projects, the 2to3 CHAIR, is a piece of furniture built for 2-3 year-olds out of a single 30"X30" sheet of plywood. The idea arose out of a fascination with what we saw as the potential for using CNC tools in the rapid production of low cost assemblies; the epitome of GoodFastCheap. Toward this end we set three primary goals for the project: minimization of waste (good), ability for rapid assembly (fast), and the ability to make multiple chairs out of a single sheet of stock material (cheap). The second project, called the DRIFT LAMP, began with a single parametric definition developed by the students that is transformed through a shared social network. This process emphasizes design as a social activity; a new and democratic form of GoodFastCheap design-build.

MAKING PREFAB: A PANELIZED SYSTEM FOR AN OFF-GRID OFFICE/STUDIO

Olivier E. Chamel, Florida Agricultural and Mechanical University

Tackling a prefab design-build project within an educational or professional setting brings a number of challenges to both aspiring architects and professional designers. As opposed to a conventional project delivery method where design and construction are typically thought as distinct phases, prefabrication requires designers to take into account construction methods throughout the design process. In this case construction cannot be limited to the somewhat prescribed response to a specific design as manufacturing processes inform design decisions from the early phases of a project.

In this context designing and building a small prefabricated structure can provide students with an opportunity to truly integrate construction techniques and assembly methods at all phases of the design process.

The project presented here was undertaken in a Material & Methods course with third-year students. This assignment was conceived as a practical introduction to construction documents, creative detailing and project scheduling. The overall goal was to empower students to plan an entire construction process and understand the importance of construction as a means to inform design.

The project itself consisted in a small, energy efficient off-grid office/studio which could typically be sited adjacent to an existing house and function as a net-zero energy addition. The prefab structure has an overall 8'x16' footprint including an 8'x8' enclosed office/studio adjacent to an 8'x8' covered patio. The prefabricated panels are 4'x8' and composed of a rigid wood frame with applied sheathing, rigid insulation and exterior paneling. Both the studio space and patio are covered by a shed roof which receives Photovoltaic panels. The solar system set up with net-zero metering provides electricity to power all lights and office equipment. Lighting and electrical systems are integrated in specific wall panels so they can be connected to the solar array as the structure is assembled. Overall interior strategies include built-in shelving, storage and foldable work surfaces. A variety of opening types brings natural light, provides views and allows for natural ventilation.

In terms of process, a team of students created a detailed set of construction documents describing the various building components along with their methods of assembly while another team was responsible for building and assembling the structure. This approach was chosen to test the efficiency and clarity of the drawings created by the design team.

As a prefabricated off-grid prototype this project presented students with an opportunity to truly understand all building components and systems as they had to plan every step of the prefabrication process in the shop prior to assembly on site. This notion of integrating the construction and assembly processes within the design phase is a key concept for students to grasp and a necessary requirement for any successful architectural project
In addition to being valuable in terms of process within academia, prefabrication has become an increasing contender in the construction industry as it successfully addresses issues of safety, quality control and sustainability to name a few.

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BUILT WORKS 2

PLAY PERCH: A CASE STUDY OF DESIGN BUILD IN THE CURRICULUM

Larry Bowne, Syracuse University
Sinead Mac Namara, Syracuse University

This paper describes, analyzes and assesses a student-initiated design build project: a classroom and outdoor learning environment for a preschool that provides an inclusive education to children with traditional and special needs. Play Perch, an award-winning 250-sf building, was realized outside the normative studio sequence by a collaborative team of students and volunteers from architecture, engineering, industrial design, and sculpture.

The authors, a structural engineer and licensed architect who served as faculty advisors on the project, assert that community-service design build has a long and storied history in architecture education and presents an opportunity to ignite debate about design both outside and inside the profession. Who is entitled to good design? Do children need good design? Does design for the physically disabled only need to meet minimum legal standards? What does design for those with non-physical challenges look like? How does the architecture profession protect its professional boundaries while also educating its consumer about the value of design?

Small-scale structures such as the one described in this study are an arena in which the architect has ceded much ground to the contractor, the interior designer, and the HGTV aficionado. This paper presents a design build project undertaken at a prominent university in the Northeast as a student-faculty collaboration structured as an independent study course. The project started out as a $4000 tree-house on the existing nature trail of a school internationally renowned for a curriculum that integrates education for students with a range of abilities and challenges, both physical and mental. Over the course of a single academic year, the project grew to a $40,000 multi-phase installation incorporating landscape, architectural and interior design.

The project represented an opportunity for our students to think about the issues outlined above and present their own response. The teaching, evaluation and assessment of this course and project represents an opportunity for educators to think about the role of both design build and service learning in architecture education and to draw conclusions about how best to deploy both to maximum effect. The nature of the project and the expertise of the faculty in question were such that the project also required comprehensive resolution of technology and structure in the design process, and as such can be further seen as an experiment in the integration of building technology and structures into the design pedagogy.

This paper presents a description of the collaborative course that was developed between the students and faculty to capitalize on the opportunity that was presented. The design process, the budgeting sequence and the curricular implications (given the success of the project and the student demand for future collaborations) are also presented.

BEGINNING FROM THE END: DECONSTRUCTING CONTEXT IN THE DESIGN/BUILD STUDIO

Lancelot Coar, University of Manitoba

In his talk entitled "The Solitude of Buildings", Rafael Moneo stated that the true value of architecture can only be revealed when the "protection of architects and critics" are gone, and the building resides alone within the site and situation in which it is built. In this talk, Moneo raises a real concern that without a view towards the life a building might live within a particular context, architecture and the students of it are in danger of producing objects rather than participants accountable to the place and situation in which they are built.

Design/build studios have over the past half-century emerged, almost viscerally, in response to this question of how what we teach can be accountable and actively engaged with the world. These unique and very real situations are immersed within a context of vulnerability, unpredictability and accountability unlike almost any traditional studio setting.

Since the middle of the 20th century the industrialized agricultural movement swept across the mid-west region of North America causing many farming communities to shrink in response to the race to farm more land with less people using larger equipment. This shift has left countless abandoned century-old buildings behind in its wake peppering the industrial agricultural landscape. These buildings, although abandoned, are host to immense resources of old-growth lumber hidden behind their weathered appearance.

In 2007 the author began an unbuild/design/build architecture studio in collaboration with a farming community of sixty-eight people located in the central Canadian prairies. These studios have tested how deconstruction can stand in radical opposition to the entropic path of our singular purpose building designs. By beginning from the perceived "end" of the life of a building, these studios have reimagined a building's life cycle and introduced students to the meaning of construction through an initial act of disassembly. By working closely with the community members, the living-memories of these structures are revived through the unique histories that are shared and transform the meaning of this material within the new design/build projects the students produce for them.
Over the past seven years this studio has resulted in the deconstruction of five century-old buildings, and the creation of eight new structures using locally reclaimed material to serve this community, once again, yet in a new way.

This paper will critically review the lessons learned so far, reframing how the author has come to appreciate the role of the design studio as not only an effectual teaching model, but also as a potential agent of social and economic change within a community. By working over a number of years this project has offered the author a new understanding of what important issues can only be revealed through a sustained commitment to a single place and people. Over time, this studio has used it's own work to see first-hand how the past intentions of previous projects have stood defenseless to the unintended results of their ultimate use as well as the unexpected impacts they've had within the culture of the community.

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PEDAGOGY 1

(RE)DEFINING THE DASH: DESIGN-BUILD PERCEPTION AND PEDAGOGY

Daniel Butko, University of Oklahoma
Haven Hardage, University of Oklahoma

> "Artists, let us at last break down the walls erected by our deforming academic training between the 'arts' and all of us become builders again! Let us together will, think out, create the new idea of architecture."
> - Walter Gropius

Aside from Mr. Gropius's stance, current design-build projects often stir opinions and subsequently shake the trees of traditional teaching and academic policies, but two fundamental questions concerning the project type are critical elements.

1. Are design-build projects always a linear process: a beginning to an end?
2. How can design-build projects be the culmination of collaboration among students and professors, combining teaching and learning?

Subsequent to the perceived process, educators continually redefine the dash between the two words. Process fits within the pedagogy of designing and building not merely analogous to that found on a tombstone. Designing and building is the active sense of doing where both entities influence and navigate the other. The project type allows for real-time designing to occur while physically building a full-scale prototype.

Design-build learning environments offer a means to engage today's design students outside typical small-scale representations into development of full-scale inhabitable space(s). Varied in scale and disposition, opportunities focus upon deliberate and expressive inhabitable deliverables where design concepts address materials, function, and scale. The reliance between design and construction phases establishes the foundation of what can be defined as the architectural terminology "creating-making."

Aside from only faculty instruction, opportunities allow vertical learning among students of various years levels and majors to facilitate learning. Students directly involved with the projects (enrolled or volunteer) and employed in the College's model and production shop share their responsibilities as both instructor and mentor to begin and enhance their journey of combining creating and making. The overlapping of knowledge and approach allows students to see potential and discover how crafting materials from overall dimensions to connection details defines architecture as dependent articulation. The connections are both physical and pedagogical – they are learning process and iterations of creating and making to mentally and physically understand how ideas manifest into physical constructs.

In the spirit of creating and making, architecture curriculums explore integration across thinking, developing, crafting, and physical building. The union of creating and making begins when students possess curiosity for bridging between stereotypical designers and constructors, thus recognizing the two aspects of creating are intrinsically linked. Opportunities defined traditionally as design-build projects may be more aptly labeled build-design projects, where the activity of building is the learning component. The project type is a method of real-time sketching. This paper explores the pedagogy of varied design-build engagements and how both faculty and students have advanced the design process and level of design comprehension leading to future cumulative advancement. Various project scales, year level interaction, student mentoring, and timeframes are explored ranging from 3 week course assignments in 2nd year studios, to dedicated elective short-term vertical studios, to extracurricular service learning projects, to a long term research and community based built comparison of traditional and alternative construction types.

MAKING DO, IGNORANCE AND EMANCIPATION IN THE DESIGN STUDIO

Philip Tidwell, Aalto University

The German author, physician, psychologist, acoustician, philosopher and general polymath Hermann von Helmholtz described his research in terms that many architects would probably find familiar.

'... success in solving these problems was attained only by way of increasing generalization of favorable instances, by a series of happy conjectures after numerous failures. I was like a mountaineer who, not knowing his path, must climb slowly and laboriously, is forced to turn back frequently because his way is blocked but discovers, sometimes by deliberation and often by accident, new passages which lead him onward for a distance. Finally, when he reaches his goal, he finds to his embarrassment a royal road which would have permitted him easy access by vehicle if he had been clever enough to find the proper start. In my publications, of course, I did not tell the reader of my erratic course but described for him only the wagon road by which he may now reach the summit without labor.'

Beginning with our professional training and continuing in our practice as architects, architects tend to present design solutions as the product of a more or less cogent process leading to a more or less satisfying result. With reworked drawings, final photography and retrospective analysis, we aim to describe our productions in terms that are clear and comprehensible to a broad audience. This is an altogether reasonable ambition. Few clients, colleagues and collaborators could be expected to understand or to appreciate the exploratory walk in the dark that is design research. But as educators concerned primarily with the development and growth of aspiring architects, we have an obligation to consider the circuitous path that Helmholtz describes, as well as the labor that it entails.

The requisite stumbles, bumps and pitfalls along the mountaineer's path contrast markedly with the wagon road not only because they require strenuous labor, but also because they engender a particular mode of thinking. When the relative correctness of a route is unclear, and most efficient trajectory is not evident, a tactical mode of thinking is of greater value than one based on instruction. Whether on a mountain path or on the bumpy road of architectural production, one's ability to distinguish between relative difficulty and expediency is less a matter of recognizing signals than one of self-motivated analysis and critical comparison.

Building on Helmholtz's metaphor of exploration and using the framework set forth by the French philosopher Jacques Rancière in his treatise on pedagogy, The Ignorant Schoolmaster, this paper will seek to explore the terms and methods of the wandering journey toward knowledge in particular reference to the architectural design-build studio. Using Rancière's terms of ignorance and emancipation I argue for the importance of tactical thinking as a opposed to professional competency and seek to explore what these terms might suggest for instruction in design-build projects.

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PEDAGOGY 1

PAYDIRT

Samantha Krukowski, Iowa State University

> "He who works with his hands is a laborer.
> He who works with his hands and his head is a craftsman.
> He who works with his hands and his head and his heart is an artist."
>
> - St. Francis of Assisi

Playing in the dirt is important. Really. Because the willingness to "get one's hands dirty" (a deliciously loaded idiom) is a required component of any design process, and the value of doing so is a central premise of the pedagogy of designlbuild.

Dirty hands are complex socioeconomic symbols, for they simultaneously belong to the image of the brute, unsophisticated laborer and to that of the ethical soul made honest through physical work. They are evidence of activity, of being busy, while they are also interpreted as interlopers in the refined, even monastic world of the mind.

Designlbuild exists at the confluence of these ideas about how we understand and value the actions of the mind and the body in architecture. Its popularity as an educational and professional modality is surging alongside the number of hours logged by laser cutters and 3D printers, machines that have stilled some of the work of our hands but not our love of physicality or desire for material contact and understanding.

This paper is a foray into the discourse about what it means to think through our hands, how our direct involvement with the stuff of building informs how we design, and how the movements of our bodies (our work outs) shape space. It is also a meditation on the long-standing political, religious and legal narratives of judgment that continue to accompany this discourse – narratives that include references to appetite ("dig in"), disease ("wash your hands"), and ethics ("the devil finds work for idle hands").

DESIGN-BUILD: MODELS FOR EXPANDED IMPACT

Liane A. Hancock, Louisiana Tech University

Across the United States, design-build studios broadly adopt the pedagogy of a single project for a single client, designed and built by student labor. These projects are accomplished through a mix of traditional and digital construction methods, and often result in meaningful personal experiences, and increased visibility in the community for the architecture school. However, with so few projects, design-build studios have limited impact on the built environment. Nor do these projects often interrogate the basic relationship between design and building in academia. How might one look at different pedagogies that embrace more wide ranging implications for design-build? Is there a way to rethink design-build so that it probes the relationship of architecture design and construction? This paper presents several models currently used in critical practice that could be adapted to academic design-build studios to create broader impact within the built environment.

The first model investigates product design. A prototype could be designed by students, manufactured in a factory and installed by a client. By using this model, many of the same projects could be built concurrently, impacting a larger client base. In particular this model would be relevant for emergency housing, and precedents include Kengo Kuma's Water Block House and Ikea's refugee shelter.

The second model teams universities with manufacturers and fabricators. Students would work with a manufacturer's product line to envision new applications, or to develop altogether new product lines. Zahner currently works in this way with individual architects such as Thom Mayne and Herzog & DeMeuron. Zahner collaborated with Virginia Tech University in a similar way for the 2009 solar decathlon house, and Rigidized Metals, another metal manufacturer, has teamed with University of Buffalo to consider new uses for its products.

The last pedagogical model incorporates the problem solving capability of skilled tradesmen with the design ability of students. This model encourages skilled workers to be the students' hands as they design details and assemblies. By engaging in this methodology, students could complete projects which are larger in scale and more complex in design. Students could work with local contractors, or nationally recognized sub-contractors who have experience with world class architects. This would bring the design build model that exists in the field into the classroom.

Engaging in a product design model, re-envisioning manufacturers' product lines, and enlisting the problem solving capability of skilled tradesmen all provide opportunities to create a new vision for design-build studios. In addition to forging long-lasting relationships between students and the community, the models presented in this paper could build relationships between the design profession, manufacturers, and the building trade; in turn, these methods could fundamentally change the built environment at a scale unimagined by current design-build studios.

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PEDAGOGY 2

ADD/REACT: AN EXERCISE IN PRAGMATIC BRICOLAGE

Matthew Scott Hall, Auburn University

There are countless scenarios in which an architect must face unexpected problems. The designer acts as a collector; in constant process of an inventory of possibility, and within the given limits of culture, regulation, economy, client need and concept, they find ways to make do. When Claude Levi-Strauss makes a distinction between the definitive world/mind of the engineer, and the untamed "savage mind," he could very well be describing the dilemma of the young designer, which struggles to balance the quantitative with the qualitative. A recent assignment in an undergraduate materials and methods course deals with these issues in the form of design-build exercises that are not aimed at completing a project in context, but at setting up the circumstances for unpredictability and problem solving. The objective is to engage students with the conflict between individual desire for aesthetics and composition, and simply getting the job done.

"The bricoleur uses what is at hand because that is all that he has. His materials bear no relation to his task because they are themselves the result of previous constructions" Irénée Scalbert, Candide Journal for Architectural Knowledge No. 4, 07/2011

The Add/React exercise is a series of assignments setting up a scenario of "previous constructions" without revealing the next steps encouraging acts of bricolage. The task involves constructing an existing design from provided diagrams and basic performance specifications for a 1:1 installation that receives an addition each week. The specifications allow maneuver room (and demand) for variation and experimentation. Very little is given other than the basic dimensions and tolerances resulting in experimentation with the myriad ways to complete the task. Students are encouraged to do whatever is necessary to solve the problem within the parameters. This is not a project about concept, or even technique. It is a directed study in thinking on one's feet and learning to react to unpredictable circumstances. It is also a vehicle to explore standardized materials, fasteners, common tools and connection methods as a design-build primer. Just as we design virtual buildings before the actual, we must also train students to practice with details before they are asked to construct useable prototypes in context.

The design studio is a place of practice. Students engage in exercises involving potential programs and develop possible architecture all in the hopes that such training will benefit them when the time comes to apply their knowledge. While one could argue that the typical curriculum at an accredited architecture school covers too much, with an increase in the popularity and demand for design build related education it begs the question of whether design education's purpose is to train students to design, to make, or some hybrid of the two. This project proposes a process of directed bricolage as a way to bridge the gap. While an architect and tradesman have their distinct roles, understanding the toil of the worker and the capability of tool and material are no doubt of considerable value to a young student.

DESIGN-BUILD - BEYOND THE BUILD

Ilona Hay

Tools are down, the dust has settled, and congratulations have been given. Objects in their new 'homes'… are now abandoned. What now?

As part of coursework, our undergraduate architecture students built small-scale community projects for real clients. Clients included: an art commissioning body for hospitals, local allotments, and the university. Projects included: seating, a market stall, a catering cart, a privacy screen, and planters. Student teams managed small budgets provided by clients, purchased materials, and built what they designed. Projects were eco- and budget friendly, as they made much use of local and re-claimed materials.

The research question explored in this proposal is how can this work move beyond the 'one-off'? This paper reviews Design-Build projects as a social process in a place, and a material manifestation of culture. Projects start as an intense period of designing, collaborating, and making, but the question is: what happens when the work is complete, delivered to the client and the makers walk away? Longer relationships with commissioning client groups are possible, and there is a continuing pedagogic link and legacy with the next year of students.

This abstract is for a collaborative study that has come out of an initial client relationship: between a practicing architect and lecturer, and a specialist completing a Master's in Social Sculpture. The former runs architecture courses with Design-Build, and the latter is client to student projects and is also a professional who project manages art commissions.

To clarify the potential for continuity beyond completion of an object, this paper will review a) the design process, b) the material/building implications, and c) the pedagogical element. To expand on these points:

The design process for Design-Build is similar to that of craft, as observed by Adamson (2007, p.4), 'It is a way of doing things, not a classification of objects, institutions, or people.' Context is an important element of the work and informs what is produced. The reflective dialogue within group collaboration is perhaps the most important outcome but this is hard to teach, it needs to be experienced. It is a 'lived experience', a phenomenological approach.

Following a material culture approach, the object itself can be a source for study. Drawing upon the research of Maudlin and Vellinga (2014, p.1) one can "…[examine] the lives of buildings after 'completion', not as examples of decay through use, but as [an] ongoing and formative process of consumption." Not only the material and construction can be studied, but the subsequent use.

How can students learn through reflecting on practice? There are at least three areas of focus possible, linked to both process and material: i) what students learn as they build, ii) what they learn upon reviewing objects, and iii) what others can learn from the objects –even if not involved in the original making.

Intersection between architecture and social sculpture (and architecture, project management, and university) is the viewpoint through which the above topics are explored. Through this cross-disciplinary collaboration the educational potential of Design-Build is explored, beyond the build.

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PEDAGOGY 2

HARDWIRING WORKING HANDS: LEARNING TO BUILD

Daniel Nevin Harding, Clemson University

Process is more important than outcome. When the outcome drives the process we will only ever go to where we've already been. If process drives outcome we may not know where we're going, but we will know we want to be there.
-- Bruce Mau, Incomplete Manifesto for Growth, 1994

To those immersed in a hands-on design+build curriculum and pedagogy in higher education, concrete realization demonstrates clear benefits. Likewise, the opportunities of simulating practice through design and construction, often coupled with multi-disciplinary and collaborative activities, buoys the outcomes even further. However, all too often the product is the focus of the studio, its management, and the agenda of the faculty, student teams, and/or the projects' recipients. Unfortunately this leads many to assume that the built deliverable outweighs the act and art of making and, in the case for higher education, learning and scholarship is questioned; as is its place as a curriculum requirement in many accredited graduate and undergraduate programs. Yet adhering to the belief that process may be more important than the final product, design+build endeavors can be crafted to ensure a quality educational experience, asserting that neuroscience influence and positive psychology can impact the learning process though active and participatory measures.

There is no architecture without event, no architecture without action, without activities… -- Bernard Tsumi, Architecture and Disjunction, 1996

Tschumi professes there can be no architecture without action and event. To this end, the making of architecture is an action and an activity that is mandatory for its existence. Undoubtedly Vitruvius would support the importance of actively pursing architecture endeavors that blur the boundaries of practice and theory. Molecular biologist John Medina maintains in his book Brain Rules that the development of our mammalian brain has been made possible by our ability as a species to survive while working creatively as a collective group, eventually developing the inherent and intuitive appreciation for cognitive and non-cognitive skills and the differentiating ability to conceptualize, socialize, learn from active experiences, and collaborate to achieve a common goal.

I hear and I forget. I see and I remember. I do and I understand. -- Confucius

Uniquely this paper will chronicle the benefits of design+build studios through an assertion that hands-on full-scale acts of collaborative making and craft should be mandatory in schools of architecture. In addition to supporting threads of parallel research, basic neuroscience principles will serve, as a foundation to examine how design+build praxis and pedagogy can be developed to capitalize on our brains natural ability to learn in a more proactive and action-oriented manner. Likewise, it will delve into constructive education philosophies and teaching methodologies by which project case studies embrace and test varied approaches ranging from early childhood education, such as the work of Loris Malaguzzi with the Reggio Emilia Approach to early child education, John Dewey's influence on higher education through his thoughts associated with Experimental Education, and Ernest Boyer's assertions on scholarship, teaching, service, and fundamental reform.

ITERATION IN THE PUBLIC REALM

Bradford Watson, Montana State University

Iteration is a fundamental part of the design process, both in the academic studio and in the professional office. It is through iterative investigation within the design process, founded in research, that students develop the skill set to be critical designers, poised to make a valuable contribution to the built environment. Typically this process is limited to speculative work, ie. work that only exists in scale representations of reality, where there is a level of complexity and resolve that cannot be obtained. Design Build courses within the academy seek to provide students a deeper understanding of the implications of their design representations in a tangible manifestation. Students understand the complexities of connections, physical limitations and the true spatial qualities of their design. They learn how to work with a client, mitigate budget and code issues, and understand the value of scheduling a team's efforts towards a common goal. Ultimately, students are able to observe and learn for future design projects based on feedback from the end users on the final product. However, this process tends to rely on iteration within the confines of the studio environment, waiting until the work is built to offer an engagement with the community around the actual design and not representations. This paper proposes a pedagogical methodology for design build courses to engage the public throughout the design process, integral to the iterative development of the built environment.

Similar to many design build studios, students within these courses are engaged in working with non-profit organizations that rely on community support, be they outreach programs, educational institutions or governmental agencies. Within this context, teams of students conduct site analysis and user group meetings to understand the desires, limitations and opportunities for each site. Once this criteria is established, students begin real time prototyping within the public realm to test their theories. Sketches of proposed tactics are constructed using easily manipulated materials like cardboard, plywood, dirt and existing furniture. This method allows for manipulation and alteration while working with the public, removing the lag created by working within the studio to refine ideas. Additionally, it creates opportunities for engagement and ownership of the work by the community during its development, in hopes of establishing greater care and sustained value by the public of the student's final installation.

Through previous, current and planned courses, this paper will document and examine design iteration in the public realm and how real time feedback can be adopted into the design process. It will also discuss projective futures for the course and student's learning outcomes. Finally, it will outline the pedagogical and studio culture influence a vertically integrated course (composed of students from multiple years of study in both undergraduate and graduate studies), actively evidencing the value of an architectural education in the public realm, can have on the community and the academy.

PUBLIC INTEREST DESIGN 1

ARCHITECTURE AS A SOCIAL PROCESS: EVIDENCES FROM DESIGN-BUILD STUDIOS IN SOUTHERN MEXICO.

Alessandra Basile, Archintorno
Roberta Nicchia, Archintorno
Andrea Tulisi, Archintorno

This contribution focuses on a relevant aspect of the design-build studio format when applied to international cooperation programs, that is the complex social process by which distant worlds are put into relation, communicate and cooperate in order to reach a shared objective, creating a virtuous cultural and technological exchange.

Within this paper, three projects will be presented, in which university students are directly involved in designing and building architectures that support self-help development programs proposed by indigenous communities and local NGOs of the Oaxaca State, Mexico. The construction of these buildings aims at activating self-help development processes, that would allow to overcome poverty and marginalization through the enhancement of local natural, human and technological resources.

The here presented DesignBuild Studios focus on the complex participatory process that involves principally European students and Mexican communities. This cooperation starts with a visit in the communities, where all elements useful for the project's development are collected, and a first exchange of expectations, ideas and arrangements takes place. The latter continues during the architecture design and with the choice by the community of one project among different proposals. After that, during the construction step, technical exchange among the participants is pursued; the attempt is to valorize local building materials, knowledge and expertise - and through this to strengthen the community's self-esteem -, and to practically suggest possible improvements in these fields. Moreover, an important goal is the cultural exchange, which emerges spontaneously thanks to the experience of living and working together for some months. This aspect has been further improved in the last project through an household survey lead by the students with the families of the host village, in order to understand local lifestyles and housing cultures.

At the end of each project, it was possible to notice that one important result of the above summarized participatory process is the creation of a broad network of cooperation and solidarity on our territory and abroad, that involve different actors: public, private and the various expressions of the civil society. Moreover, the here presented projects are inspired by the European DesignBuild Knowledge Network, a network of universities and non-profit organizations that aims at stimulating the DesignBuild Studio format also within international cooperation programs.

BY DEMONSTRATION: CATALYZING CHANGE

John E. Folan, Carnegie Mellon University

BY DEMONSTRATION reflectively and projectively explores the work of a Design-Build Studio in suggesting a re-emergent urban environment. It is an alternative form of urban environment; one that originates at the edge - in the marginalized and underutilized sectors of the city. It is predicated on immediate action through the implementation of built interventions developed through participatory design processes with community stakeholders and residents. The programs for these interventions are tangibly relevant to needs of local residents and are entirely representative of their empowerment in achieving implementation. The re-emergent urban environment established through these interventions is not characterized by a singular plan, image, or vision; but by aggregation over time - an agglomeration of catalytic projects. The agglomeration is not subversive or dystopic – it is predicated on the reorientation of once viable landscapes and structures; emerging from collaborative, transparent process - demonstrative of public interest.

The work of the design build studio utilized to illustrate the potential of public interest design is firmly tied to its own context - the social and economic conditions of western Pennsylvania (USA). While explicitly specific to regional context, design and implementation processes are strategy based, suggesting broader relevance. This paper utilizes an interactive installation that was built by the design-build entity to communicate the potency that catalytic projects can have over time. Sequential projections and film utilized to communicate with audiences are utilized to illustrate how design-build processes, modest design-build projects, and participatory design can be of great significance. The paper covers eight completed projects in brief and objectively illustrates their successes and failures in suggesting a re-emergent urban environment. Data collected from the projects is utilized to suggest what impact a similar form of work, generated over the next fifty years might have in catalyzing a more positive urban future. In each case, the location and scale of a catalytic demonstration project is presented. Second, the immediate spheres of influence that the project has had are identified. Data regarding challenges addressed and constituencies engaged, both public and private, through participatory process to facilitate the implementation of the projects is provided as a mechanism for demonstrating the practical underpinnings of this theoretical projection – a projection which threads the links between: 1) URBAN ANALYSIS, 2) Analytical Research, 3) Urban Design Framework Development, 4) Opportunity Identification, 5) Objective Identification, 6) Stakeholder Identification, 7) Program Development, 8) Constituent Engagement, 9) Project Funding, 10) Project Design, 11) Multi-Scale Systems Development, 12) Construction, 13) Monitoring and Post Occupancy Evaluation, 14) Replication, and 15) policy change.

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PUBLIC INTEREST DESIGN 1

DESIGN-BUILD AS SOCIAL DESIGN INSTIGATION

Kevin J. Singh, Louisiana Tech University

Public Interest Design (formerly known as Community Design) pedagogy in schools continues to expand exponentially in both courses and school affiliated design centers (i.e. Sharon Haar's map "Community Design Centers and Community Based Architecture Organizations in the US" hosted on the Association for Community Design's website). The work of these faculty and students is not simply proposals of potential projects for deserving communities or design work that is later built by a contractor. An increasing portion of this work is being built by students as small-scale design-build projects as an incipient instigation to impact the social landscape within a community. These initial projects can stimulate larger projects and are a key component to building trust and relationships within communities.

The proposed paper will site recent publications and reference current Public Interest Design (PID) school affiliated work that designs and builds their projects (or a portion of a project) and seeks to enact social change. The paper will focus on the participatory nature of the work with community members which provides an opportunity for the public to provide design feedback and potential hands-on building experience. The outcomes of these projects from the perspective of the clients will be highlighted as well as how the project has made a social impact in the community.

The paper will summarize and disseminate the following:

- Best practices of how PID Design-Build can best serve the social issues within communities (both processes and praxis).
- Participatory involvement. How do schools engage the public in the design and building process?
- Community Buy-in. What is the best way to gain community-wide support for projects?
- Projects. How are projects initiated? How do projects begin?
- Process. (Researching, Planning, Designing, Building, Post Occupancy Evaluation)
- Future. What is next for the social design instigation of PID Design-Build? Where do we go from here?

BUILT WORKS 3

1 : 1 | LESSONS FROM THE CONSTRUCTION SITE

Patrick Doan, Virginia Tech

The growing interest and willingness of architecture schools to engage and invest in design/build programs as a viable and significant component to their curriculum speaks to a growing trend that is challenging and seeking out alternative paths to the traditional studio-based culture. Convincing arguments can be made that articulate and support the development of design/build programs; most specifically the 'real world' experience students are exposed to that foster a direct hands-on engagement with the complex social, professional, and constructive conditions at play within the architectural profession. Yet, due to the demands and intricacies that surround the physical realization of any building endeavor, design/build programs can at times be overwhelming in their scope, scale, and intent. Seeking out and sustaining financial support and investment, securing clients, addressing building codes / regulations, deadlines, construction site safety / management, building skills, construction types, and faculty / curriculum demands are real issues that can strain and challenge the development of a program. This proposal seeks to illuminate the value of a different approach to design/build that does not have the constraints and pressures that are a part of the more traditionally based design/build programs.

With these thoughts in mind, a design/build project was initiated within our school called the 'cube'. This student-led design/build project stands 13'8" x 13'8" x 13'8", encloses a 96 sq. ft. room, and is composed of three cast-in-place concrete walls. The cube evolved over a period of 4 years, involved over 30 students, 3 faculty members, and culminated as a student's master's thesis. The intent was not so much about the completion of a 'project' as it was to provide a place and opportunity for the students to be immersed into the constructive nature of architecture. The work was structured and developed with an understanding that it was an ongoing effort to be passed on to other students and faculty to continue. The construction site became a place of inhabitation where the students were allowed time and the opportunity for failure. Time and failure are arguably essential aspects to the education of an architect, yet often they are not feasible within the traditional design/build model of client and deadline-based construction.

Being both an observer and one of the faculty instigators to the cube project, the following questions are offered as a way to both reflect on the lessons learned from the cube and to speculate on the larger role a design/build effort of this nature plays in the education of the architect.

- What 'place' does the 'construction site' have in the education of the architect?
- What can the 'construction site' teach both the student and teacher about architecture's constructive nature?
- How are failure and time measured, engaged, and embraced within a design/build project?

CONSTRUCTION AND THERAPY AND INTEGRATED APPROACH TO DESIGN BUILD

Peter Russell, University At Buffalo, SUNY
Sergio Porta, University of Strathclyde

This paper documents a semester long project; Construction and Therapy (C&T). C&T is a concept that merges design and construction with community engagement while taking advantage of the therapeutic nature of the shared experience of making one's place in the world. C&T is based on the concept that direct construction can be a therapeutic experience at more than one level. While a number of cases of construction have been developed in the past by charities or NGOs targeting particular communities (for example war veterans) on a case-by-case basis, and the connection between shared experience of "making" in general and psychotherapy has been largely explored in counseling, putting together the two angles into one single practice-based scientifically-grounded model has never been attempted and can open an entirely new area of research.

This integrated model of community-based construction hopes to include a new generation of professional architects as "master-builders", assembling responsibilities that are currently spread among several different players in the conventional process of housing production, leading to a new way of producing the built environment.

The process's first major success was the completion of a small design build project over three weeks one year ago. The process involved using a pattern language rather than a design brief, and was built at full-scale using the design methods of Christopher Alexander.

As the initial small project took place in the city center of Glasgow Scotland, it was subject to robust health and safety and building requirements, offering a glimpse of the challenges of moving design build from rural to urban environments.

In addition to documenting the design build efforts and the pedagogical and research background of C&T, the research goes on to address, in the context of our ongoing efforts to establish an International Center of Construction and Therapy, how the capacity of design build education can be used through the vehicle of service learning to have maximum impact on the communities we serve, as well as the students that take part.

The results of our initial project have shown success in building with a non-traditional process, success in engaging architecture students across disciplines of business, mental health, and design, and success in the integration of design build education with accreditation criteria. However we have also seen many challenges in fundraising, and project delivery.

The paper will conclude underscoring the difficulties in design build education as Live Projects. Meaning the interaction with communities and charities and the additional coordination that is required by schools and departments of architecture for the projects to be successful.

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BUILT WORKS 3

KNOWN UNKNOWNS AND UNKOWN KNOWNS: SORTING OUT WHEN AND WHAT TO BUILD

John E. Folan, Carnegie Mellon University

University affiliated Design Build Studios are focused on making, but if the sole benefit of that enterprise is students experience without benefit in the Public Interest, it can be argued that the making is for its own sake. Because of the vast intellectual resources that research based institutions can offer, the value proposition of the design-build studio is that it will afford an opportunity to offer something to the public that might otherwise not be feasible. Feasibility through traditional project delivery can be compromised because of economic parameters, socio-political condition, and public will. When these forces inhibit market-based interventions in the built environment, what are the mechanisms that should be employed by university affiliated Design Build entities to ensure that work is not being built for its own sake? When is it appropriate to build, and what is appropriate to build? There are a number of factors that need to be considered and a number mechanisms for establishing the relevance of a project to a community. It is a matter of understanding what is Known, and what is Unknown – it is also a matter of communicating to learn what is Known by others in the constituent pools that positively influence the most potent Design Build Propositions – those are often Unkown Knowns.

This paper presents a case study that covers a three year process in working with a challenged community in Pittsburgh, PA. The case study illustrates how the RE_IMAGINE LESLIE project, which proposed a large-scale urban design and infrastructure solution for de-commissioned municipal amenities, ultimately resulted in the realization of a small-scale, mobile, proof of concept project, the PURIFLUME. The case study identifies consistent challenges that exist in the delivery of public interest design build projects such as 1) land control, 2) operations and maintenance, 3) appropriate technological risk, and 4) participant capacity. The case study illustrates how resident base selection of priority on Flexibility, Sustainability, and Connectivity in the development of the urban design strategy ultimately resulted in a decision NOT TO BUILD until more was KNOWN -

The case study illustrates how the proof of concept project emerged from this realization to addresses critical regional water management issues. It outlines the integrated efforts of 11 Undergraduate Bachelor of Architecture students, 4 Masters of Urban Design (MUD) Students, and 3 Architecture Engineering and Construction Management (AECM) students over the duration of three years in a variety of vertically integrated studios and support courses oriented towards different aspects of the project delivery. Funded by grants from two corporations, a county economic development agency, and a foundation, the scope of work spans the territories of Urban Analysis, Urban Design, Rapid Prototyping and Digital Fabrication. Constituent groups impacting the development of the project include residents of the Lawrenceville Neighborhood in Pittsburgh, PA, Municipal Government Leaders, a County Regulatory Agency, multiple non-profit agencies, and a federal environmental agency. Illustrating a decrease in constructive scale and escalation of influence in impacting regional decision-making and policy.

SOCIAL PROTOTYPING

Daniel M. Baerlecken, Georgia Institute of Technology

This paper focuses on the pedagogical outcomes of a design build project in South Africa, that is part of a program, where students from four international universities design and build a theater with 200 seats as an extension to an existing Arts and Culture Center in collaboration with a local architect and under direction of the local community. The paper will present the framework of this collective approach and show how the different stakeholders and users are included in the design and construction process of the theater. Three different areas of impact will be foregrounded in the discussion:

1. Design through making:
From Robert Evans we know that architects usually do not work with objects themselves, but work on representations that instruct the making of the building. In this Albertian paradigm the designer becomes the intellectual author of objects that he does not make (Carpo, 2010). This disconnect is somewhat reversed within the framework of the program: students design and fabricate simultaneously and iteratively. Material explorations through physical making – instead of drawing - are foregrounded at every stage of the project. During the construction phase students and unskilled members of the community explore different construction materials - with a special focus on re-used materials.

2. Making as prototypical construction:
Students investigate combinations of re-used or recycled waste materials with traditional earth construction methods as a key element of neo-vernacular low cost construction methods. Cape Town, with its big harbor, opens the opportunity to re-use locally found shipping containers. Single shipping containers are used everywhere in the townships to provide safe and inexpensive shelters. Unfortunately containers perform very poorly climatically. The project rethinks container architecture as a sustainable prototype, which could lead to new typologies for the private sector in South Africa. In order to improve the interior climate, a paneling system using on site prefabricated straw and clay modules was developed as the thermal skin of the theater. Different recycled materials for the envelope will be explored.

3. Prototypical construction as social practice:
Students, instructors and external helpers learn to develop a strong awareness of the built and social environment in another culture and the adequateness of applied construction methods. The existing center attracts a lot of local children, adolescents and artists as well as international tourists. The new theater facilitates productions of local theater companies, concerts, church services, marriages and festivals and aims to provide a stimulating environment for the community. Next to the direct use of the building, the involvement of the community in the construction process allows members of the community to acquire knowledge. All local helpers explore a “vertical network”, as the building site functions as platform for meetings between CEOs, professional builders, local students, people working in creative industries and local NGOs. To understand participation and social responsibility not only related to the underprivileged group of society, but also to local academics and stakeholders, could broaden the positive impact of the project.

The paper will present, discuss and self-criticize those 3 areas.

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PEDAGOGY 3

A SPECULATIVE PRACTICE: PATTERNING PROCESSES AND PRODUCTS

Clay Odom, University of Texas at Austin

The processes of 'working out' or 'working things out' are not typically celebrated beyond the walls of the academy. The mirror condition is created by the need for professional practices primarily to engage, not in working-out but, in leveraging expertise to 'realize work'. This dialectic sets the basic tension between preconceptions about theoretical and conceptually-driven approaches and the actualities of building. However, it also creates the territory for speculative critical practice to insert itself in the breach between these conditions and where systematized approaches to design from concept through actualization. Through the lens of a specific type of speculative project, the installation, this schism between 'working (things) out' and 'realizing work' may be bridged. This paper will explore a series of temporary installation projects for sound and music performance. They were created iteratively within a speculative, spatial practice, and produced in collaboration with a sound artist, a composer, and a visual artist.

The agency for the engagement with process and product within these projects is a process we will call patterning. Fundamentally, patterning it is the conceptual framework for these projects as a diagram-driven process of selection, operational manipulation, and deployment of material and form. Extending further, it is also a critical tool that allows for the manipulation and re-assembly of conditions both within projects and in subsequent iterations. In practice for example, patterning is used within these projects to outline desired effects, select for material and optical qualities such as reflectivity, lightness, cost or durability, to test ideas of form through the interaction of material, context and performance, and to select and reconfigure the project for future iterations. This situational, materialist approach to the basic conceptual frameworks, is driven by the diagram as a way of doing and thinking about organizing and responding to different constraints. It aids in understanding how to hack into project constraints and respond to them synthetically and generatively.

The temporary interventions described, and the processes that afforded for their creation, critical engagement and iterative development are creative and generative. Within the work described here, the totality of the system includes material-technical components, the organization of these components, the installation, the generated effects, the emergent conditions, and the human experiences combined into one.

Ultimately, it is the condition between 'working out' and 'realizing work' that creates the conditions allowing for theses speculative and diagram driven-processes to be leveraged most effectively. The series of projects provide a backdrop for the exploring the development of an active, on-going engagement with design as both process and product. Using patterning to explore concepts, techniques and effiects within projects may allow us to understand the products of design processes on a generative continuum of similarity and difference. An extremely variable, parametric set of relationships that describe the potentiality of physical constructs along this continuum. As Deleuze described, …"the diagrammatic or abstract machine…constructs a real that is yet to come." Finally, it is the diagram-driven agency of patterning that allows this series of collaborative projects to be created, reconsidered, and reconfigured.

MATERIAL MISADVENTURES: LESSONS IN FAILURE

Lisa Huang, University of Florida

It should be noted that fingers are not born with brains, these develop gradually with the passage of time and with the help of what the eyes see. The help of the eyes is important, as important as what is seen through them. That is why the fingers have always excelled at uncovering what is concealed. Anything in the brain-in-our-head that appears to have an instinctive, magical, or supernatural quality—whatever that may mean—is taught to it by the small brains in our fingers. In order for the brain-in-the-head to know what stone is, the fingers have to touch it, to feel its rough surface, its weight and density, to cut themselves on it.[1]

Our first-hand experiences are instrumental in the understanding of the world around us. Learning occurs not only through visual or auditory means but also through tactile engagement. Jose Saramego's words are particularly pertinent for the building design field in that cutting oneself on stone provides critical knowledge in comprehending the parameters of working with the material. The value of working hands-on with materials and physically engaging matter must also account for the potential of stumbles along the way.

It is significant to examine the distinction between explicit and tacit knowledge in architectural design education. There is a cultural shift of thinking in our students that only focuses on successes; however, it is the failures that are more revealing in the developmental learning process. The typical studio design work that is done on paper or in the computer can easily mask potential mistakes where as those errors cannot be hidden when confronted with the physical presence of the real thing. In professional practice, the desire to experiment is often stripped away. There is too much at stake to fail with issues of budgets, schedules, life safety, and liability looming over each project. Design education is an ideal time to take risks and learn from mistakes where one cannot be penalized or held liable for naïve propositions.

Design students arguably learn more through an active experience than learning exclusively through lectures, images, and readings. This paper will examine the student outcomes and work produced in a material workshop seminar where students experimented hands-on and at full scale with building materials. What do students learn from the process of working hands-on with building materials? How does one teach what is difficult to teach? With the attention on active engagement with material studies, the intention of this paper is to investigate different modes of failure encountered to evaluate their merit in cultivating building design knowledge.

Note:
1. Jose Saramego, The Cave (New York: Houghton Mifflin Harcourt, 2002), 67.

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PEDAGOGY 3

NAAB CRITERIA MEETS DESIGN-BUILD CURRICULUM

Anthony Cricchio, University of Oklahoma

With the emphasis of National Architectural Accrediting Board (NAAB) requirements constantly ebbing and flowing between the profession and academia, architectural educators are continually revisiting curriculum to meet a standard. The perception of these educational standards is that they limit unique approaches to educate a constant changing student cohort. Attempts to generalize a typical architectural design curriculum approach seem to go against the learning traits of the current millennial generation.[1] The millennial student comes to higher education wanting more hands-on learning with less lecture based education. Project based education has been studied and found to be a useful tool to engage this generation. Traditional architectural studios have long been the stalwarts of project based education for architects, yet design-build projects within architectural education have been seen as just a hands-on platform to learn building skills. By engaging visual, auditory, and kinesthetic, learning, design-build opportunities can span a number of learning objectives within the broad based education of an architect. The question is therefore asked: Can an architectural curriculum based solely on design-build principles meet NAAB criteria while providing the new generation of students an architectural education for the future?

This paper investigates the theoretical development of a NAAB accredited program solely based on a design-build curriculum. There are both historical and current programs which train architects through the art of building, but these programs are either partly based on design-build, or they are not NAAB accredited programs. The paper will at first look at how to use best practices from current and past examples and to apply them as a foundation to a core curriculum. The second part will look at how design-build practices can be applied to non-traditional building performance criteria. This includes areas such as "Historical Traditions and Global Culture" and "Comprehensive Design."[2] The final part will look at how the curriculum could change and be adaptable to future changes in NAAB Conditions and Procedures.

With state architectural licensing boards moving away from requiring accredited degrees to obtain an architectural license, students are beginning to question the cost and need for an accredited architectural degree. By providing more diverse and interactive alternatives to the traditional studio based curriculums like design-build based curriculums, programs can promote degrees which both provide an individual outlet for students to educate and innovate, but also expand and promote the knowledge and profession of architecture.

Notes

1. For a complete description of millennial student traits see. Taylor, Mark. "Generation NeXt Comes to College:." A Collection of Papers on Self-Study and Institutional Improvement. Chicago: 2006 Higher Learning Commission Collection of Papers, 2006. 51.

2. 2009 Conditions, National Architectural Accrediting Board

THE END OF INNOCENCE

Bradley Walters, University of Florida
Mark McGlothlin, University of Florida

> "Ralph looked through him. Here at last was the imagined but never fully realized place leaping into real life. Ralph's lips parted in a delighted smile and Piggy, taking this smile to himself as a mark of recognition, laughed with pleasure."[1]

There is something beautiful and amazing about youth, especially the possibility of all things and the impossibility of nothing. In early design education, we capitalize on the willingness of our students to test themselves, to push their work beyond all reasonable expectations, and to make things that exceed both their own sense of the known and, at times, the anticipations of their faculty. It is also a moment where a certain naïveté about buildings is of great benefit: anything is possible.

For students who are unaccustomed to working at full-scale and with the materials of building, it is easy for construction to possess a certain attraction and allure of the unknown. These students arrive with a tinge of fear but also with overwhelming enthusiasm. Their eyes are opened widely and hands whetted with anticipation. As with Ralph and Piggy, there is a certain promise of all that lays before them, and the great possibility of a project to be realized by their own hands. But as portended in this passage from William Golding's Lord of the Flies, this moment can be fleeting. The process of building is one that is fraught with challenge and compromise, of coming to terms with one's own self and others, and of recognizing the limitations of the architect to exert his or her will on matter. It can be a difficult and unsettling process, one that challenges students to grow up quickly. It is also an important moment of learning, where students can be challenged to stretch without breaking, negotiating complex translations between different modes of thinking and making.

The great possibility of design-build as a part of the education of an architect lies in the careful probing of this middle moment, the act of translating, where neither the design nor construction processes are fully in charge. This paper proposes the investigation of engagements with materiality and building at a number of scales in a design and construction curriculum from first year through full-scale design-build projects at the scale of a small residence. The impetus towards realization and physicality is checked in each instance by counter tendencies that tilt towards speculation, meaning, incompleteness, and occasional perfectionism. Design-build is posited thus not as a solution or a culmination of one's studies, but rather as a fertile site of great risk and great opportunity. It can serve as a site and locus of study, one in which the student is fully engaged in a dialogue with matter and his or her peers. It is the beginning of a complex and lifelong conversation between ideas and matter, a kind of coming of age, and the end of innocence.

Note:

1. William Golding, Lord of the Flies: Casebook Edition (London: Penguin Books Ltd, 1954), 13.

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PEDAGOGY 4

DESIGN/BUILD UNPLUGGED: SEVERING THE CRUTCH OF DIGITAL AND ELECTRONIC DEVICES

Margaret McManus, Marywood University
Kate O'Connor, Marywood University

This topic explores methods of relating to our millennial students and attempting to amputate their connection with the digital realm. By assigning the project as a written description of the projected outcome and not including images, the student has no preconceived idea of what a project should look like. Students are free to deduce and conjure meaning from the words on the page. The students are given the freedom to think creatively, to create unique and original structures, and to learn while in the process of making. This pedagogy explores the process of making through specific written parameters, eliminating precedent imaging and leaving the students no other option but to proceed "unplugged."

An example project to support this is a structural assignment for the beginner design student called the "Cardboard Catwalk." The primary objective of the project is to construct a well-designed beam structure, and to analyze its material behavior, shape, and strength as it is subjected to several point loads. While the goal of the student is to complete a structurally sound beam, the goals of the instructors are quite different.

Typically, the millennial student will search for information on the computer to assist with a connection to data and images of a project. The creative title distracts a successful search, and the new curricular project does not allow the class to refer to previous assignments. A stringent list of written rules induces the creativity and ingenuity of the students. For example, some of the rules include the following:

1. Each team will be allowed to use corrugated cardboard and rope of any kind. Laminating (layering cardboard sheets with glue) is strictly prohibited. No tape or mechanical fasteners will be permitted. Pre-manufactured tubing is also prohibited.
2. The structure will be subjected to two LIVE loads of approximately 100-180lbs.
3. The catwalk must consist of three separate levels. Level One must measure 24" A.F.F. when loaded, Level Two must measure 30" A.F.F. when loaded and Level Three must measure 36" A.F.F. when loaded.

Even when considering possible fabrication methods of the project this notion of being "unplugged" was considered. The scale of the project was certainly large enough to warrant woodshop access and power tool devices, yet the materials assigned called for none of that. Instead the chosen materials of cardboard and string recalled only good, ol' fashion, hand-held devices: scissors and box cutters. The scale and choice of materials also fell out the realm of the ever-trusted, computerized, laser cutter. For this two-week assignment the students were on their own: their brain, their hands.

It is in the descriptive method of prescribing The Cardboard Catwalk assignment that induces ingenuity and allows students to be bound only by their imaginations. The students are able to express their innovative thoughts through physical manifestation, albeit, unplugged.

DESIGN-BUILD: A VEHICLE FOR SELF DISCOVERY

Jade Polizzi, The University of Colorado Boulder

As a faculty member in an interdisciplinary design program I've recently taught a handful of design-build classes. One thing I've learned during this process is that the "best" students in the program are not necessarily the best students on-site. Bringing students out of the studio environment and onto the site teaches them many things. In a design-build environment students learn: the realities of a design process, construction methods, keeping a project on budget, working for a client and how to estimate and schedule work to be completed within a realistic timeframe. But, most importantly students learn about themselves.

My research supports a conclusion that current generations are lacking hands-on skills and mastery previously learned through experiential education and independence. Many of today's young adults have grown up with a lack of freedom and expression, which manifests itself in anxiety and fear in a work-force setting. If done correctly, design-build helps foster independence, confidence, and creativity in young adults.

In design-build courses, students work together to accomplish a common goal. Problems must be solved to move forward rather than glossed over, or avoided, as is commonly the case in a typical studio environment. Giving students responsibility and a sense of ownership causes students to work harder than in a traditional studio environment.

What is most interesting is the way that personal interests are expressed in the design-build process. Some people prefer to lead a group on solving design details while others chose manual labor. Some people work better in the solitude of a wood-shop while others gravitate to high-energy group work. As instructors we see all types of students: deliberate, creative, pompous, optimistic, negative. We are faced with the age-old question of who is more productive the tortoise or the hare?

When I teach students in the field, every student is required to try their hand on as many facets of the design and construction process as possible. Everyone is required to work together to produce the end product and everyone's skills are essential. And yet, experience doesn't equal leadership. If in framing a structure, I have a student who spent the summer framing I will purposefully not chose this student as a crew leader. Instead we will gather information and techniques from this student, but her job will be minimal for this day's work.

In the end, a design-build class that is run successfully will empower students to feel that they can do things that are challenging. Design build encourages underachieving students to take leadership roles, while it teaches traditionally successful students to confront gaps in their education. Design-build is not about a final product-it is about an educational process of self-discovery.

This paper will include specifics regarding the design-build projects, the curriculum of the university supporting this process, and successful student examples. I will present on techniques to encourage leadership amongst students who don't necessary take leadership roles. I will also discuss ways that design build can confront gender inequality in the design profession.

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PEDAGOGY 4

HARVEST/DESIGN/BUILD AS A SUSTAINABLE DESIGN PEDAGOGY

Travis Bell, Portland State University

Sustainable design is generally associated with technological innovation. As a professor of architecture focused on sustainable design, I am not opposed to technology and welcome all efforts to design solutions to our current predicament. I am, however, concerned that the focus on technology masks an assumption that issues of conservation and carrying capacity will be picked up elsewhere by our students. Worse, as a species, we generally occupy places where systems of ecology are not even present to demonstrate their processes to us (i.e. the city). The allure of the technological solution is that it needn't address this lack of understanding; it needs only to offer a way around it. I believe the Design/Build pedagogy, carefully structured, can be a powerful tool in educating architecture students in the socio-ecological knowledge necessary to an authentic sustainable design education in architecture.

Many thoughtful ideas have been offered for how we might better structure higher education by centering it on the study of healthy socio-ecological systems. I am always searching for ways to better address these questions and issues with my students. These students are eager to design and build human shelters. They are enamored by what they see in popular media. They are technologically advanced and visually minded. They are artists who have been socialized to desire creation more than conservation. How to best impart the socio-ecological knowledge needed at this time to students with ingrained and passionate perspectives so at odds with such knowledge? Design/Build pedagogy offers a compelling opportunity.

Design/build courses are incredibly exciting to students and offer them a lasting and visceral experience in the art of design and the craft of building that is mutually inspiring to each. This paper will explore the possibilities of formulating design/build pedagogy to take full advantage of the already demonstrated benefits of the format, while adding a stage of natural resource education that is fundamental to any authentic understanding of issues surrounding sustainability in the built environment. This adapted pedagogy might be called Harvest/Design/Build. This paper offers a modest example of such a Harvest/Design/Build project undertaken with students during the summer of 2013. In this course, students were first tasked with developing a deeper understanding of the chosen building material – in this case bamboo. Students spent time at a local bamboo groove learning about material properties, methods of working with the material, as well as growing and harvesting techniques. After this initial workshop, students were then put to work harvesting our building material in keeping with the desired sustainable growing practices. Armed with a direct experience with the material and a deeper appreciation for the work involved in growing and harvesting, students then began a more traditional design/build process. The results were exciting and encouraging. We have continued to pursue the possibilities of the Harvest/Design/Build pedagogy in an expanded, two-term project, targeting completion in the summer of 2014. This paper explores the potential directions that a fully realized Harvest/Design/Build pedagogy might take, and the conditions necessary to achieve it.

SUSPENDING MATERIAL FLOWS: DESIGN/BUILD AS AN EMBEDDED MODE OF INQUIRY

Meredith Sattler, Louisiana State University

In order to support the discipline's increasingly urgent investigation into the realities of materially-limited futures, it is critical that design/build curricula engage issues of resource scarcity. In the fall of 2013 an upper-division elective seminar titled "[UP]cycling > [down]cycling," tested the plausibility of actualizing small-scale, temporary design/build, within a semester, and without a budget, by situating design/build within the context of material flows. Through the utilization of sustainable interventionist tactics, the seminar mapped, sourced, stock-piled, and ultimately designed, built and exhibited upcycled interventions, designed for disassembly, that were then recycled at the end of the term. In addition to the more typical embodied knowledge gained from design/build experiences, this design/build framework facilitated embedded realizations for the students including understandings of developing vs. developed world valuation of materials vs. labor, material mapping and harvesting strategies, inherent material properties/logics, and modes of assembly that facilitate ease of disassembly.

This paper details the distinct pedagogic practice and principles from which the above realizations were, in part, produced, and discusses how these deeply embedded realizations were garnered by the students. Seminar guiding principles addressed include: (1.) no utilization of adhesives or fasteners that were not native to the material, (2.) 1:1 material explorations were to occur simultaneously and continuously throughout the model-based design process, (3.) adherence to all code and safety requirements imposed by the state, the city, and the university applicable within the Student Recreational Facility within which the interventions were designed and installed, (4.) any and all Fire Marshal investigation/intervention was to be explicitly avoided, (5.) if a project took the form of seating it must support multiple individuals weighing up to 300 pounds for the entire three week exhibition duration, and finally, (6.) labor among team members must be distributed as equitably as possible.

Ultimately, the seminar proved that intervening into and suspending material flows provided a critical lens through which to explore design/build both theoretically and pragmatically. The insights gained through engaging basic analysis of material flows within urban ecosystems, conducting stakeholder guerrilla research, rehearsing the spatial requirements for material stockpiling, understanding and testing material intelligence, and developing methodologies for incorporating the former into the design of architectural responses to a materially-limited future are not only plausible, but a necessary bridge for emerging architects entering into an increasingly material limited environment. It is only through direct engagement with materiality, and the flows that bring materials from globally distributed locations into the local context within which architects generate design/build interventions, that sensitivities to the physical constraints of the environment are embedded into architectural education. Often these material aware-nesses remain abstract for students who work primarily in the computer and on paper. This seminar's methodology proves that this abstraction can be overcome in order to propel the discipline into a sustainable design paradigm of the twenty-first century.

PUBLIC INTEREST DESIGN 2

BEYOND THE CHARRETTE: CRAFTING COMMUNITY THROUGH FULL-SCALE PROTOTYPING

Terry Boling, University of Cincinnati
Michael Zaretsky, University of Cincinnati

In recent years, the work of many academic design build programs across the US and Canada has been tethered to community outreach and engagement, a symbiotic relationship that has resulted in a wide spectrum of work- from the highly inventive projects of the Rural Studio, to the more utilitarian design/build studios that service blighted areas in many urban cores. How can community centered design/build initiatives continue to advance multiple research agendas as well as to satisfy community needs? We are interested in exploring the relationship between community design and design/build - looking for opportunities to advance both the process and the product of future design build endeavors.

Community design/build projects typically start with the charrette, where experts armed with rolls of sketch paper and markers lead teams of stakeholders through a process of ideation- usually starting with diagrams of relationships and leading to pictorial images of projects that will ultimately be constructed by groups of students. The charrette format relies on conventional architectural notational systems (diagrams, plans, elevations, and technical sections), potentially alienating those without the ability to comprehend discipline-specific abstractions. The process is generally linear, and parallels conventional practice - design it, then build it. Unfortunately, this technique doesn't capitalize on the distinct benefit of design/build, namely the feedback that results from the unexpected behaviors, resistances, tolerances, material limits, and serendipitous discoveries that can only be understood through enabling a direct interface with the tools, techniques, and materials of construction.
Our goal is to facilitate a process for community engagement in design that introduces full-scale material and assembly prototyping as a generative force in community building. We advocate a bottom up process where the project and program is discovered from within rather than imposed from the outside. Instead of slick renderings of a future assembly of materials in space, community members are presented with constructed artifacts to assess that have real weight, depth, color, texture, and light. These artifacts can then be contemplated and tested for fit in situ- moved, altered, and modified through direct interaction with physical components rather than through abstract notations. This slow process allows participants to claim ownership as authors in their own right by connecting process, participation, and memory through their own engagement with iteratively crafted constructions. The work produced is speculative, and operates at the intimate scale of the detail rather than at the scale of the building, suggesting future events and fabrications rather than definitively setting them.

This paper makes a case for this alternative approach to community engagement and includes a recent case study project that is the result of a collaboration between our design/build program, a local community development foundation, and the community they serve.

CONSENSUS BUILDING & THE DESIGN-BUILD PROJECT

David Kratzer, Philadelphia University

> "Clearly, when we discuss the people, their behavior, and their purposes as they relate to the built environment, we are bound to engage in conflicts, which is the very stuff of design decisions."
> -- Henry Sanoff; Methods of Architectural Programming

The community-based academic design-build project can be an incredibly exciting adventure - or a frustrating, short lived debacle. At the core of the architectural design-build curriculum is student exploration into the nature of architectural making – the translation of idea into construction, the materialization of intention. This charge is more than enough to fuel a semester long academic studio. Add to the mix the task of navigating a charged community client group expecting a usable product and the project process can easily drift and crash. The benefits of working with a community, though, can be inspirational and extremely satisfying for both students and faculty alike. Having a community take possession of a hard wrought project and find value is one of the most rewarding events in a designer's career. This satisfaction can be amplified in social projects where the results better the lives of others.

Community-based design requires a unique skill set. In order for interdisciplinary teams to collaborate successfully with community-based client groups, designers must develop a means to lead deliberations, mediate decisions and guide the process to conclusion – a process founded in consensus building.

This paper will case study two interdisciplinary, community-based academic design-build projects focusing on the consensus building methodologies utilized and the processes which led to successful conclusions – as well as ones that did not work. One project was a shelter project for a social service agency and the second a politically charged interactive exhibit. Each involved large client teams and multiple professional and academic participants. Specific methodologies included research presentations, interviews, questionnaires, surveys, interactive workshops, charettes, and prototyping workshops. With each methodology, evaluation tools were incorporated which assessed the designs and programmatic implications of the schemes in order to build consensus.

The trick with consensus building, and the nature of the skill set, is in mediating a process where total accord for a decision is rare. The process must develop trust and understanding in disagreement to move forward.

PUBLIC INTEREST DESIGN 2

THE ART OF CONSTRUCTING TRUST: MATERIAL, MAKING, AND OUR RELATIONSHIP WITH IMPLEMENTS

Daniel Nevin Harding, Clemson University
Paul Russell, Clemson University
Dave Pastre, Clemson University

As design pedagogy increasingly shifts toward studio partnerships with communities and outreach organizations, it is easy to see how service learning through interdisciplinary design-build studios has become an ideal catalyst for spawning public interest design. However, all community-centric design build projects should not be viewed as equal; a discerning and critical eye must be developed. For those who choose to build with students outside their own communities, often the process is misguided and therefore has the tendency to yield narcissistic products identified as monuments to frustrated practitioners, indulgent faculty, or naïve and impressionable students. Distorted motives can create a false perspective of success, misrepresenting the value of good design and quality construction. In an attempt to create an approach that will avoid "service-learning wash" yet simultaneously and enthusiastically advance the agenda of Public Interest Design, this paper focuses on the need for a critical process that builds poignant relationships between the academy and the community.

In Service Learning in Design and Planning, Agnotti, Doble, and Horrigan write: "Service learning shifts the site of learning from the classroom or studio to the community but involves much more than a change in venue." The authors argue "situating academic activities in the community requires the development of committed academic-community partnerships, open communication, shared goals, reciprocity, and continuing reflection." Service learning can integrate a community's needs to address a problem with the academic need to provide critical learning experiences. However, it must also create a new relationship between academic and community partners in which the contributions of both are understood and valued. Based on a series of consecutive multidisciplinary service learning design-build studios, a case study approach is used to explore the effectiveness of the studio not only as a catalyst for recognizing and engaging community needs but also as an effective environment for developing critical thinking and innovative design skills. Additionally, this paper will serve as a reflective narrative as it relates to the post design-build and community engagement components of these series of collaborations.

Horrigan's essay suggests that "bringing students and professors into neighborhoods reinforces the power and status of the professionals and dis-empowers residents," thus creating more exploitation than education. Through the investigation of the series of case study projects, this paper will explore and illustrate strategic interventions that demonstrate a multi-scaled approach to community design-build through multidisciplinary service learning as a fundamental tool from which to measure and communicate why and how good design matters– especially in communities. Likewise, it will illustrate through the processes of collaboration, discussion, and reflection that trust is a critical component for successful interventions.

References:

The Hand and the Soul, Aesthetics and Ethics in Architecture and Art
Editor: Iliescu, Sanda; University of Virginia Press; Charlottesville, VA

Service-Learning in Design and Planning: educating at the boundaries
Editor: Angotti, Doble Horrigan; New Village Press; Oakland, CA

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RESEARCH: INDUSTRY

DESIGNED FOR PERFORMANCE: INTEGRATING PROTOTYPING AND EXPERIMENTAL METHODS IN ARCHITECTURAL EDUCATION

Michael D. Gibson, Kansas State University

With ever-increasing efficacy, today's buildings are expected to respond to the multivalent challenge of sustainability. A critical aspect of this sustainability is the integration of performance with the many qualitative imperatives of design. In turn, architectural education must do more than merely provide ancillary technical knowledge in preparing students to address the advancing paradigm of sustainability. Architecture students must engage methods for integrating performance in design, looking beyond simplistic efficiency towards the maximization of performance with respect to energy, humanistic needs, environmental quality, and contextual integration.

The proposed paper stems from an ongoing, nationally-recognized research studio that engages performance problems in the building envelope, working collaboratively with design firms, manufacturers, engineers, and scientists. The fabrication and live testing of prototypes – a method transplanted from engineering and manufacturing research and development – has served as a core activity in the studio. As a variation of the popular 'design-build' exercise, prototyping serves as an immersive encounter with the complex and multivalent performance problems underpinning high performance architecture. While advanced computer simulation and analysis has supported the physics implications in the work, prototyping integrates performance within larger environmental imperatives including construction, building program, users, and context.
Ultimately, the core of the proposed paper will outline methods for research and experimentation that the students encounter and ultimately embrace in their work, building upon the previously published research outcomes of the studio. For many students, this research studio is the first occasion where prototyping and experimental methods have been pursued in systematic, objective inquiry. In this circumstance, prototyping is not merely passive exploration, but critical exploration where both quantitative and qualitative performance must be interpreted, communicated, and applied. Here, design knowledge is not alienated but rather serves as an important asset for the students in the development of their research questions, pursuit of evidence, and formulation of interpretations.

Sections of the paper will reformulate the stages of scientific investigation, overlaying them with familiar themes in the design process: (1) inquiry/argument, (2) context, (3) prediction, (4) prototyping and experimentation, (5) interpretation, and (6) design feedback.

The paper thus will argue for a more explicit approach to prototyping and experimental design in education. Further, the paper will engage the studio's primary collaborating firm to identify how methods of experimentation have been applied to performance-based inquiry in practice, and will present these examples in addition to the work of the studio. While typical practice today passes off potentially formative problems of performance to engineers and specialists, the attitude presented here is that the architectural discipline's unique knowledge breadth, cutting across so many aspects of the building, can do much more to define how buildings are built and how they work. Arguably more of architectural practice, rather than a relative handful of large and niche firms, will engage prototyping and performance. In an architectural future where high performance architecture and high stakes building commissioning will become the norm rather than the exception, methods for prototyping and performance-based inquiry will be critical in preparing the next leaders of practice.

EXOTIC CONSTRUCTIONS / INCORPORATING INVASIVE SPECIES IN DESIGN-BUILD STUDIO

Nick Gelpi, Florida International University

Drive twenty miles west from downtown Miami, and you'll land in the Florida Everglades, where the "river of grass" is overrun by stands of invasive Australian Melaleuca trees. South Florida is unlike any other place, where approximately twenty-six percent of all fish, reptiles, birds, and mammals residing in this ecology are considered exotic—more than in any other part of the United States—and the region has the highest number of exotic plant species in the world.

The effects of invasive species are both disruptive and formative. Alien intruders disrupt the local ecologies of regions often pushing some endemic species to extinction, while also establishing new relationships and expanding possibilities through constructive adaptation. This paradox came to life while investigating the useful potentials of the Melaleuca tree as a construction material. While management officials work to eradicate the Melaleuca from the Everglades, teams of graduate students at the School of Architecture at Florida International University adapted the invasive species into various design-build proposals that aimed to adapt the nuisance species into constructive prototypes.

By taking trees that are systematically removed from the landscape, the class attempted to forge a feedback system to create a demand for this alien material, thus linking a local craft-based practice to a foreign building material.
An industrial sponsor provided a proprietary process for chipping the tree-trunks and then mineralizing the woodchips, which facilitated experimentation and research into the performance of invasive aggregates in cast concrete applications.

A state park in North Miami allowed students to design and build proposals for a public garden. This project became the program for a graduate level studio co-taught between the landscape architecture and architecture departments. Students designed applications ranging from the single-user to collective spaces, and from the mass-produced to the custom. They considered landscape applications as well as conventional architectural solutions for structures and enclosures.

Students not only had to design and build their proposals, but they were required to test and evaluate them through a series of performance markers including compression testing for strength based on formula variations, as well as making observations of cosmetic and textural characteristics, ranging from texture and porosity to color. Not only did they need to design spaces, but they were required to define the material itself, adjusting the formula for certain effects.

The studio marked the first time this melaleuca/concrete composite material was extensively tested in the US, which has not yet been used in the US building market. Ultimately, this prototypical investigation which incorporated the use of an invasive plant as building material, explored the very basic relationships between design, material, ecology, and form. The studio showcased how alien building materials can redefine the idea of locally sourced, highlighting the potential to reorganize building practice, representation, and pedagogy, by utilizing design build to think outside of existing conventions and ecologies.

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RESEARCH: INDUSTRY

INNOVATIONS THAT MAKE IT OUT OF THE CLASSROOM

Margarette Leite, Portland State University

In most Universities, innovation in research and product development involving business and industry partnerships are commonly linked to technologically focused science and engineering programs. Beyond their initial sponsorships, these innovations can lead to patent and copyright agreements that promise continued financial returns and recognition to those institutions and individuals involved. As budgets tighten, these endeavors receive greater encouragement, even pressure, by universities hoping to develop models of support generated by the output of their own faculty and students.

Schools of Architecture are not often at the forefronts of these activities as their primary pedagogical purpose is to educate a service sector profession not primarily engaged in research. Thankfully, architecture programs all over the US are adding coursework that includes community engagement with the goal of moving the profession toward greater social and societal relevance. The School of Architecture at (This Institution) has made major advances in this direction including the inauguration of one of the country's first Centers for Public Interest Design (CPID). While few today would dispute the importance of this movement, there exist significant challenges to the implementation of the relatively difficult to fund opportunities in this area. The following projects described in this paper/presentation, outline some initiatives aimed at addressing those social goals in ways that may also achieve the kinds of market success exemplified by the more technologically focused innovations of other disciplines.

The first project, the SAGE green modular classroom, was designed and launched at (This Institution's) School of Architecture. In addition to addressing the concerns of school communities regarding the health and wellbeing of students in poorly designed modular classrooms, this project provided a range of lessons for architecture students that expand on the traditional curriculum, including becoming partners in a copyrighted product that returns royalties to the university to support further research, as well as contributes potential downstream profits to project partners including the students themselves.

A second project at (This Institution) is underway with similar goals. In an Advanced Architectural Materials class, students have partnered with a local business to create market ready building products made from landfill-bound materials that also provide job creation for disabled individuals. The students construct their building components at full scale and test them in (This Institution's) federally funded Green Building Research Laboratory. At the end of the course, the students pitch their ideas at a competitive "Clean Tech Challenge" event with the hopes of securing venture capital to further develop their products and move them towards marketing.

These projects serve as models for how architecture schools can bridge the gaps between social goals, pedagogical reform and financial viability through the development of marketable innovations.

LEEDLAB: DESIGN-BUILD AS ACTION RESEARCH; AN INTERDISCIPLINARY PILOT FOR SUSTAINABLE ARCHITECTURAL EDUCATION

Patricia Andrasik, Catholic University of America

Design-build is typically recognized as an architectural project delivery system in which one firm contracts to provide all of the architectural, construction and engineering services on a project. Yet it can have other interpretations. "Design-build," says architect Edward Wundram, "is an entire range of possibilities." This paper addresses design-build as a method to coordinate all of the services required for a facility performance evaluation to inform subsequent sustainability upgrades.

While sustainable alterations can be costly, the implementation of certain efficiency improvements can minimize pressure on capital. Therefore, it is important to properly diagnose sustainability potential. The National Institute of Building Sciences identifies Facility Performance Evaluation (FPE) as a "continuous process of systematically evaluating the performance and/or effectiveness of one or more aspects of buildings in relation to issues," among which are cost-effectiveness, functionality, and sustainability.

To utilize a cost-efficient approach to sustainability at the Catholic University of America, the School of Architecture and Planning created LEED Lab, a pilot interdisciplinary laboratory course based on "design-build as action research" using USGBC's LEED EB:O&M rating system. This paper explores the fundamentals of the course and the results of implementation on our first case study, the Crough Center of Architectural Studies, targeted for LEED EB:O&M certification this year. The collaborative foundation of this course, its groundbreaking successes at CUA, and propagation to other universities, are the primary reasons for submission to this conference.

LEEDlab formed a platform for collaboration with facility managers, external engineering firms, USGBC, GBCI, mechanical contractors, and other departments, creating a 'course' as a single-point source for evaluation, documentation and modifications to Crough. It enabled understanding national building performance benchmarking mandates by studying design through performance simulation and metric tools.

Experience gained from LEEDlab fostered the architectural student-to-professional relationship, creating an attractive transition to the professional world. Students became qualified for the LEED GA and Accredited Professional (LEED AP) examinations concurrently, meeting market demands. The course also provided a mechanism for students to initiate and participate in sustainability efforts on campus by facilitating charrettes and educating university administrators and operations staff about sustainability. Their research became a catalyst for policy, design and operational changes. "After all, the collaborative character of action research aims at generating both theoretical understanding and practical impact."

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PEDAGOGY: EARLY MAKING

THE PRACTICE OF PRACTICE: FOUNDATION STUDIO TO RURAL STUDIO

Margaret Fletcher, Auburn University
Rusty Smith, Auburn University

In today's future, knowledge is indeed valuable. But know-how is invaluable and the architecture students at Auburn University have the know-how to get things done. As a direct reflection of the stated mission and values of the architecture program, we believe in the importance of action. Therefore we also believe that the best way to learn how to do something is by actually doing it. As a Land Grant institution, our architecture program is deeply rooted in the ethos of outreach and service learning. In close collaboration with architectural and industry professionals, consultants, and community leaders, our students work on meaningful, public interest design projects that have real life impacts. Through this context-intensive work, our students come to understand that design is a material act that bears profound social consequences. As such, the issues of making, craft, manufacture and assembly all have meaning that resonates much deeper than a simple understanding of form and aesthetics. Thus the development of "know-how" (the embodiment of knowledge through the act of making and building) becomes the unique characteristic that enables our students to emerge as socially engaged, active and truly impactful design professionals. These are our core values.

Ours is a design-build program and from their first year to their last, our students are immersed in an education in which they are instructed in the value of impact. Learning through their respective collaborative, community-based design-build projects, they quickly come to understand that they don't need to wait until they are professionals to make a resonating impact upon the place in which they find themselves. The Architecture Program as a whole embeds in each year level some aspect of community-based collaboration and design-build strategies as a pedagogical framework in an effort to push the educational ethos of learning by making out of the representational mode of the architectural model and into the material discourse of actual-sized architectural fabrications and assemblies.

Our principles of community-based design-build education are rooted in the Vitruvian virtues of architecture, "firmitas, utilitas, et venustas."1 These virtues translate directly to "firmness, commodity and delight." Within the scaffolding of our pedagogical framework, we think of these architectural virtues as part of our core principles and translate them as follows: firmitas as building performance, utilitas as environmental stewardship and venustas as social relevance.

This paper seeks to discuss four frameworks countering the Foundation Unit community-based, design-build project, South's BEST with the resulting Rural Studio projects designed by these student cohorts as Fifth Year Rural Studio students through the lens of the three principles, firmitas, utilitas et venustas. The frameworks are: 1) mediating through scale, texture and pattern, 2) component-based architectural assemblies, 3) material repurposing and 4) the dynamic nature of architectural systems.

Endnotes
1. Vitruvius: The Ten Books on Architecture, Vitruvius Pollio, M.H. Morgan, H.L. Warren, 1960.

CONSTRUCTING EXPERIENCE: EXPLORING DESIGN/ BUILD STRATEGIES WITHIN A TECHNOLOGY COURSE

Chad Schwartz, Southern Illinois University

The pedagogy of design/build can be deployed in a wide variety of ways in an architectural curriculum. Despite common goals of breaking education free of the classroom, the exploration of architecture through experiential learning, and instilling within the students a more complete understanding of the practice of architecture (amongst other objectives), the different forms that design/build can take have a significant impact on course learning objectives and student outcomes. A primary issue with design/build, as with most curricular constructs, then becomes balancing these objectives to optimize the learning experience for the students.

For the past several years, design/build has become an integral part of the second year introductory building technology course at ---- (university name withheld for anonymity). We have experimented with two distinctly different styles of design/build within the construct of this course. The first involved the building of residential wall sections in the courtyard of the School of Architecture; the second was a more traditional community-based design/build centered on the construction of an amphitheater for an outdoor learning and event space located on university property. Both design/build strategies carried with them opportunities for student engagement and learning. However, a close examination of the response to the course learning objectives reveals significant advantages for the courtyard build over its more widely recognized community-based counterpart. This paper presents a comparison of the two project types, outlines the experiences each offered the students, and concludes with the position that despite its popularity, community-based design/build may, in some situations, not be the best choice for delivering experiential building content in an architectural curriculum.

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PEDAGOGY: EARLY MAKING

SCALING UP-MODEL FITNESS

Kristy Balliet, The Ohio State University

This paper explores how digital modeling, material studies and rapid prototyping can be connected to produce surface models that explore architectural volume. The research includes work from a range of pedagogical contexts – foundational design studios and advanced seminars– that address the design/build issue of scaling up the architectural model in anticipation of full scale construction. The large physical model prioritizes modeling fitness and relies on a cultivated relationship between digital and analog fabrication. The work is exploratory and draws connections between contemporary volumetric ambitions and fabrication capabilities as a design development and a pedagogic model.

The workflow moves between digitally calibrated tactics and intuitive revisions resulting in visually rich volumetric environments that can be accessed by the designer. The process interrogates multiple geometries to create intricate relationships between interior and exterior, expanding the contemporary capacity of architectural poche. The prompt for large surface models early in the design process inspires construction innovation. Literal and figurative problem areas arise that offer opportunities for targeted toning and editing. This is architectural calisthenics.

The large model can be operated on from within, have parts added and removed and sponsors multiple iterations. It strikes a balance between the precious qualities associated with 3D printing and the heft of a full-scale mock up. In many cases, especially within a teaching context, surfaces are developable, computationally calculated, precisely cut and manually assembled. Negotiating between three-dimensional and two-dimensional surfaces anticipates the planar quality of most building materials and promotes construction innovation. The large model necessitates multiple construction techniques and addresses issues of tectonics. As models scale up, connections, seams and detail considerations are paramount.

Testing the fitness of the architectural model sharpens the specificity of the design intent. Design tasks that challenge issues of orientation incite the introduction of gravity by asking can it stand up, can it hang and can it tumble? A robust and fit model can. Large models simultaneously exhibit structural and spatial qualities. They examine two critical aspects within the discipline of architecture: the creation of borders (edges, transitions, threshold, corners) and the creation of space (enclosure, volume, interiority). The selected projects isolate, interrogate and exaggerate the potential of these aspects as a means to wrestle convention and challenge typologies.

Today in academia there is a tendency towards vagueness, guised as mysterious and masquerading as promise. Instruction through the large scale models similar to the design/build project aims to contest this notion. The papers focuses on a series of design investigations that construct dog-sized models as the primary mode of representation to address contemporary issues related to volume and construction technology. Model fitness is an explicit pedagogic intention to develop and hone design skills and articulate ambitions in direct relation to the tradition of architecture. The research approach seeks a connection between calibrated computation and general form finding which blurs and challenges the contemporary dialogue of design research, technique and application.

STUDIES IN CRAFT: FURNITURE DESIGN AND FABRICATION BETWEEN THE ANALOG AND THE DIGITAL

Stephen Belton, University of Florida

The design and fabrication of furniture represents the touchstone of our engagement with the material world, both as designers and users. Furniture maintains a critical link with architecture, both as a bookend to the smaller scale of form and space as it engages human occupation and use, and as a scaled distillation of the evolving interplay between form, materiality and fabrication. Within the Modernist movement furniture became a focused study by both architects and industrial designers between material form and the methods of industrial production. Today's advancements in CAD/CAM design fabrication present new questions regarding the dialectic of human and machine, and in turn new challenges and new opportunities in exploration of craft.

The paper represents a semester seminar/workshop in exploring, discussing, and experimenting with contemporary issues of craft using furniture as the vehicle for design and fabrication. The close engagement with material offers students the chance to experiment with, and ask questions of the relation between designing and making. At this scale materiality becomes, not simply a specification but a medium by which to inquire about the nature and process of how something is made. As such, the lessons and implications for architecture are much greater than the scale of the work would initially suggest.

While not intended to be all encompassing or exhaustive as to the scope of the course, the following four dialectical pairs served as frameworks for class discussions, presentations, and the understanding, critique and conceptual development of the student design work:

Dialectic 1: Hand vs. Digital Craft/Design
Dialectic 2: Structure vs. Surface
Dialectic 3: Material Behavior vs. the Joint
Dialectic 4: "Function" and/or Engagement with the Body – Ideal vs. Actual

It became useful to return to these themes throughout the semester to clarify particular concepts explored in individual lines of research and design, as well as reflect upon the larger body of studio work and changing understandings of material and design with respect to historical antecedents.

Before any design took place students were asked to explore material behavior in response to various tools and operations. From this collective research and group discussions students developed an individual line of inquiry regarding material form and process, leading to the design conception, testing, prototyping, further design development, and finally finished fabrication of a single piece of furniture. The work of the seminar was based upon design research that was iterative and non-linear. As such the finished furniture pieces, rather than definitive endpoints to design concepts may be thought of as momentary crystallizations of material expressions in constant evolution. In this manner the locus of craft begins to change: rather than the careful execution of a thoughtful design, craft becomes embedded into various feedback loops – through the care and thoughtfulness in which they are pursued – leading to unexpected design outcomes and material expressions. As such, the work serves as a touchstone to the changing nature of the design process in contemporary architecture and the way architecture and design more generally may find new drivers for design conception.

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PEDAGOGY: CURRICULUM 1

>INNOVATE>EVALUATE>LEARN>: THE IMPORTANCE OF ITERATIVE RESEARCH IN HOUSING DESIGN/BUILD

Lisa D. Iulo, Pennsylvania State University
R. Allen Kimel, Pennsylvania State University
Shahrzad Fadaei
Kyle Macht
Mina Rahimian
David Riley, Pennsylvania State University

"Within the profession in general, there has never been a consistent pattern of innovation, evaluation and learning applied to the design of housing" (Plunz 1990).

Affordable, sustainable, well-designed housing is a rising concern. While we have amassed significant knowledge into methods for realizing comfortable, healthy, sustainable housing, through design/build programs in post-professional education throughout North America, more information is needed on the long-term performance of projects. It is through the acquisition and evaluation of housing performance data that we can close the loop and move beyond "one-off" construction, towards meaningful change in addressing responsible affordable housing. The necessity for a reiterative loop in housing research that considers project evaluation is widely acknowledged (Plunz 1990, Kieran 2007, Weinstock 2008, Dulaney 2013). Goals of the iterative process are to synthesize information from previous projects to yield new knowledge, disseminate findings to improve home performance, and implement new information into future design/build projects. But the methods for evaluation and, more importantly, dissemination of knowledge are only beginning to emerge, if at all. Dialog around these topics is necessary to improve the delivery and efficacy of affordable housing and design/build as research, pedagogy and practice.

This paper will present emerging protocols for project innovation, evaluation, and iterative learning being developed by a multidisciplinary team of faculty, graduate and undergraduate students at a NAAB accredited university. The research group is dedicated to the investigation of the entire "life-cycle" of housing – design & construction methods through performance evaluation and optimization – in order to inform more responsible housing solutions for more resource conscious living. In our research, responsible housing means well-designed energy-efficient housing that is affordable over the entire life cycle of the home. Affordability addresses both the initial costs of providing housing and the long-term energy-related expenses carried forth by the resident. One of the foci of the research group is the establishment of tools and methodologies for evaluation that contribute to reflective learning and improving the design of subsequent projects. The work that will be presented has grown out of involvement on multiple Solar Decathlon and affordable housing projects undertaken in collaboration with a local housing authority. The paper is a reflection on previous projects in the interest of identifying opportunities as we embark on another ambitious design/build project.

LOOKING OUT AND IN: DESIGN/BUILD IN THE EXTREME SOUTH

Rocco J. Ceo, III, University of Miami

Building in the visitor camp of Flamingo is rough. Mosquitos, "no-see-ums," pythons (reality not myth) and the heat and humidity, are all cause for reflection if not resignation. On the southern tip of Everglades National Park our latest Design/Build project tested our resolve and principals. We needed to erect in two days what we spent many weeks building on campus. The long commute (45 minute drive from the park entrance alone) and the extreme conditions tested our notion of modularity in constructing an off-the-grid Ecotent for four people. The view from the site was inspirational but we soon also looked inward, reflecting upon what we were doing and whether our mission justified this trip to the extreme south.

A new Design/Build Program, now in its fifth year, has focused on modular, prototypical projects mostly for not-for-profits. Our mission has been well received, and our projects continue to be supported by generous contributions from the community. Success of the program has even meant we now have funds to build our own Design/Build studio making permanent what was initially just about expanding our student's curricular experience. The possibility of now having a permanent place for our efforts is cause for reflection into our mission (looking in) and how we might accomplish it (looking out).

This paper reviews the work to date of a new Design/Build program on the threshold of being a permanent part of a school's curriculum. Riding the winds of student interest in building and digital fabrication it is time to ask a few questions about how, and what we are doing. Individual gratification by both faculty and student was initially enough to forge ahead with design/build, but we are increasingly facing a number of issues that test this trajectory. Inspired by our own Design/Build work and now the impending construction of our own Design/Build Studio building, this paper seeks to bring to the conference a series of questions that may assist in building a dialogue about what might be the central questions guiding Design/build as a growing factor in architectural education.

1. Local, regional, national or global – what makes sense as a focus for a program?
2. Is project size, duration, a question of funding, curriculum or ideology?
3. What is Design/Build, community outreach, scholarly research or both, and how do you make a case for it as scholarship in a research institution.

In addition to showing the work of the program the presentation hopes to build a case for design/Build work as scholarship not just service learning. The form of our new Design/Build studio building is setting our mission in the academy by showing how systematic investigations into modular, prototypical construction leads to learning and knowledge that feeds both the school and the discipline.

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PEDAGOGY: CURRICULUM 1

TAKING THE PULSE OF BLUFF

Shundana Yusaf, University of Utah
Jose R. Galarza, University of Utah

The School of Architecture at the University of Utah has hosted a design Build Program in Bluff, Utah for ten years. The emergence of the program at the same time as the consolidation of digital technologies in architectural schools is no coincidence. Favoring the conceptual, rather than the practical, modeling software and digital fabrication, have introduced notions of space, materiality, and locality that take little notice of the capacity of the building industry to realize them. They have drawn a wedge between the high and low design opportunities available in the marketplace; and have created graduates alienated from the dominant conditions of the material production of the built environment.

Design Build Bluff, in contrast, is conceptualized around the desire to immerse students into the realities and exigencies of construction industry. It encourages a more lateral relationship between the ideas on paper and "nuts and bolts" on site. Every spring a number of graduate students move more than 300 miles away from the school of architecture and form a tightknit commune to build a small single family home for a beneficiary on the Navajo reservation near Bluff.

This paper will access the successes and failures of the pedagogy of learning-by-doing as practiced at Bluff by taking a closer look at the three most interesting houses built by the students of Utah in the past ten years. It will think through Rosie Joe (2004) that put the program on the map, Sweet Caroline (2006) a playful exploration of the geometry of a Hogan, and Rabbit Ear (2013) the last completed expression of its teaching philosophy. Taking the pulse of the school's decade long involvement with the reservation, the paper will argue that moving into its second decade, the critically acclaimed program needs to transcend the object-centric architectural education for it leads to an impossibly narrow, technocratic, and ironically, market-driven understanding of the role of the future architect.

FROM "NASCAR" TO PRODUCTION MODEL

Mark Stephen Taylor, University of Illinois, Urbana-Champaign

This paper tracks the progression of one school's research/pedagogical endeavors as they relate to the US Dept. of Energy's Solar Decathlon Competition. The paper will chart the progress of a design build seminar that aims to further innovative, in partnerships with those in the construction industry to deliver Net Zero homes that are viable beyond the confines of the academy and a "one-off" competition entry.

Four projects will be discussed and the most important lesson learned from each will be presented. These lessons include the following:

1. The learning opportunities available after the build process.
2. Pioneering Energy Modeling as a Design and Detailing Tool.
3. Addressing Affordability.
4. Working with Agendas of Collaborators.

1. The enthusiasm to compete in the Solar Decathlon can unfortunately obscure good planning to address how an experimental building can be transitioned from and competition house to a permanent location. That said, even if the transition is not smooth many valuable lessons can be learned along the way.

2. Refining details during constructions is one of the pleasures of a design-build studio; the advancement of modeling software to predict building performance prior to construction has become a new tool for those who are interested in designing and building energy efficient buildings.

3. The Solar Decathlon Competition has been criticized for promoting "one-off, small, very expensive houses". Since 2009 the DOE has attempted to address that issue by establishing metrics that quantify building costs. One unique aspect of a design-build seminar, and something which often sets them apart from other design studios, is the fact that in one form or another building costs need to be factored into design process. The author believes this a great strength to the design-build approach and has great potential to ensure research has impact outside the academy.

4. One of the most valuable aspects of a design-build studio are the partnerships that are formed during the process of designing and building. Engaging with start-up companies, established home builders, as well as non-for-profit organizations can provide valuable insight for students as to how their ideas will be received beyond the classroom. Engagement with various partners and collaborators can also lead to career opportunities previously not considered by architecture students.

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PEDAGOGY: CURRICULUM 2

MAKING ABROAD: MOCK-UPS AS A MEANS OF CULTURAL ENGAGEMENT

Michael Zaretsky, University of Cincinnati

Making buildings in rural Tanzania requires a westerner to engage a set of conditions materially, culturally and environmentally that challenge every assumption evident in contemporary construction. Our School of Architecture began working with a local non-profit in 2008 to address the need for a health center in Roche, Tanzania. Following extensive research, interviews and discussions with the local community, Phase 1 of construction began in 2010 with plans of designing and constructing a 2000-sf clinic to serve as administrative and clinic space. The clinic opened April 1, 2011 and has received multiple awards and is being heavily used by the community. However, to retain quality medical professionals there is a need for rural high quality medical housing for Tanzanian-educated Doctors and Nurses. Phase 2 will provide medical housing and construction will begin in 2014.

The Tanzania projects combine faculty-led graduate architecture studios and seminars that engage design research at several different levels of engagement. This research informs the development of the built projects though the design evolves throughout every step of the construction process. Since 2008, students have done extensive research, engaged in real-time interviews with members of the community in Tanzania, built several mock-ups using only materials available locally, traveled to the region for research and construction, and lived on the ground in Tanzania leading the design and construction process.

The Tanzania design/build studios require a group of mid-western, affluent, white students to design meaningful projects for a rural, impoverished, Tanzanian community. We do this by engaging the local culture in every way possible. One primary means of engagement is the exploration of mock-ups using only materials and tools that are available locally in Tanzania.

During initial research we identified several critical issues with existing construction and used mock-ups to propose improvements. These proposals were presented to the local community with the hope of becoming integrated into the local construction for villagers who were building in the region. Initial research identified major seismic concerns as evidenced in several masonry buildings that were damaged or destroyed. We discovered that they had inadequate steel reinforcement. Through extensive testing using only locally-available materials, we identified significant improvements in the construction of concrete and the introduction of the Interlocking Stabilized Soil Block (ISSB) Press. We also identified major acoustical issues as the result of un-insulated metal roofs. We tested combinations of available materials and developed a roof assembly that reduces heat loads and acoustic transfer extensively, thereby allowing users to be able to communicate, even during torrential rains.

In phase 2 we studied the first building and utilized mock-ups to address additional conditions that need improvement. Phase 2 mock-ups included alternative wall and roof structure materials, new approaches to columns, roofing alternatives, and privacy filters for apertures.

This paper proposes that one can engage students in meaningful, inspirational Design/Build projects without actually traveling to the place in which they will be implemented. Using design research and design/build mock-ups students can gain cultural knowledge.

NOTES ON THE INTERSECTION OF ARCHITECTURE AND SOCIAL ENTREPRENEURSHIP

Scott Bernhard, Tulane University

Although a clear and singular definition of social entrepreneurship has yet to be agreed upon, many accept the term to apply to organizations in service of a social mission while drawing upon both revenue positive business models and socially oriented, non-profit strategies. In general, social entrepreneurship is characterized by a continuous process of learning and adapting - appropriating and testing a broad range of unconventional inputs to solve social problems. Optimal outcomes in these ventures address pressing and ongoing societal needs without generating cycles of dependence on continued philanthropy or subsidy. Though it may seem self-evident to architects and environmental designers, this recursive process of continual learning (as well as the open embrace of models from many sources) is quite like the design process at its best. Likewise, components of the built environment that continue to serve a social or cultural purpose with little need for extensive maintenance regimes and endless cycles of consumption and waste, are construction in its most sustainable form.

This research and consequent design/build project demonstrate how a group of faculty and students from a range of design and engineering disciplines converged to create an educational non-profit and an urban agriculture facility to support a social mission. Both the facility and the organization were created and deployed in the field by the same group of young architects and designers. The fit between the facility (designed by students and faculty) and the organization it supports (also created by the faculty and students) was thus developed in a recursive feedback loop with numerous instances of continual learning and adaptation that greatly improved the architectural outcome. The resulting 6000 square foot urban agriculture facility on a 4 acre site serves as a model for award-winning environmentally-conscious design, innovative reuse of construction materials, environmental remediation, sophisticated water management, progressive land conservation techniques and successful social entrepreneurship through mission driven design, programing and revenue generating building elements.

Though many design build projects engage non-profit clients, the process here was to build the nonprofit, its program and its facility simultaneously over a three-year period of looping and overlapping coursework and professional collaborations. Over a five semester period more than sixty architecture students, four faculty (two architects, one ecologist and one landscape architect), and seven different engineering, non-profit and agriculture consultants were involved in the process. Students participated in every aspect of design and construction, functioning as the designers, contractors, laborers, and post-occupancy evaluators. The non-profit organization was developed in sync with the facility, including a pilot year in an existing facility that offered insights into the preliminary assumptions about the spatial needs and the operational exigencies of the non-profit. We believe this process is unprecedented in higher education design/build and was of enormous value as a learning experience and in the success of the final project.

This paper and presentation will describe the process of design through the lens of social entrepreneurship in this unique instance of a truly comprehensive design effort. Architects and architecture students became effective agents of social change.

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PEDAGOGY: CURRICULUM 2

SIZE MATTERS: INVESTIGATING THE SCALE OF PROJECTS, TEAMS AND TIME THROUGH FOUR DESIGN/ BUILD STUDIO ITERATIONS

Thomas Bradley Deal, Louisiana Tech University

The this paper tells the story of the evolution of an undergraduate program's effort to define the role of the design/build format within its curriculum and the four distinct modes it has assumed over the past 13 years. These modes have covered a significant range of project scales, class sizes, and time constraints yielding a valuable set of case studies in which only a few specific variables differ from one iteration to the next. This paper will summarize the lessons learned thorough each mode and extract from them some operational guidelines useful in organizing design build studios based on the available time, project and student resources.

In 2001, in an effort to create a "capstone" studio experience for students completing their Bachelor of Architecture, the Louisiana Tech School of Architecture adopted the design/ build format for their terminal undergraduate studios. Seeking a comprehensive project experience at the intersection of "community, collaboration and craft", the studio sought to evaluate and inform it's students of their ability to deliver competent and valuable design projects vetted by the constraints awaiting them following graduation.

At its inception, teams of 3-4 students spent an entire academic year identifying, defining, designing and constructing 100-600sf outdoor pavilions, kiosks, bridges, etc. Student ambition and project opportunities eventually led to increased project scale and complexity as a string of enclosed, conditioned projects began to demand larger teams. In 2006 this trend led to the entire graduating class collaborating on a single-family home for the local Habitat for Humanity Chapter.

During a string of 8 Consecutive Homes, the school's 5-year Bachelors of Architecture program was restructured to become a 4+1 M Arch Curriculum making the annual Habitat for Humanity Home the responsibility of 4th year seniors accomplishing it in two academic quarters rather than an entire year. Frequent critiques of this project included students ill-prepared for the graduate program having spent so much time "swinging hammers" and projects so constrained by budget, client conservatism and program consistency that they lacked rigor as design problems.

In response to these critiques and the desire for all students to be able to participate in the design build process, in 2013 the role of the design/build studio underwent its most recent change. Rather than 11-14 4th year students spending 2 quarters on a project, twice the number of 3rd year students were challenged to design and construct a project in half the time. Currently in its second iteration, the single quarter design build represents opportunities for more complex and varied design problems and service learning formats coupled with a far more constrained calendar.

As with many other curriculum features, Design/Build is now accomplished in less time by less experienced students bringing with it a number of challenges and opportunities. This paper seeks to critically evaluate the various modes of design build tested at Louisiana Tech and illustrate the lessons learned to extract some operational suggestions useful in organizing design build studios based on the available time, project and student resources.

TRANSITIONING TO DESIGN BUILD; INITIAL SUCCESSES AND CHALLENGES

Peter Russell, University at Buffalo, SUNY
Lindsay Romano, University at Buffalo, SUNY

This paper chronicles the transformation of a school of architecture's model-making facilities into a laboratory for design-build education. The department of architecture has had for several years exceptionally large and well-maintained model-making facilities with the capacity to explore and learn about many materials and construction methods. Recognizing the trend for the last decade of design education curricula around the country and the world, the school has recently taken steps to build the capacity of the lab and allow it to better serve the changing pedagogies in architecture education, with a focus on full scale design build projects.

Initial results from the first formalized design-build seminar at our university have focused on development plans and small design build projects. These projects are documented as case studies and range from projects that further the ethos of the architect as a maker, to service learning projects that attempt to effect social processes and social change.

In addition to documenting the first formal design build seminar, the paper will address some of the foundations of design build education that have come out of our university, all of which contribute in a meaningful way to the theoretical discussion on design build pedagogy and its potential as a learning model.

The design build seminar under review has yielded some interesting results that we are using to shape the future development of the seminar and the building lab itself. These results have become an integral part of any discussion about design build education. First and foremost we have been forced to re-address the goal of the seminar, has the goal been strictly educational all along, or does the unique nature of this seminar mean the goals are closely tied to the outputs, and is this fair to our students? Do the learning goals and outcomes of the course determine the success of the seminar, or does the constructed output?

The paper will conclude with an illustration of how the seminar, coupled with the School of Architecture's commitment to design build education, and the transformation of our building laboratory have the potential to foster a very active and productive design build unit across urbanism and architecture.

PEDAGOGY: PRINCIPLES

...EVERYTHING A NAIL: MAINTAINING A PEDAGOGY OF DESIGN/BUILD EXPERIMENTATION

Pasquale De Paola, Louisiana Tech University
Damon Caldwell, Louisiana Tech University
Liane A. Hancock, Louisiana Tech University

While design-build has certainly become an important subset of architectural education – particularly in the USA – its dualistic and dichotomous pedagogical nature is still fundamentally problematic. In fact, while the design-build praxis has offered both schools and students a good framework for a collaborative, civic, and activist agenda, its pedagogical and methodological characters are mainly defined by the contrasting relationship between designing and building. The two frameworks are methodologically split as they pedagogically juxtapose a speculative creative process (Design) characterized by iterative explorations; and a more practical and pragmatic approach (Build) that focuses on the actual building/construction process. The latter is often addressed in a normative way, emphasizing the delivery of a completed project, a completion valued above the criticality of the design process. How do we redefine and adjust the design-build pedagogy so that both the act of designing and building are equally and synchronically organized?

This paper will contrast the methodological understanding of design as a holistic and ambitious iterative process in which formal experimentations can genuinely challenge the norm through completion at full scale, with certain pedagogical subsets that have promoted design-build praxis where the best finalized solutions are generally aligned to the designer's original solution and ambition. Thus we will look into the design-build praxis currently operative at the Architectural Association in London, which has seen projects designed and built by Frei Otto, Bernard Tschumi, and John Hedjuk, and which all share a desire to eventually deliver, in their formal and tectonic components, the designer's common ambition toward building experimentation. In addition, we will present design projects completed at our University, ranging in scale from furniture to pavilion design.

These examples exhibit how the pedagogy of experimentation and invention need not stop at maquette scale, but can continue through to the innovative use of materials, tools, and techniques throughout construction.

FABHOUSE STUDIO(S) SAGA

Jane Murphy, The Ohio State University

Wherein, Two Habitat Directors, Two shop directors, Three faculty members, Ninety students (give or take a few) participate in Six design studios and One seminar over Six academic years and Three summers, write Six grant applications and finally build One sunny house for One happy family.

Acknowledging the benefits and difficulties of many design/build projects in academia (such as annual attempts to define projects, each with new clients and widely varying budgetary and bureaucratic restraints) the Clark County Community Habitat for Humanity (CCCHfH) / Knowlton School of Architecture (KSA) FabHouse project attempted to define a new way of designing and building volunteer-constructed homes—not one-offs, but a system, to be improved with each iteration, and designed to be built not necessarily be architecture students, but by typical Habitat volunteers, including architecture students in that group.

Dovetailing with the granting of HUD Neighborhood Stabilization funding in 2008, a federally funded grant administered at the state level, the initiative had the potential for resulting in the construction of a whole neighborhood of houses, and a community building. From Spring of 2007 to Winter of 2013, a total of 6 design studios and one quarter long workshop were conducted that eventually produced two sets of construction drawings, one ultimately leading to the construction of one home, finally dedicated in December 2013.

The project seemed to have all the pieces it needed to be a success, but its successes are greatly overshadowed by its failures. This paper would evaluate the project on its merits, and ask what went wrong. Why were more houses not built? The process has to be deemed a failure in all aspects except for the fact that a family now happily occupies a light-filled, energy efficient, home—one that will not be repeated, though it may deserve to be.

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PEDAGOGY: PRINCIPLES

LEVEL AND PLUMB WITHOUT RHINO: PROBLEM SOLVING ISSUES OF MAKING BEYOND THE DIGITAL REALM

Tiffany Lin, Tulane University

Using the computer as a design tool has become ubiquitous in contemporary design education, encouraging students to imagine complex forms without having to consider material resistance or issues of gravity at the onset of a design project. This paper presents several case-studies of design/build efforts that were guided by a craftsman when design proposals met actual problems of construction. The craft of making has a long history that has evolved almost entirely without influences of the digital realm. Fundamental lessons of geometry, leveling and plumb-ing at full scale are essential in the education of a designer, especially when the computer enables lines and planes to be effortlessly snapped into place on the screen.

Far too often, students default to the use of oversized templates plotted from the computer as a means of translating imagined geometry to full scale construction. In the mind of an unwitting designer whose primary facility is digital, the hurdle between representation and reality is simply resolved by printing shapes at a larger scale. The dialogue between artisan and object is lost in these cases, along with important lessons of tactility and material negotiation. Drawing from the instincts and sensibilities of a craftsman, students learn that the logic of making has its own parameters rooted in a knowledge of tools, material resistance, dimensional tolerance, and gravity. Only by extending the design process into the techniques of making can student designs be embodied with an artistry that allows built form to transcend its conception and representation.

The history of craftsmanship and its intrinsic connection to development of modeling software can also help students become more mindful of their automatic sense of control in the digital realm. Learning the etymology of a Rhino command such as “lofting” for example, allows one to gain an appreciation for the process involved in shaping full-scale material in three-dimensional, physical space.

Design/Build exercises are paramount in contemporary architecture curricula as they provide the necessary bridge between the digital and physical world. Understanding the translation from design to construction requires another set of instincts that can often liberate students from the perfect scaleless space of a computer. Rather than plotting a circle at full scale, sometimes all you need is a piece of string.

WHOLE SCHOOL DESIGN/BUILD IN THE LIBERAL ARTS TRADITION

Traci D. Sooter, Drury University
Nancy Chikaraishi, Drury University
Keith Hedges, Drury University

Most design/build projects emerge from architectural programs with participation from the engineering and landscape architecture disciplines. Although a variety of interdisciplinary collaborations frequently occur, rarely does a design-build project assume a whole campus experience. One liberal arts institution developed an all-university, inclusive program that enables educators from any discipline to engage students in design/build through the lens of diverse majors.

The paper is a faculty narrative describing the whole campus design/build process. Design and build inspirations were eclectically borne with multidirectional dissemination. Seven case studies explore the inspiration given and received from collaboration in the liberal arts tradition.
The Joplin tornado event stimulated design as the English majors revealed their survivor story interviews, and a build was motivated from a music therapy Rejuvenation Station to elevate the spirits up of the build crew and volunteers. The volunteer-based university wide student organization “SmartMob! A flash mob with a cause” is a high-impact, low-time commitment mechanism for volunteers to participate in a design/build project and give back to the community. Biology, marketing, and education faculty (among many others) held class on the construction site of a Habitat for Humanity LEED Platinum home prior to transitioning to service on the site. The university has logged 27,260 services hours in the two most recent projects with volunteers representing 23 majors.

The aforementioned examples along with others illustrate a whole campus exchange that strengthens the sense of place and purpose, builds relationships between faculty and staff, and ensures upper administration support and enthusiasm for the program. Everyone has the opportunity to influence the design, whether it is a student of architecture, nursing, or communications. The points of view and critique are equally valued and usually insightful.

The paper will provide seven case studies and best practices for a new model for design/build programs, Inclusive Design/Build, reaching beyond boundaries to create whole-campus participation and support.

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BUILT WORKS: INTERACTION

NETWORK OBJECTS: PARTICIPATORY DESIGN AND INTERACTIVE FABRICATIONS

Jason Scroggin, University of Kentucky

Rapid prototyping made iterative design methods common practice, but also suggests that the final selection of these processes is an artifact embedded with behavioral forces of the parameters that generated its configuration. How do tectonic systems and construction logic affect these forms and what happens when we distribute other configurations of the selected prototypical form in space?

There still remains some ground to tread in the exploration of digitally developed fabrications as our design technologies evolve, but perhaps the infatuation with technique and the possibility of limitless formal results can be set aside in favor of new conceptual models to drive architectural projects such as narrative and event. With this in mind, there opens up a possibility to consider the use of the systematic processes of computation in design to be directed towards the development of the architectural object that not only considers the operations embedded in the development of its form, but how the resulting objects may activate user participation.

The graduate level design and fabrication elective entitled Tectonics, Typology, and Distribution taught in Spring 2014 explores these issues through research, discussion, and fabrication over the course of 14 weeks. Comprised of ten students and sponsored with a modest budget by the local 2014 Beaux Arts Ball, the class was charged with developing full-scale interactive objects. Specific to the theme of the course is to consider the product as a series of related objects to give a unified spatial character to its site in an existing concert venue.

The course begins with an analysis of a set of simple toys in order to extract concepts of "play." These act as the motivating driver for a series of material constructs that consider how physical form can engage the public realm. Each student developed their own project for the first half of the semester working back and forth between concept, fabrication, analysis, and evaluation. Through an evolutionary process of selection and synthesis of the students' proposals, a final design emerged. The resulting construct, Hg-162, took the form of a full-scale installation generated out of systematic assemblies of off-the-shelf and digitally manufactured components.

Hg-162 is a thickened inhabitable landscape measuring 18' square. It undulates 3 feet off the ground and is comprised of tessellated silvery pillows arranged in a 9x9 modular grid. Its title derives from the number of its pillowed tiles and their resemblance to the chemical element Mercury (its symbol, "Hg") when aggregated. Inhabitants can crawl on and relax in its soft hills and valleys. Hg-162 breaks into 9 sub-objects (landscapes) that resemble the larger field, but with only a 3x3 grid. This network of smaller seating elements generates a variety of social configurations allowing a range of intimacy for small and large groups of people. While flexible in the distribution of its layout, the proximity, materiality, and formal character of the smaller forms echo the larger whole generating an autonomous spatial network that can be implemented into a variety of site conditions and enhancing the sense of place.

PROFFERING DESIGN: SERVICE LEARNING STRATEGIES TO INSTIGATE DESIGN PROJECTS AS SOCIAL CHANGE.

Norma Isa Figueroa, University of Texas at Arlington
Colleen Casey, University of Texas at Arlington

A service learning component in any course can make the experience richer, benefitting all parties involved, and at the same time foster social change. However, creating and incorporating a service learning component into a rigorously established course like design studio can be daunting. Professors may face some consternation when trying to identify a community to work with, and may get discouraged because of the uncertainties involved in this kind of project; they may worry about introducing service learning into a school or organization structure that does not recognize its value or potential, or even perhaps worry that it might conflict with the curriculum. At the same time, communities may be reluctant to partner with the university or college, in fear of letting "so-called" experts into their communities. The purpose of this paper is to illustrate several strategies that have been effectively used to overcome these consternations in order to successfully integrate service learning in diverse settings and design courses.

The strategies identified in this paper draw upon the experiences of the authors and offer strategies such as how to identify potential service learning projects, choose a community to work collaboratively, and integrate service-learning into the curriculum. Five case studies of diverse service learning projects provide the data for the analysis.

The first project reviews a design studio based in an active community that constantly sought help from students and faculty at the school of architecture. In this situation, the glut of requests required professors to establish specific criteria in order to select projects that best aligned with the curriculum. Another case discusses the strategies adopted by a professor in a school of architecture discouraging service learning pedagogy. Despite cultural impediments, the professor was able to incorporate service learning successfully through a design thinking research course, earning several awards for the school and the students as well, and maintained positive relationships with the administration.

The third case will present a collaborative project with the mission of building homes for very low-income families in the United States. In this particular case, students were asked to go into diverse, impoverished communities, which varied substantially from the communities in which they live and work; the professor as well as the nonprofit organization adopted strategies to make both the community residents and students feel at ease. Another case will talk about coordinating a design/built project in a third world country for a graduate studio project, and make a recount of the steps already covered in the process.

This paper concludes with a collaborative project by students in architecture and fine arts with the objective of teaching art principles and design to disadvantaged students in several public elementary schools, culminating with a playground structure built by the students and the community at one of the schools. An initiative of two students and solely voluntary, this project makes obvious the fact that many students want to get involved beyond the walls of academia. As faculty, we are in part responsible for guiding and encouraging their work.

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BUILT WORKS: INTERACTION

THE INTERACTIVE EXHIBIT, JFK & DESIGN-BUILD

David Kratzer, Philadelphia University

> If a movie makes it really big, they make an amusement park ride out of it. Superman The Ride!... Batman The Ride! ...JFK The Ride!
> Brian Regan; The Epitome of Hyperbole, 2013.

The exhibit Mathematica: A World of Numbers...And Beyond, designed by Charles and Ray Eames in 1961, marked a distinct shift in exhibition design by making the visitor an active participant in the unfolding of information. Moving beyond the static didactic presentation, the installations were organized around the notion that the visitor affected the content transforming the exhibit into a personal experience. This ability to translate information into an active learning condition created a dynamic and engaging platform from which to consider the nature of exhibitions and didactic information. This paper explores the nature of the interactive exhibit and its effect on interdisciplinary design-build processes utilized in creation of an academic exhibit.

(Name) University received a grant to design, fabricate, curate and host an exhibit celebrating the career of Arlen Specter to be located in the campus library. His emergence into the public eye began with service on the Warren Commission investigating the JFK assassination. An interdisciplinary "client" team was assembled whose members included library administration/ staff, an exhibition consultant, archivists, researchers and faculty/ staff from the fashion, law & society, architecture and graphic design programs. The exhibit components were design and fabricated by architecture and graphic design students as part of design-build studio coursework. The exhibit opening coincided with the 50th anniversary of JFK's death. The goal was not to answer the question of who killed JFK but rather to present the evidence in such a way that the visitor could draw their own conclusions.

During initiating research into the nature of the interactive exhibit, the student team proposed that the visitor be "put in the place" of Arlen Specter in order to understand his investigative struggles. This empathetic posturing led to "taking the place" of Abraham Zapruder, whose film became the iconic evidence for the event, and then on to JFK himself. The visitor could best understand the conspiracy theories by sitting in his seat – literally. In addition to didactic graphic panels, physical exhibition components centered on a representation of the presidential Lincoln Continental convertible where visitors can sit in JFK's seat and see via video monitors themselves in the rifle scopes from the three predominate conspiracy theory shooter locations – the Texas Book Depository, the grassy knoll and the bridge overpass. This is a very personal experience.

The empathetic propositions became the core of the exhibit but were only realized through a series of prototype/ workshop negotiations which spread across the campus indirectly involving physical plant, library management and the university administration. The design-build prototyping and interactive evaluation process built the consensus necessary to materialize the controversial exhibit. This paper will conclude with a summary of the design-build tools and methodologies utilized to bridge the conflicts of such a charged, sensitive topic and diverse client team.

BILDS: A DEVELOPING MODEL FOR RESIDENTIAL DESIGN-BUILD EDUCATION

Rob Thallon, University of Oregon

> "The most interesting things are happening at the intersection of two fields. To pursue that, you need expertise in both fields."
> -- Lazlo Bock, Senior Vice President of People Operations at Google, interviewed by Thomas L. Friedman, New York Times, April 19, 2014

Design-build education in architectural schools prepares students in ways that cannot be replicated in the classroom. My university has a long and distinguished history of design-build education, but had not involved students in residential construction. While placing great value on the pavilions, bridges, bike shelters, and other structures designed and built by students over the years, I was convinced that designing and constructing a modest residence would provide a richer and more complete experience. I applied for and was awarded a grant to study existing design-build programs across the country. I visited Studio 804 at Kansas and programs at Yale, Tulane and others. Returning with a deeper understanding of the potentials and challenges, I set out to develop a similar program – the only in this climatic region – at my own university.

The result is BILDS, an acronym for "Building Integrated Livable Designs Sustainably." In this program, students design an affordable dwelling one term, and these and/or other students construct the project during the following two terms. University architecture, landscape architecture, and interior architecture students work side-by side with construction technology students from our local community college. All are encouraged to find practical ways to combine simple, off-the-shelf materials in ways that are respectful of the environment and fully support the lifestyle of the target "affordable" market. A primary objective is to find a balance between "affordable" and "sustainable". While all of the parts are perfectly ordinary, the ensemble should be anything but.

While providing much needed affordable housing, the principle goal of the program is education. Architecture students are exposed to challenges of achieving high energy performance benchmarks while managing a budget. These students work with landscape students who bring interest and expertise in storm water retention, for example; with interior architecture students who design and construct custom cabinetry; and with construction students who offer a whole different set of priorities, skills and vocabulary. All of these students work with instructors and professionals from a wide variety of fields, with material suppliers, and with city agencies and non-profit organizations. Our goal is to educate all involved about practical, sustainable design and construction, where participants can and do learn from each other. Taking advantage of the existing curricular structure, students can move in and out of the program with ease. So not only can they learn from building what they design, but they also can build first and then bring this experience to the design studio.

How can such an educational opportunity enable our program to more critically articulate our mission and our strategic priorities within the rapidly transforming contexts of both higher education and the architectural profession?

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PEDAGOGY: DIGITAL

DESIGN PROCESS IN A DIGITAL WORLD

Brian Grieb, Morgan State University

Technology is reshaping every aspect of our world. People from all cultures and economic backgrounds are becoming more attuned and comfortable interacting through machines and devices. Communication through digital outlets such as Instagram, Facebook and Twitter are the norm. What was once a world consumed by industrialization is now a landscape shaped and molded by an infinite access of information and virtual environments. This potential overload of stimuli risks promoting even shorter attention spans, feeding our appetite for a more virtual world. Is it possible to harness these new norms of digital interaction to shape our design process?

Over the years, much discourse has been exchanged on the appropriateness and the extent that technology should play in architectural design. For centuries, buildings were designed through an intensive, iterative exploration of sketches, drawings and physical models. This methodical process of design investigation was reflective of the building process itself. However, since the late 1980's, manual techniques have given way to a greater reliance on digital technologies in the design studio. Animated debates have spawned across the architectural community, pitting the merits of analogue vs. digital representation against one another. Architects such as Tom Mayne have declared "drawing to be dead" while others have vehemently defended the importance and vitality of drawing by hand. It is the contention of our research that the significance of technological mediums is not merely about the product it helps create, but the design process in which it affords.

Our research proposes re-thinking the traditional design studio model by incorporating a methodology that delivers studio curriculum that extends beyond the classroom walls. However, unlike other studios, special emphasis is placed on structuring the process to be more reflective of the high-paced, technology driven world of the students. Typically ranging from 6-8 weeks, students must design, prototype and construct a public environmental installation for a major urban space. Coupled with design and construction, the students participate in fundraising, marketing, material procurement, logistics and transportation needs. Despite the intensity and wide ranging responsibilities, the students of this new generation weaned on digital diets, adjust remarkably well to the demands of the project.

It is our belief, through our research and pedagogical explorations, that our design process must evolve to embrace the overflow of information and stimuli so that we may better prepare the digital generation for the complex challenges of tomorrow.

MOCK PLAY / FROM VORKURS TO DIGITAL FABRICATION AND DESIGN-BUILD

Nick Gelpi, Florida International University

This paper will highlight several important case studies of mocking-up and situate their history as a foundation of design build. First, Frank Lloyd Wright's full scale column failure test from the S.C. Johnson Wax Administration Building in Racine Wisconsin form 1937 and second the full scale fabric and wood mockup of Mies Van der Rohe's Kroller-Muller Villa from 1912. In both cases the effects of full scale are rehearsed in two complimentary ways. One tests entanglements with reality as the behavior of form as the performance of structural flows at full scale, while the other tests the effects of form at full scale. In both cases something is learned and gained from the process of building at full scale, not possible to be seen in small scale conventional representations. In short, the designs had to be enacted or plated in some fundamental way, as preconceived notions weren't adequate to produce new thought and understanding.

This paper will examine these two canonical studies in relation to a series of bent plywood prototypes which led to the construction of a full scale inhabitable pavilion. The link between the historical case studies and a series of contemporary projects will be delineated and compared in relation to the Bauhaus foundation course, the Vorkurs. The Vorkurs class was the introduction to the curriculum of the Bauhaus in which "…students learned by doing, experimentation for its own sake was encouraged and 'play' was considered key in imparting important theoretical discoveries."

This paper highlights a range of Mocking-up and the progression of the Bauhaus foundation class, progressing from something preconceived to the intentional shedding of preconceptions in the pursuit of new insights into the new capacities and potentials, a relevant definition for 'mockups.' With the Vorkurs in mind we can situate these large scale mockups as examples of experimentation in which thinking is building, and building is play for the sake of experimentation. Shouldn't contemporary design build incorporate more aspects of play, destabilizing the conventional methods of construction and assembly? When Josef Albers taught the 3rd installment of the Vorkurs class, students would visit workshops such as cabinet makers, wall paper factories, even breweries to criticize and rethink their manufacturing procedures.

While both Mockups represent types of built test-subjects, what becomes clear are the differences between the architectural model as a rhetorical device, and the model as an instrumental test subject. These test subjects suggest a new type of practice where the architect looks for evidence outside the normal conventions of practice abandoning preconceptions, producing new entanglements with reality both expected and even hopefully anticipated. This paper argues that the value of any design/build effort is not in the commercial value of the build artifact rather in the insight produced by the process of building, mocking, and playing.

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PEDAGOGY: DIGITAL

ROBOTTREEHOUSES - COLLABORATIBVE RESEARCH: STE(A)M EDUCATION & DIGITAL FABRICATION

Robert Corser, University of Washington

Among today's most pressing educational agendas is engaging young students in Science, Technology Engineering and Math (STEM) subject matter. The arts, including architecture, have an emerging role to play in energizing this agenda, and transforming STEM into STE(A)M. The RobotTreehouse project is aimed at situating (A)rchitecture in the center of this agenda.

A collaboration between a university architecture program, a nationally acclaimed architecture practice and an leading international engineering firm, RobotTreehouses explores the possibilities of playfully integrating STEAM education with advanced digital design and fabrication. "Robot" and "Treehouse" are words loaded with meaning for children and adults alike. Prompted to describe a Robot Treehouse, younger children (ages 8 to 10) were given a room full of drawing and modeling supplies to communicate their ideas and vision. The results and processes were documented and they formed the seed for eight undergraduate and graduate architecture students to design and prototype a full-scale Robot Treehouse in only seven weeks. The result is a classroom in the landscape –a social space and an outlook on the environment – a place for science and play.

The ultimate goal for this full-scale prototype is to engage young people in the observation of their world, and to spark their imaginations about architecture, engineering and fabrication. The RobotTreehouse is designed for adaptive deployment in a forest or a park, at a suburban playground, or on a telephone pole downtown. The final prototype was realized through sophisticated computer modeling and digital fabrication. Students of all ages were exposed to advanced analytical and fabrication tools and processes, and they saw first hand how the digital world that computer games are based in can generate a physical space in which to play, observe, and engage with the world. According to one of the university students: "the Robot Treehouse's poetic form is inspired by the dialogue between the organic shape and the geometric order of a lily pad… The magic of the Treehouse's tensile structure lays in how it responds to human movement. As one leans on the curving backrests and changes the balance of the whole structure, one feels the gentle concentric sway of the platforms. Thus, the Robot Treehouse allows for a personal and intensified connection to the tree and a unique experience of gravity."

The poetics of technology are evident in this gentle responsive movement. It is this gentle swaying that fulfills the childlike dream of an autonomous expressive space, free from the ground and up in a tree. While there is no "robot" in the final built form of this first prototype, digital design and robotic tools were crucial to creating the formal and experiential reality of the treehouse. This RobotTreehouse is the first in a series of adaptive and responsive architectural parasites that will engage youth and adults alike in STEAM education, bringing architectural pedagogy and fabrication research together with K-12 education in an ongoing multi-disciplinary collaboration.

THE DIGITAL VERNACULAR, PRACTICE AND PEDAGOGY

James Stevens, Lawrence Technological University
Ralph Nelson, Lawrence Technological University

Prior to the Industrial Age, most architecture was created by the master craftsman or within the vernacular trades where "design" and "making" were aligned. The Industrial Age, and most recently the Information Age, shifted the role of the architect away from that of the "master craftsman" to the professional "knowledge worker." As a result, a divide between design and making in the practice of architecture occurred. This shift impacted an essential part of the architect's process by degrading the symbiotic relationship between mind and hand and limiting the immediate design consequences that only making can provide. But recent technological developments have changed the economic model of design and making in architectural practice and re-established this lost connection. Most importantly, it has realigned craft, design, and architectural practice, creating a new relationship between the digital, the vernacular and what this paper will define as the digital vernacular.

The purpose of this paper is to examine these new opportunities, define what constitutes the digital vernacular and explore the direct practice and pedagogical impacts making has on architecture. The paper will seek to define the digital vernacular by evaluating digital design-build projects completed in the academy with varying scales, processes and tools. To make evident the virtues of digital vernacular practice, case studies are provided that describe the process of design and fabrication of projects undertaken by [Omitted], an architecture and digital fabrication studio within a college of architecture and design. The selected projects demonstrate the variability digital design-build provides. In addition to emphasizing the future of possible outcomes for design, the studies also highlight the potential for tools to be made and modified according to the needs of the project, ranging from onsite portability to offsite fabrication. These tools provide maker-architects with the ability to create projects of considerable scope, whether they are highly customized masonry units fabricated onsite in India or the offsite fabrication of a full-scale conference room. As evidenced by the case studies, the digital vernacular is an applicable pedagogical approach that provides specific insights to the process of making as well as physical outcomes.

The focus of this research is not to build an inventory of equipment, methods and results; rather it is to develop a higher understanding of what constitutes vernacular practice within the digital age. Exploring the digital vernacular is not intended to seek new form-making, but to improve and inform understanding of traditional vernacular methods and to enable a new generation of maker-architects.

PEDAGOGY: GOING SMALL

DESIGN-BUILD AT THE MICRO-SCALE

Emanuel Jannasch, Dalhousie University

Design-build projects teach lessons that can't be learned at the desktop, and awaken modes of learning that students may never have experienced. However, the projects can only take place where resources and enthusiasm are equal to the logistical challenges. And even then, learning may be limited by the very constraints that make the projects so valuable. This paper describes a project that foregoes size to maximize other benefits of design-build. We are currently preparing for the fourth iteration of the project and report on a range of difficulties, solutions, and plans for the future.

The 4th Element is a material and compositional study of a limited number of components including line voltage electrical parts. It is colloquially known as "the lamp project", but it isn't an exercise in product design, and the projects needn't provide light of any particular quality or efficacy. It is an exercise in design and construction. It requires students to build formwork, to mix and place concrete incorporating cavities and inserts, to work wood among other materials, to make various mechanical connections, to incorporate electrical and piping components, and to achieve passive ventilation. In a small volume, the project offers considerable breadth and complexity of experience. We identify six salient features of interest to teachers.

1. The organizational burden of design-build teaching can be substantial, but it decreases rapidly with project size, and in our case is minimal.
2. The design-build cycle can be too long for the academic rhythm. The 4th Element resides in an existing, one-semester course.
3. The delivery demands of design-build can inhibit design investigation. The small scale of our project allows the students time to develop and compare parallel or iterative approaches.
4. Regulation of technical trades means that critical aspects of systems integration and construction must often be left to others to design and execute, or to be left out of the project. Our exercise includes M and E experience.
5. Design-build courses tend to be elective, and may attract students that already have experience of hands-on learning. The 4th Element is part of a mandatory class, so all students complete it, especially those who have the most to learn.
6. Design-build projects are generally undertaken by groups. This fosters collaborative skills but can limit individual exposure to the particularities of building. Our micro-project is completed by individuals, each of whom confronts all of the difficulties entailed.

This project does not bring the rewards of working for an outside client. It cannot provide the structural and project management lessons of full scale building. But students are highly motivated to complete a project that is in most cases their first built work, and they bring substantial ambition to bear.

The teaching principles we set out could be used to design other exercises on a similar scale or to refine traditionally sized projects. As at our school, they can provide basic learning on which more advanced design-build can later be undertaken.

LET'S BUILD BIGGER: FOUNDATION PROJECTS AT FULL SCALE

Liane A. Hancock, Louisiana Tech University

In introductory studios, projects are often simplified to achieve specific pedagogical outcomes. By artificially separating issues of mass, structure, composition and spatial organization, individual exercises can be developed to focus on each. This simplification results in a teaching model that does not reflect the practice of architecture. In addition, freshman level projects often rely on reduction in scale to contain project implications. However, these limitations make it difficult for freshmen to understand implications of their designs, and in particular, what it would be like to construct and inhabit their designs at full scale.

This paper presents introductory exercises which teach students the implications of materiality, weight, and spatial character through design at full scale. These exercises are rooted in exploring composition and capitalizing upon inventiveness. They introduce the multivalent character of design, allowing students to quickly learn to work with numerous design issues at the same time in order to come to a single solution. Three case studies are presented.

Structural exercise: students support a collection of plaster masses with insulation rods. Developing a connective logic between the rods and an intuitive understanding of compression and tension, they react to the weight of the plaster masses to create complex and unexpected structures. This exercise requires that students develop a creative synthesis of structure and geometry in service of gravity.

Inhabitable composition: this project asks students to operate between maquette and full scale, in order to reveal the implications of their design decisions. Students begin by designing a composition of linear members that encloses space. Working in groups, students develop designs in a scale model of the site. Students then translate their design to full scale, using a kit of materials.

Tectonic structural construction: students develop a complex geometric volume, which they then divide into ten equal sections. Each section is envisioned as a structural rib, which when considered together enclose the space described by the original volume. Students work to develop a structural logic to the ribs, employing linear members in tension and compression. Students vary materials and the sizing of members to create compositional hierarchy. As students move from scale models to full scale construction, they develop tectonic resolution between members through detailing. In particular, students must consider the limitations of their own ability to work with tools, and the stock lengths of materials, using their ingenuity to invent ways to build their ideas at full scale.

In all three cases the students gain a direct physical and haptic knowledge of the materials they use. They acquire an understanding of the relationship of abstraction and modeling to construction in reality. They translate between designing in maquette form, when a project appears as an object, to full scale installation, where they must consider its spatial implications. They learn to solve many problems with a single solution. Finally, they become confident in their own ingenuity to problem solve and to invent, rather than to rely upon predetermined answers.

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PEDAGOGY: GOING SMALL

MICRO-DESIGN|BUILD: URBAN APIARIES AS AN INTRODUCTION TO DESIGN|BUILD EDUCATION

Carey Clouse, University of Massachusetts, Amherst

During the Fall Semester of 2011, eight first-year students with no prior agricultural, architectural or construction experience designed and built four original bee hives 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 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.

Unlike most studio-based design|build courses, the hive design|build project presented freshmen students with a tangible, hands-on opportunity to engage with the issues of local food production and food security, in the format of a one-credit elective. Short-term design|build can be a major undertaking for both teacher and student, but this miniature project scope allowed for a host of manageable outcomes: the introduction to new tools and design techniques, a beautifully-crafted product, and meaningful community engagement.

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. In researching, designing, and building the hives the students were invited to explore, intellectually and physically, a critical engagement with their community.

This paper will share the organization and outcomes of this one-credit seminar, as well as the methods, challenges and pedagogical opportunities this model presents. The paper will then proceed to interrogate the topic of micro-design-build, as a pedagogical tool that is useful as preparation for, or in lieu of, longer and more committed design-build experiences. The paper will draw upon small-scale design-build examples from the past (Buckminster Fuller's Geoscope at Cornell) to the present (the small-scale projects initiated by the Tulane City Center). At the heart of this paper is an effort to draw attention to small-scale forms of design-build education, and the structure of such efforts in the classroom.

PHYSICAL COMPUTING WITHOUT COMPUTING: A SMALL, RESPONSIVE DESIGN-BUILD PROTOTYPE

Joshua Vermillion, University of Nevada, Las Vegas

The built environment is rich with opportunities for embedding and integrating digital technologies to create responsive and adaptable systems. Physical computing, a term coined by Tom Igoe and Dan O'Sullivan of New York University, refers to these sorts of systems that can sense, interpret this data computationally and, in response, physically change. The technical implementation of these systems requires a broad range of skills that span multiple knowledge domains—design, engineering, mechanics, programming and computer science, robotics, mathematics, electronics—just to name some. There are more and more examples of built design projects that successfully negotiating these interdisciplinary challenges and deploy them to create responsive prototypes with marvelous effects. However, assuming that the design of the built environment will increasingly integrate physical computing systems, does our architectural repertoire of skills and knowledge need to be adjusted to meet these challenges? In particular, how do we educate and prepare architecture professionals for this future of physically active and interactive environments? Will we be professional architects, and also have to be professional programmers, engineers, and electricians?

This paper outlines a framework for better understanding the appropriate skills and roles of design students as developed by the author for a one-week short course on the topic of physical computing and design. The process of designing this short course forced an examination of how to introduce physical computing to students with novice understandings of these systems and how they work, while maintaining expectations to prototype and produce a full-scale spatial installation with only one week from start to finish. This framework allowed the short-course students to deliver a focused and well-crafted design-build outcome, while integrating the complexities of human interaction, spatial effects, fabrication, detailing, and prototyping.

"LOGISTICS"

ASTERIX ON THE WEST COAST

Volkan Alkanoglu, Georgia Institute of Technology

The 'Adventures of Asterix' is a collection of comic books written by the French illustrator Rene Goscinny and Albert Uderzo.

The story line describes the entirety of Gallia as occupied by the Romans with the exception of one settlement. The village of Asterix and his eccentric fellow Gauls resists the Roman territorialization with their smart, clever and sophisticated ideas as well as the support of a magic potion. Stimulated through the intake of this special elixir, the villagers are able to fight off the Romans with their temporary superhuman power.

Asterix, the main character of the adventures, is a brave, shrewd warrior of somewhat diminutive size, who eagerly volunteers for all perilous missions. Obelix is Asterix's closest friend and works as a sculptor. He is a tall, obese man with two notable attributes: his phenomenal strength and his voracious appetite for food, especially wild boar. His superhuman power results from having fallen into a magic potion cauldron as a boy.

Getafix is the village druid. In appearance, he is tall with a white beard, white robe, red cloak. He is usually seen in possession of a small golden sickle. While his age is never stated, in the story of Asterix's birth (in which all but the oldest villagers are seen as small children), he appears unchanged.

SCI-ARC, the Southern California Institute of Architecture based in Downtown Los Angeles, mirrors the faith and stamina of this Gallian village in many ways. It is a small renegade architecture school situated within an ocean of overpowering large institutions with highly acclaimed reputation. Yet, since its inauguration, SCI-ARC has been able to not just compete against these academic giants, but fully resist the mainstream paradigm of the discipline and profession. For many decades now, the program has constantly managed to stay outside the box while constantly pushing the boundaries of architectural innovation.
So, what is the magic potion behind the SCI-ARC Model and how does it maintain its unique status within the ordinary architectural landscape?

The full paper will critically evaluate the opportunity SCI-Arc offers its faculty to engage in design/build projects with and for the School. From small scale installation within the school building to large scale pavilions for graduate ceremonies the faculty is able to implement a range of design/build projects and hence keep the status of a contemporary place of education.
The paper will discuss the unique role of the schools mission; identify its contribution for practitioners and educators; specify its achievements and production; and conclude with its potential contribution to contemporary models of design/ build in an academic environment.

TERRITORIES OF EDUCATIONAL DESIGN-BUILD: TOWARD AN EVIDENCE-BASED DISCOURSE

Stephen Verderber, University of Toronto

The design/build "movement" remains a ship without a rudder, sailing from port (project) to port without a genuinely theoretical position or discursive agenda. Lacking its own distinct discourse it remains arguable that it is not now nor has ever been a movement per se. Instead, it remains more like a series of moments. This position undercuts, unfortunately, a tremendous amount of important work and pedagogical advancements made over the past four decades. It is time to enter the fray, to join and inform broader disciplinary and interdisciplinary discourses. Educational Design-Build need to longer continue to revel in its renegade outsider status within the academy. It has in fact prospered by consciously existing in the margins, resulting often in unusual degrees of freedom to experiment outside of conventional curricular boundaries, and in the extreme to operable outside conventional university administrative channels. It is arguable that this freedom has been essential to continued advances, advances that have led to a significant landscape of current activity across the continent. Yet this freedom has also inhibited its scholarly evolution. Ten territories of Educational Design-Build (E-db) are put forth. Collectively, they represent a conceptual overview of various streams of activity expected to characterize the movement in the coming years. This is followed by the presentation of an evidence-based perspective for E-db that calls for systematic approaches to documentation, to the generation of new scholarly knowledge, and to ensure knowledge mobilization into other disciplines and society at large.

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"LOGISTICS"

DESIGN/BUILD GONE SOUTH

Christopher D. Trumble, University of Arizona
W. Geoff Gjertson, University of Louisiana - Lafayette

> "...just talked to my attorney, we need to get this resolved. If I don't hear from you I will file suit." - excerpt from voicemail from a neighbor of design build project 04/11/14
>
> "...been getting calls from Charlie and his family. He says the afternoon sun is reflecting off the shelter and turning his kitchen yellow, a color he doesn't like." - excerpt from conversation with Project Manager from Transportation Department, May 2011

Educational design/build has a broad spectrum and takes many diverse forms including the studio-based professional 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, building codes, gravity and use.

Many interpretations of educational design build are demanding endeavors with challenges and values closely associated with professional practice. These include project planning, funding acquisition, legal authority, contracts, clients, liability, and the physical realization of actual architectural products for use by actual users; done for the purposes of education, service and research. These 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.

Upon completion, educational design/build projects are typically 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 is 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.

The underbelly of educational design build is the other realm of truths, one that is equally if not more positive and most certainly more negative. This realm is often suppressed due to the controversial efficacy of educational design/build and the tenure and promotion pressures imposed on participating faculty. This paper presents the rarely disclosed ways educational design/build projects go south.

Over a ten-year history, through more than a dozen design/build projects, the authors from two different universities have witnessed and been party to a wide diversity of calamities. Although they have not had life-threatening injuries, they have had threats of lawsuits, shouting matches with attorneys and administrators, resentful students and clients, structural failures and project overruns. Through the examination of their failures they aspire to ultimately improve the pedagogies and processes of educational design/build. Design/build endeavors are an ever-growing facet of architectural education. New faculty practitioners of design/build deserve an open, honest and direct disclosure of the causes and effects of both common and unique dilemmas and catastrophes. These span from anticipated and controlled teaching moments, to unforeseen conditions understood through hindsight, to absurd outcomes that could never have been anticipated.

HIGH TECH / LOW THRESHOLD - DIGITAL COMMUNICATION IN DESIGNBUILD INITIATIVES

Nina Pawlicki, Cocoon

Today´s architectural practice and academia is being reshaped by technology. Apart from the more visual effects such as digital fabrication or computer modeling techniques, it is also deeply affecting the way the different stakeholders are communicating.

New means of communication may serve as a working tool for ALL actors involved. Different disciplines, cultures, levels of education or forms of access to the Internet are a challenge public interest design projects are facing. To tackle this challenge by incorporating new media as a tool in order to benefit from the possibilities they are offering is the crucial point that yet has to be solved. Many DesignBuild programs with a focus on a socially engaged architecture and/or cross-cultural exchange as well are seeking to facilitate their work by the means of new communication tools. Online meetings with the clients that might be far away, live-streams from the building site, webblogs offering insightful views and worldwide research possibilities are clearly affecting their work.

The paper will present a DesignBuild-Studio and the resulting development of a DesignBuild network initiative as case studies. The 'Mexikoprojekt' is a DesignBuild program established in 1998. So far 43 building projects were realized by European and Mexican students in Mexico for communities in need. Whereas the challenge of communication between the students as planners in Europe and the clients in Mexico stayed the same for the lifetime of the project during all stages of the process: design, realization and documentation/evaluation, the means of communication changed from post letter to regular Skype meetings.

Based on this experience an international DesignBuild exchange network is currently being developed by an European research consortium. It aims to promote the implementation, distribution and sustainability of the DesignBuild methodology by using a web-based platform as most effective tool. It will enable the knowledge transfer and exchange of experiences amongst DesignBuild protagonists. It will mitigate problems and strengthen the efficiency in the work of DesignBuild Studios through creating a corporate identity for DesignBuild Studios and facilitating the search for cooperation in regards to partners and funding. It will incorporate an extensive interactive DesignBuild database that will be filled by the acting participants worldwide.

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PEDAGOGY: LEARNING PRACTICE

DESIGN/BUILD AS COLLABORATION: HANDS-ON CONSTRUCTION TO FACILITATE COMMUNICATION AND DEDICATION

Alexis Gregory, Mississippi State University

Design/build has become so ubiquitous in NAAB accredited architecture programs that over 80% have some form of design/build program. This is necessitated by the interest of both faculty and students to provide an alternative to lectures as the only form of information transfer, primarily through interactive learning experiences such as design/build. However, collaboration is an important, and necessary, component to design/build that can teach students the skills needed to communicate with colleagues and to aid in the investment in the project by all involved parties.

This abstract proposes a paper that examines three various design/build projects in three different courses. The scale of the projects vary as well and include small constructed details focused on specific connections, storage sheds for Habitat for Humanity Houses, and partial full construction mockups for a Habitat for Humanity prototype. The range of scales, courses, project types, and pedagogies created a wealth of information on how collaboration can work, or not work, in design/build projects. The paper will discuss the specific collaboration methods for each project and critique each as to its efficacy and duplicability.

Collaboration has become more important in the field of architecture over the past few years. The NCARB 2007 Practice Analysis of Architecture noted "Collaboration/Cooperation" as only the 7th most important change wanted in the field of architecture. However, the NCARB 2012 Practice Analysis of Architecture released in June 2013 gives more in-depth information on the importance of collaboration. Educators, interns, and licensed architects were surveyed to gauge the level of agreement on the knowledge and skills that students were achieving during their education.

The Education section of the 2012 NCARB Practice Analysis of Architecture delves into the knowledge and skills that educators and practitioners think architecture students should achieve. Select data from this report shows that over 50% of architects and educators agree on the importance of the understanding of certain knowledge and skills such as different project delivery methods, the roles, responsibilities and authorities of project team members during construction, and building information modeling (BIM) and its impact on planning, financial management and construction documentation. Additional results of the 2012 NCARB Practice Analysis of Architecture are that more than 80% of practitioners that completed the survey feel that "collaboration with stakeholders is important, very important, or critically important." Educators note that collaboration is included in their program, with a response of over 50%, and 70% of educator respondents noted that students worked collaboratively with either guidance or feedback from faculty, or collaborated independently.

The use of design/build projects of various scales and scopes will allow architecture programs to facilitate the collaborative knowledge needed to educate our students for the future of the profession, as well as initiate research into working with the construction sector. The analysis of collaboration in past projects will allow the development of best practices for the inclusion of not just learning about architecture and construction, but also working out projects and ideas with others.

INTERNATIONAL DESIGN BUILD: EDUCATION/ PROFESSION COMPARISONS

Phil B. Gallegos, University of Colorado Denver

With over 25 years of educational experience in design build program, the most recent design-build exploration has in the arena of international programs. These international opportunities challenged educational assumptions, material differences, and the implication of integragted approaches required in both educational and professional settings.
Incresingly, the world is reposnding to both catastrophic events, climate induced disruptions and human induced environmental stresses caused by wars and civil strife.

As the profession took a significant lead in initial exploration of design build as a project delivery method, the most visionary thinkers in the professional have responded to the opportunities and dangers of expanding design build in stressed situations. A good example of visionary thinking by a professional is the recent Pritzger Prize winner Shigeru Ban. The next question for educational design build programs is to ask parallel questions about design build possibilities in other countries.

This paper will examine a university led design build project in Guatemala as a University led program, and Rwanda a professional service.

The overarching goal is to explore similarities in the framework of a university program and a professional firm. The framework will be to compare and contrast the needs for integration of knowledge, communications, project delivery implications, and the problems with international design and construction. The methodology will be to explore the results of design and construction work. The paper will also examine appropriate context, cultural and political, and discern lessons about program selection, expectations, design results, dangers and management issues.

The implication is to address the quality of design work and the implications for both educational objectives and professional work.

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PEDAGOGY: LEARNING PRACTICE

REALITY CHECK: PEDAGOGY AT THE INTERSECTION OF PRACTICE, EDUCATION AND OUTREACH

Marie Zawistowski, Virginia Tech
Keith Brian Zawistowski, Virginia Tech

Though much of architectural education revolves around theoretical concepts necessary to the development of creative sensibilities, a key curricular component in 5-year undergraduate professional degree programs is the obligation to prepare students for the practice of Architecture. In this context, design/build is a strategy to balance theoretical underpinning with technical aptitude.

Reality Check is a comprehensive case study of a 2-semester studio integrated with required peripheral courses such as Structures, Systems, and Professional Practice. It focuses on the development and implementation of a single internationally acclaimed project in which students collaborated with community leaders and industry experts to identify needs, develop concepts, and propose solutions to real-world problems. The goal of the project was to teach students the skills necessary to confront the design and realization of architecture projects, with a consciousness for social and environmental issues. It removed the abstraction, engaged students' initiative and encouraged them to ask fundamental questions about the nature of practice and the role of the architect.

This case study will examine the pros and cons of public versus private project selection, the size and duration of the design/build studio, the situation of design/build within architecture curricula, the balances of student leadership and faculty guidance, the equilibriums of project scale and technical complexity, and the nuances of independent student development and evaluation within a collaborative, consensus-based pedagogical setting.

A Reality Check is not a faculty-led research initiative with student assistants, a practical internship with professional mentors or a professional apprenticeship with studio masters, nor does it profess an accepted understanding or a common way of doing. Rather, it is a learning environment where projects are led by students and faculty are simply advisors who bring resources to the discussion and refocus or encourage as needed.

Only through experiencing the process of making architecture in its entirety can we give students the competence and confidence to design the future of their discipline.

FROM THE END TO THE BEGINNING: DESIGN-BUILD TEACHING THROUGH THE LENS OF THE SOLAR DECATHLON

Mark McGlothlin, University of Florida
Bradley Walters, University of Florida

Architecture, which has always involved drawing before building, can be split into prior and subsequent activities: design and construction. The building can be discarded as an unfortunate aftermath, and all the properties, values, and attributes that are worth keeping can be held in the drawing; perhaps a better way of putting it would be to say that they retract back into the drawing.[1]

Robin Evans' comments, offered as part of a broader review of Daniel Libeskind's Chamber Works: Architectural Meditations on Themes from Heraclitus, seem a strange point of departure to reflect on constructing architecture. Written in 1984, Evans' thoughts were a provocative reminder that architecture's meaning was not entirely defined by the act of construction, and that a critical uncoupling of design and construction could yield profound and powerful architectural results. In that era, architectural education favored experimentation through the reflective crafting of spatial ideas, probing issues of our discipline's interiority as situated within and amongst other forms of linguistic, artistic, cultural, and social production. Like many of today's educators, we came of age during precisely this moment. The educational experiences upon which our fundamental architectural beliefs were founded reinforced the potency of architectural meaning as being influenced by, but independent of, construction.

As we donned mortarboards and prepared to engage the material world of practice, the architectural academy was just beginning to recognize the emerging voices of design-build methodologies as a critical component of design pedagogy. In hindsight, this interest in hands-on building is not entirely surprising, as it helped offset the earlier retreat of architecture towards an exercise of images and words. But more importantly, it reminded the discipline that direct encounters with materials and construction provided a kind of learning experience that transcended theoretical trappings and offered the potential meanings found only through the making of "real" things.

In retrospect, what stands out to us is not the apparent dispute between the primacy of either theoretical prowess or material mechanics in architectural education, nor do we wish to create a tempest where one does not exist. Rather, we are interested in exploring the distinctions, overlaps and syntheses between these two principles within design teaching, the potential ends that might be reached, and most importantly the knowledge they imbue, both explicit and tacit. We see the opportunity to probe issues of learning that cannot be taught and architectures that cannot be built. Design-build projects bring these issues into acute focus. We sit at a curious moment, closing the chapter on one solar decathlon house and the initiating of a second. As we take a moment between these two projects, we find ourselves reflecting on both theoretical intents and material realities, and in doing so wishing to examine the broader role of design-build projects within the layered fabric of design pedagogy.

Notes:
1. Robin Evans, "In Front of Lines That Leave Nothing Behind," in Architectural Theory Since 1968, ed. Michael K. Hays, K. Michael. (Cambridge, Mass: The MIT Press, 1998), 488. Print.

BUILT WORKS 4

ART FARM - DESIGN AT HAND

Jeffrey L. Day, University of Nebraska-Lincoln

> "His universe of instruments is closed and the rules of his game are always to make do with 'whatever is at hand'..."
> Claude Levi-Strauss

Debates about sustainability in architecture frequently reduce to arguments founded on one or another value system. Certain schools of thought hold that sustainable design produces constructions that consume as little energy as possible. Others claim that the goal is to be "eco-effective", not merely to "be less bad" by consuming less energy. A third orientation promotes high quality itself as an assurance of sustainability (the production of environments that promote stewardship reduces that likelihood of obsolescence). All of these strategies for sustainability share a fundamental goal: to retard entropy. All are grounded in a scientific orientation to the world that holds universal truths to be universally applicable.

This paper explores an alternative based not in the proper role of science, but in the expedient constructions of the everyday – the tactical improvisations of a fluid and mutable design process. Drawing on Levi-Strauss' description of bricolage and Michel de Certeau's notion of tactical practice ("making do"), the paper argues that a pliant, unstable, and opportunistic form of practice is "sustainable" due to its ability to constantly adjust to local conditions. Where science relies upon the rigid structures of deduction and induction to produce events, bricolage draws upon abductive reasoning and the immediacy of events in medias res to generate new structures. Material organizations created through such fluid, non-linear and recursive processes are apt to produce far more negotiable relationships between space, form and inhabitation. Their open-endedness transfers from the relatively compressed period of making to the extended useful lifetime of the project.

The subject of this discussion is the Red Shed Video Lounge and other projects created by ----, a design-build program, for Art Farm (a non-profit art residency institution located on a 40-acre farm in rural Nebraska) that engage the problem of the post-agricultural landscape by treating the residue of 150 years of productive land use as the raw material for a new kind of creative inhabitation on the land. The Shed serves as gallery for new media art constructed using a 100 year-old farm building in conjunction with a smooth-surface interior fabricated from contemporary synthetic materials. With the Shed at its center, the paper will examine the broader theme in the context of other ongoing projects at the same site.

Both art work and design work created at Art Farm tackle the multiple histories of objects (buildings), reinterpret them, give them new life, new histories, and new narratives. As part of an overall strategy for the development of Art Farm the reuse of existing materials often involves a radical juxtaposition of new and old forms. The Red Shed is representative of this process and the shared attitude towards materials that emerges from diverse practices at Art Farm. The paper thus argues for a value-driven, experimental design-build pedagogy that seeks relevance outside of the productive and technique-laden mandate often given such programs.

BURKE PARK OUTDOOR CLASSROOM: A DESIGN/BUILD STUDIO HELPS BUILD COMMUNITY

David Kahn, The University of Colorado Boulder
Brian Cook, The University of Colorado Boulder

To address economic and social sustainability, the Boulder, Colorado Parks and Recreation Department engages community stakeholders to provide stewardship. At Burke Park, a studio of University of Colorado Environmental Design (ENVD) students worked with City staff to lead a collaborative Design/Build project uniting multiple community groups to conceive an outdoor classroom. The City provided a budget of $30,000, and a three-month time frame to design and execute the project.

The ENVD studio utilized a multi-faceted community engagement strategy to involve a diverse, and constantly emerging constituency of park users. Creative momentum was sustained through engagement techniques involving elementary school students, participatory installations, material prototyping, web-based community communications, and interpretation of natural, cultural, and oral histories. The process resulted in an expansion of the concept of an "outdoor classroom" to produce unexpected architectural and educational landscapes.

Burke Park sits in the heart of a diverse, multigenerational neighborhood including a K-8 charter school and retirement community. The ENVD Program began by conducting a class with the school focused on envisioning potential park improvements via art and story telling. During public brainstorming workshops, participants expressed the desire to connect and interact. The design team invited the community to view the project through the lens of universal space - the idea of an inclusionary landscape that is accessible and usable to every group or individual.

To understand the potentials of the site, the design studio provided hay bales so community members could stack and arrange them, creating spaces and temporary places. This led to spontaneous interaction and play by community members, and became an ever-changing conversation piece for the neighborhood. People came forward to share stories of nature and culture that had transpired over decades, and information about the park's birds and trees. The community's enthusiasm to use and learn from the park in multiple ways led to the concept of interpreting the multiple personalities of the park. The projects' program transformed from a singular outdoor classroom to a constellation of interactive, educational landscape features rooted in the fundamental qualities of the site. These include:

- A folded gathering deck punctuates the design. The form provides multiple ways of inhabitation and education, by groups or individuals.
- An arboretum collection representing species for the local environment, providing educational opportunities and horticultural information for gardeners and naturalists.
- A series of pocket biome ecosystems replicating regional ecologies.
- Five landform mounds shaped and planted with native grasses for nature play and geographical awareness.
- The 10 Walks of Burke Park, a web based interpretive guide, reveals the layers of the park. It includes sections on bird watching, the arboretum, geological and ecological histories, and oral histories from community members who have witnessed the park's transformation.

This project left a tremendous impression on the neighborhood. Particularly significant was the opportunity for young students to get involved, and see their input realized. Beyond physical accomplishments, this project helped establish a sense of agency and ownership. With learning and community-building entwined, three generations were empowered to transform their environment.

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BUILT WORKS 4

FIELDWORK: THE HOUSE AS A CAMERA

Regin Schwaen, North Dakota State University
Meghan Duda, North Dakota State University

This paper presents a collaborative design/build project between a photographer and an architect teaching at two different universities. The idea was to explore technologies and design moments that would complement each other in such a way that photography would not be secondary to architecture. Taking inspiration from Gordon Matta-Clark [sculpture], Vilhelm Hammershøi and Jan Vermeer [painting], and Carlo Scarpa [architect] the design reexamines a house from 1919, cutting out sections and adding small additions. Photography was essential to the process.

Thinking while building. We began the design process with a set of drawings. The camera replaced the model as a design tool informing alterations throughout the construction process. We realized under the demolition and construction that this house wanted to become a sequence of moments. Architecture is never framed but it does frame our views, much like the ground glass on a camera. We live in such a way that we always cross thresholds of doors or gaze through windows. However, how would we create moments? We realized that the camera was a tool. We photographed under the construction and then reviewed the images. We came to see the demolition of selected walls somehow like a shutter within a lens. Then we constructed new walls and stepped back and took a new series of photographs. At first this was a simple documentation but we quickly realized that the images suggested something else. The project became some kind of loop as the architecture suddenly wanted to be framed. With the feedback from the imagery we altered finished walls after we realized that the previous photos had captured moments like a Hammershøi painting or a view designed by Carlo Scarpa. The tool of the camera captured those moments that we had not seen being on the site. This was not a question of inspection. We had constructed those walls ourselves but strangely the drawings could not capture certain dimensions, like a view of a tree framed by studs or a view to a river while siting down. While building we realized that the drawings were like a musical score without interpretation. We needed the camera to fine tune the project. This was not our intention in the beginning. We discovered this simultaneously while building. Is this secondary association the reason that Carlo Scapa was never in the studio but always on the site? In the beginning there was the camera that recorded and the house that wanted to become a house but the project ended up with a camera that became a house, and function became more a vehicle for moments within.

Can this become a new way to teach design to architects? Can the camera be a primary tool in the designer toolkit?

QUINCHA: A PERUVIAN DESIGN/BUILD EXPERIMENT

Michael Carroll, Southern Polytechnic State University

Some projects have long histories. The story of this project begins in 1987 when a Canadian school of architecture together with a Peruvian school of engineering decided to construct a series of design-build projects funded in part by the Canadian federal government. The central focus of the project was the reinterpretation of quincha, an earthquake-resistant vernacular way of building in the coastal region of Peru. The result of this inter-disciplinary project was a series of schoolhouses constructed in a marginal settlement on the outskirts of Lima.

Twenty-five years later, this paper seeks not only to tell the multi-layered story of project, but more importantly to interview the people that were involved and to document the current condition of the schoolhouses that were completed in 1989. As well, the paper intends to update the research on contemporary quincha construction and speculate on new directions for building techniques that incorporate a range of new materials such as carbon fiber reinforcement and hydrophobic admixtures for concrete screeds.

The story of the project is an incredible one, situated in Lima in the late eighties during the political uprising of the Maoist regime, the Sendero Luminoso; this architectural project encompasses a cast of characters and a series of events that challenges the boundaries of a typical design/build project. It examines the tensions that emerged as very different worlds collided. It is a project in which the straight-laced bureaucracies of academia and its idealistic expectations are matched with the realities of building in an impoverished community driven by an informal black market. It is a project, in which the cultural differences of the North American and the South American, the rich and the poor, the 'educated' and the 'undereducated' literally come head to head. A project that would bring together a diverse range of people, that included academics, engineers, architects, artists, social scientists, community leaders, translators, and on more that one occasion, a roster of revolutionaries.

It is also a story that encompasses travel through the diverse landscapes of Peru, from the peaks of Machu Picchu, Cusco and Huancayo, to the shores of Lake Titicaca and the Amazon River, to the Pan-Am Highway and its coastal towns of Trujillo and Pisco. It is an architectural tour that includes a diverse range of building strategies from the thin, elegant quincha houses of the coastal desert to the massive stonewall construction of the Incans in the Andes Mountains.

Through this paper that documents a series of design/build projects constructed in Lima twenty-five years ago, it is the hope that some truths will be revealed on the nature of architectural research in which design and building are the central means of academic investigation. In this mode, thinking, drawing and building become an inter-connected process in which the outcome is not only a series of buildings, but more importantly a means in which a traditional way of construction, namely quicha is remembered, reinterpreted and reintroduced into a culture that had almost forgotten it.

CONTEMPORARY SURVEYS

CRITICAL FORMATIONS: THE LATENT ASPIRATIONS OF ARCHITECTURAL INSTALLATION

Aaron M Willette, University of Michigan
Robert Trumbour, Wentworth Institute of Technology

From prominent curricular positioning to increased visibility in architectural journals to this academic conference, design/build has been increasingly foregrounded in architectural discourse partially due to an expansion of its physical domain. By embracing topics positioned at the periphery of professional practice such as computational design, industrial production, and social agency, and coupling them with its core interest in the tacit learning inherent in physical production, design/build has expanded its pedagogical definition to include allied methods of physical exploration such as furniture making, physical computing, and installation. By increasing the conceptual and scalar territory of design/build it has become more accessible to a larger audience and more valuable to to the academy.

Installations inhabit a specific area within that territory due to their directness, expediency, and ephemerality. First gaining value as an artistic medium during the 1960s and 1970s due to its ability to integrate emerging technologies (such as photography and videography) and hybrid artistic-spatial mediums (such as performance, landscape interventions and urban engagement) into the traditional categories of the fine arts, installations call into question the premise of art itself, resulting in a dramatic shift in the way that artists engaged their craft, the physicality of space, and the participatory agency of the audience.[1] The medium has proven similar value to architecture, allowing for the spatial condition to respond to and incorporate new technology, cultural/social agency, material experimentation, and theoretical agendas with a freedom which challenges traditional connotations of architecture.

But does the architectural installation carry with it the same potential for reinvention (both professionally and conceptually) prompted by its artistic equivalent, or is it simply a means to an end without loftier aspirations? While it is arguably too soon to espouse the former, it has become evident that installation's utility to the larger discourse of architecture may lie in its proven ability to transition academic research into the built environment through incremental controlled experimentation and full-scale making. A truly spatial medium less constrained by budget and liability than larger design/build projects, architectural installation provides a format sympathetic to the needs of researchers looking to further their understanding through its tacit engagement and translation into built form.

Through the study of architectural installation projects that have evolved out of critical academic research such as Stuttgart University's ICD/ITKE Research Pavilions and Jenny Sabin's My Thread Pavilion, this paper endeavors to establish installation as an entry in the design/build lineage uniquely positioned to couple the tradition of tacit learning with contemporary architectural research. Positioned within the context of the expanded pedagogical definition of design/build, such work stitches together oft-disparate components of architectural curriculum such as computation, theoretical discourse, and construction methodologies into a feasible and cohesive project that furthers its core research agenda while demonstrating its inherent architectural possibilities.

[1] Rosenthal, Mark. Understanding Installation Art From Duchamp to Holzer. New York: Prestel Publishing, 2003. Print.

WALKING AWAY: ALTERNATIVE PRACTICES IN SOUTH AMERICA SOUTHERN CONE IN THE 1960'S AND THEIR LEGACY

Gustavo Crembil, Rensselaer Polytechnic Institute

"If you have an incredible idea, the best is to make a song / It has been proven that it is only possible to philosophize in German" (Lingua, Caetano Veloso)

As Brazilian singer Caetano Veloso argues in his song, 'the South's' contribution to humanity seems constrained to Culture –music, literature, art, films, or food. Science (even social science) is 'the North's' domain. Likewise, theory, the armature to operate -and dominate- the world, has remained the North's privilege, and with that the whole discursive control on the 'Future'. Could _otro_ future be possible?

The modern ideal was built upon disciplinary oppositions (urban – rural, elite-mass, body – mind, etc.) that in architecture resolve in the dialectic theory vs. practice (or thinking vs. making, or design vs. building). In the second half of the XX century, in South America's southern cone (Brazil, Uruguay, Argentina, and Chile) a new tradition brew from academia and politically conscious architects that discarded that opposition and claimed the act of building as a rightful intellectual way of thinking.

In the heat 1960's post-Brasilia revisionism, the _Nova Arquitetura_ group (Ferro, Imperio, Lafevre) in its search for a "poetic economy" claimed that _o canteiro e o desenho_ [the work site is the design] where all relations of production come to be resolved. Almost contemporarily a tight community of architects and writers converged in the Universidad Catolica de Valparaiso, Chile, re-founding its architectural program and giving birth to the so-called "School of Valparaiso" -- and its communal testing ground: _Amereida_ or Open City --, an educational experiment that understood the processes of building, construction and fabrication as foundation of a new architectural poetics, radically challenging the traditional pedagogical scenario and reclaiming architecture's social role. These precedents will setup the conditions for the rise of new aesthetical and ideological paradigm that will consolidate and be continued in other regional enclaves, even though the following repressive political period would muffle its development. In the democratic context last decade, this legacy will be being claimed by a new generation of young practitioners that were sprouting and extending across the sub-continent through design-build collective practices, such as URO1.org (Chile), Al Borde (Ecuador), A47 (Argentina), Lab.Pro.Fab (Venezuela), Oficina Informal (Colombia), among many others. Meanwhile _La Escuela de Talca_ (Universidad de Talca, Chile, a rising new architectural program) was updating Valparaiso's legacy with a clear social mandate, most notably through the required "design and built" graduation thesis that have started to populate the school's surrounding communities and landscape.

This paper will identify and define shared characteristics among these experiences, such as the notions of _travesia_ (the journey, both as physical and intellectual travelling) and _ronda_ (ring, collective thinking and making), _sitio_ (site, both as context and work-site), and _proceso_ (process, buiding as material and social performance); and argue that they are shoring the rise of new identities based not on figural questions, as expressed by traditional modernism, but in the deglution of oppositional differences between theory-practice and the embracing of "making" as a critical (haptic) thinking practice.

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CONTEMPORARY SURVEYS

WHAT TO BUILD? ON THE THEMATICALLY DIVERSITY OF UNIVERSITY BASED DESIGN-BUILD ASSIGNMENTS AND THEIR DIFFERENT IMPACT ON LEARNING OUTCOMES AND PROJECT PROCESSES

Peter Fattinger, Vienna University of Technology

The choice of an appropriate design-build assignment is a key-factor for the success of a university based design-build project. The paper discusses the pros and cons of different building-tasks as basic conditions for a learning-project.

In contrast to classical architectural practice, where architects are hired to design a certain building, the construction-task of design-build projects is very often selected on the universities, faculties or students own initiative. This means a huge opportunity, and accordingly responsibility for the ones who decide over the building-task. There is a wide range of motivations and framework-conditions which effect this decision.

It is noticeable that social aspects occupy a large place in the selection of the design-build task. Under the headings of “socially responsible architecture”, “community action”, “urban activism” or “humanitarian design” architecture schools undertake projects, which try to make a positive impact on the society in general. Another essential claim in the thematic orientation of the work of many DB programs is, to offer a scope for experimentation to the students. Universities are encouraged in their role as pioneers of innovations and design-build programs can serve as test-field for ideas and experiments, which are not restricted by the economic and time constraints of a traditional business environment. Apart from diverse motivations also limitations like available timeframe, group size or possibilities of financing are crucial for the size, complexity and type of the targeted design-build task and are therefore essential for the functioning of the overall project.

While some design-build programs, like the “Yale Building Project”, “Studio 804” of Kansas University or the “Tulane Urban Design-Build Program”, stick to one specific type of building, in this case “Affordable Housing”, other programs like the “Rural Studio”, “Basic Initiative”, “Parsons Design Workshop” or the “Design-Build Studio of Vienna University of Technology” change their building tasks from project to project, working for example on schools, pavilions and community centers.

By means of diverse best practice examples, this paper will point out very different thematic foci of design-build tasks: Small Intervention vs. Large Scale Project, Experimental Focus vs. Social Effect, Temporary Structure vs. Permanent Building, Public Facility vs. Private House, Local Initiative vs. Global Mission. Their specific potentials and possible shortcomings will be discussed in relation to the design-build learning outcome as well as in relation to the entire project.

SATURDAY, OCTOBER 18, 2014 - 9:00AM - 10:30AM

PEDAGOGY: INTERDISCIPLINE

CROSS DISCIPLINARY DESIGN/BUILD: THE DESIGN OF COLLABORATIVE EDUCATION

Emily M. McGlohn, Mississippi State University
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Alexis Gregory, Mississippi State University
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Successful collaborations are increasingly important as architectural projects grow in complexity and project delivery methods like Integrated Project Delivery and Design Build become more common.[1] Given this fact and the rise of collaborative design thinking in architectural education, this paper will explore one institution's attempt to design a clear means of cross-disciplinary collaborative learning using design/build as the vehicle.

Two bus shelters are the recent result of a design/build studio shared by architecture and building construction science (BCS) students and faculty. Unique in nature, this studio was made possible by a radical new approach to the traditional BCS curriculum, which moves away from the typical three-hour lecture to a six credit hour studio-based format scheduled to align with their architecture counterparts. Participating in design activities, and the preparation of schedules and estimates with equal interest, both student groups were asked to broaden their concept of project delivery. Complete in one semester, on time, and on budget, the bus shelters are a success by typical design/build standards, but they are not the subjects of this paper. It is the collaboration between disciplines and faculty that posed the greatest challenge, yet advanced the college's effort of a cross-disciplinary collaborative learning pedagogy.

The pedagogical preparations by faculty members to execute the planning of this studio presented new challenges for several reasons: The learning outcomes for the studio required by the National Architectural Accrediting Board (NAAB) and the American Council for Construction Education (ACCE) were different for each discipline. The large number of students (35 architecture students and 14 BCS students) required careful consideration of team creation, work sharing, and jobsite logistics. The studio was non-voluntary; not every student was fully invested in the work. Cultural differences between students in each discipline created a divide over working habits; architecture students were more likely to work at all hours of the night. Overcoming these challenges – some expected, some not – offer new insight into cross-disciplinary collaborative learning in architectural education. This paper discusses preparations for the course, a critique of the process, and lessons learned as a means of refining the curriculum and advancing the pedagogy.

A replicable cross-discipline pedagogy for teaching appreciation of expertise and effective communication between architects and constructors is one goal of this research. The shared experience of design/build is the vehicle for these lessons. Cross-disciplinary collaborative learning can create stronger professional relationships that will ultimately produce better and more efficient methods of design and construction.

[1] Andrew Pressman, Designing Relationships: The Art of Collaboration in Architecture. New York: Routledge, 2014.

INQUISITIONS OF CULTURE, CRAFT, AND MATERIALITY

Jacob A. Gines, Mississippi State University
Elizabeth Payne Tofte, Mississippi State University
Brian Templeton, Mississippi State University

The home food production garden was once the backbone of American food security. However, a cultural shift away from gardening has resulted in residential properties abdicating secure garden space. Lack of food security affects the availability, quality, and affordability of fresh local produce. First Lady Michelle Obama has made food security one of her top priorities; demonstrating her commitment by devoting some of the White House grounds to food production. Others have also trumpeted food security as being vital to the health and welfare of the people within the United States, in particular those of low-income or located within urban food deserts.

To this end, a multi-disciplinary team of Architecture, Landscape Architecture, Water Resources, and Food Science experts and educators was assembled to engage issues of food security through the development of the Garden Education Teaching and Training Site (GETTS). This project will act as a replicable model for home food production and is funded by a $50,000 seed grant to be utilized over 2 years. One of the objectives of GETTS is to develop proposals for three scales of the family vegetable garden, of which the primary focus of this paper/presentation is the small vertical garden. A design/build methodology and pedagogy was utilized in an Architecture Materials course where students were afforded the opportunity to collaboratively design and construct an innovative and affordable solution to vertical gardening. As students worked closely with Architecture and Landscape Architecture faculty they were tasked with developing appropriate and site sensitive designs, the selection and procurement of building materials, and the fabrication and construction (on-site) of their proposals. Documentation sets, in the form of brochures and user-friendly construction assembly instructions (Ikea style), were also created by the student groups for dissemination at University Extension Centers and to be made available online in digital format for broader exposure and use by the public. The project's process from conception through design development, and material procurement to construction and install (before, during, after), was documented by a designated student team tasked with digitally recording, editing, and producing a documentary/promotional video of the work.

Through this design/build experience students have become more aware of societal and cultural issues surrounding food security; developed tacit understandings of building materials, assemblies, and craft; were exposed to and developed a consciousness toward project budgets, timelines, and material acquisition; and an appreciation for the complexities of project management, coordination, and implementation.

SATURDAY, OCTOBER 18, 2014 - 9:00AM - 10:30AM

PEDAGOGY: INTERDISCIPLINE

LANDSCAPE+ARCHITECTURE: AN INTERDISCIPLINARY DESIGN-BUILD TEACHING APPROACH

Simon Colwill, Cocoon

This paper focuses on the experiences of a landscape architecture educator who has been assisting an architecture-based design-build studio since 2006. It examines how several projects throughout the last 7 years have profited from the interdisciplinary teaching approach.

The complexity of today's architectural tasks often requires interdisciplinary solutions and cooperation. Architectural practice requires highly qualified employees with interdisciplinary and specialized knowledge, and skills. These requirements are often not reflected in academic curricula, this is often due to:

- differing expectations, theories or ideologies
- lack of communication between disciplines
- lack of acceptance of other disciplines
- differing timetables
- the mutual recognition of subjects
- administrative processes (which often complicate collaboration)
- lack of time

The "Mexico Project" is a design-build studio that introduces an interdisciplinary teaching approach for the built-environment. It aims to establish an educational infrastructure that reflects "real life" design processes. Architects, Landscape-Architects, Engineers and Craftsmen participate in the project which is run by three educators from differing disciplines. Each discipline has specific goals and priorities within the project that are reflected in the teaching programme. The participants gain a deeper understanding of architectural concepts und benefit immensely from increased peer learning. By working in interdisciplinary teams and being supervised by educators from other disciplines they become more sensitive to the interests of other disciplines and gain multidisciplinary communication skills

"Mexico Projects" not only focus on the built structure itself, but also on the entire site and its relation to the surroundings. It also aims to address the broader needs of the client and community and go beyond functional necessity. The interdisciplinary teaching methods allow the students to tackle more complex planning tasks and develop more holistic design solutions. Each project seeks to be exemplary with regard to design solutions, detailing and implementation and become a model for future local developments.

This paper reflects on a series of five design-build "Mexico Project" case studies covering the nature of interdisciplinary design-build education

- San Martín Itunyoso, 2007/08
- Guadalupe Miramar, 2008/09
- Zaachila, 2009/10
- San Jeronimo Tecoatl, 2011/12
- Bugambilias, 2013/14

These projects challenge standard practices for traditional design studios, and show how we can enhance education in the built environment by implementing interdisciplinary teaching methods. This paper argues that interdisciplinary teaching methods not only intensify and multiply the learning experience but also provide students with holistic qualities that are essential to the profession today. It also aims to support the institutionalisation of interdisciplinary architectural education by reflecting on the strengths and weaknesses of this approach over the last 7 years.

SEEKING A SYNTHESIS TO INITIATE CHANGE: HEALTH + DESIGN/BUILD

Phoebe Crisman, University of Virginia

Design/build is typically seen as a way to teach students to think through making, learn about materials and construction, and often provide shelter for those in need. Innovative design/build pedagogical models can achieve other goals as well, including educating practitioners, policymakers, and the public about the crucial relationship between public health and the built environment. While architects have always known that the places we create influence human experience and hence physical and psychological states, it is only recently that a 'design & health' focus has returned to mainstream architectural discourse. Not since early modernism's fascination with health and sanitation has this idea explicitly appeared in so many publications and projects. This paper argues for a synergy between 'design/build' and 'design and health' research and pedagogy. While evidence-based research connecting public health and architecture has increased, few studios explicitly explore this connection through design research. A second claim argues for the value of a studio method that works with community partners to identify opportunities, then design and build sustainable projects that inspire environmental stewardship and civic engagement to instigate social change.

These two arguments are supported by a case study examining an ongoing interdisciplinary project that educates students, practitioners, policymakers and the public about important linkage between design and health. In collaboration with the City of ___, non-profit environmental groups, ___ public schools and community partners, University faculty and students from architecture, art and medicine investigated the complex relationship between human health, environmental restoration, and sustainability education through the design of a forty-acre wetland park. The ___ Nature Park and Pavilions is located amidst contaminated industrial sites and an economically challenged and racially diverse urban neighborhood challenged by environmental degradation, gang violence and health concerns. Students designed the Park and its Wetland Learning Lab and Rainwater Filtration Pavilion to engage urban kids in hands-on learning. There were several research goals: create a place that increases the sense of well-being and opportunity for outdoor exploration for all ages; design green pavilions that educate visitors about sustainability; and create strategies for industry and natural ecosystem to co-exist in harmony. The research considered complex social, economic, ecological and architectural issues across scales. The design manifests an inventive educational agenda that teaches about sustainable dwelling, environmental restoration and human health. Ultimately, this paper argues for design/build collaborations that promote connections between design and health, while fostering a commitment to sustainable practices and the students' desire to make a positive difference in the world.

SATURDAY, OCTOBER 18, 2014 - 9:00AM - 10:30AM

PEDAGOGY: FUNDAMENTALS

BUILDING A STRUCTURAL KNOWLEDGE

Bruce Wrightsman, Kansas State University

In his treatise, the "Ten Books on Architecture" Roman writer, engineer and architect Vitruvius coined the phrase "firmitas, utilitas, venusta", which translated means "firmness, commodity and delight". These are tenets by which architecture has always been defined. Its breadth encompassing polar disciplines: the ephemeral quality of art and beauty solidified through the permanence and efficiency of structure and engineering. This unique condition will always inexorably link architect and structural engineer. A key challenge of integrating a robust structures curriculum into an architectural education is creatively presenting structural design as a rigorous analytical and conceptual process that still creatively addresses Vitruivian ideals.

Artist Donald Judd formulated the term 'durable knowledge' which is a clear awareness of facts arrived through an intense observational and constructive effort. Creating a physical structure through the tactility of the hand helps one arrive at a 'durable knowledge' of the subject matter. A project, which set out to achieve a 'durable' knowledge of structures is structural fabrication project, where architecture students as part of their structures class design, fabricate and test a full-scale footbridge. The footbridge had to span 10-feet over an existing creek, weigh less than 70# and support a load significantly greater than its own weight with only minimal deflection. Working in small groups teams developed a structural strategy, selected building materials and built their footbridges at full-scale. The project was structured as a science lab; akin to a design studio beginning in a research phase in order to develop a design strategy that would lead to a concept from which to construct prototypes to test before for final site testing. The iterative methodology of prototyping and testing served as a 'feedback loop', which was vital to the learning objectives of the class.

The process of translating design ideas from paper (theoretical) to full-scale (real) covering the spectrum of structural analysis to constructed assembly immersed students into a world where theoretical structural challenges addressed in lectures are tangible matters with real consequences that must be explored and tested. Connecting the physical rigor of the hand (intuitive) with analytical rigor of the mind opened pathways, leading to tactile improvisation and subsequently making the knowledge learned more durable.

This paper will present the unique footbridge projects developed over 5 years, which broke away from a traditional structures curriculum in lieu of an innovative 'design/making' pedagogy for exploring the firmness, commodity and delight of structural design.

DESIGN/BUILD AS DECOY

Whitney M. Moon, University of Wisconsin-Milwaukee

The architectural inflatable has historically performed as a countercultural decoy. According to Reyner Banham, the inflatable has a "tendency to behave like a living organism," which in turn destabilizes the disciplinary paradox inherent to contemporary design/build agendas. Through their participatory and do-it-yourself nature, inflatables offer an alternative to traditional modes of generating architectural form and space. The instantaneity and ephemerality of these air-filled membranes subverts the conventional design/build relationship characterized by careful planning and durable detailing. Rather than aiming for permanence through construction, pneumatics allow for a performative spontaneity.

During the 1960s and early 1970s, pneumatics inspired an escapist and anti-monumental approach to design, responding to contemporary cultural desires for mobility and flexibility. For example, Banham and Francis Dallegret's Environmental Bubble (1965) proposed a domesticated utopia equipped with modern amenities, freed from the fixity and permanence of the traditional home. The portability of Michael Webb's Suitaloon (1967), a garment that inflated into a nomadic living envelope, echoed the perpetual dynamism of the human body. Building upon these notions of transience and adaptability, Hans Hollein's Mobile Office (1969) suggested that one could work anywhere, anytime. In their performance Basel Event: The Restless Sphere (1971), Coop Himmelb(l)au used human bodies to propel an inflatable bubble down the street, rendering the pneumatic membrane as a "barely-there" form of architectural enclosure. These and other inflatables shared an interest in maximizing flexibility through minimal means.

Ant Farm's Inflatocookbook (1971), a do-it-yourself manual for pneumatic construction, claimed that designing and building an inflatable could be as easy as following a recipe. By offering an alternative to the xyz plane routine, pneumatics could be experienced in ways previously unknown to architecture. According to Ant Farm, the reason to build inflatables becomes obvious "as soon as you get people inside" and they experience "the freedom and instability of an environment." Here, meaning becomes as malleable as the membranes of these new-dimensional spaces.

How then, can an architectural curriculum integrate the inflatable as a pedagogical model for architectural experimentation in post-secondary education today? In other words, can new methods of design/build be forged through the playful instantaneity and immateriality of "cooking" with air? This paper will examine how pneumatics have, and continue to serve as performative decoys to lure new processes, technologies, and sensibilities to the discipline of architecture.

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PEDAGOGY: FUNDAMENTALS

FROM KERNFORM TO KERNEL: DESIGN-BUILD TECTONICS AND CONTEMPORARY FORM-MAKING IN BEGINNING ARCHITECTURAL EDUCATION

Dora Epstein Jones, Southern California Institute of Architecture

In the mid-1800's, Karl Botticher, a German archeologist working on classifying Hellenic architecture, turned to the idea of "tectonics" as a form of architectural description. In his published text (following Semper), Botticher described tectonics as a median between what he called "work-forms," or building, and "art-forms," careful to preserve the dialectic between the mechanistic view of architecture and its expressive features. For Botticher, and other writers aligned with his more historicist and progressive thinking, this dialectic was not merely a method for analyzing, but also, potentially, for any future development in architecture, and for all architectural education. He stated, "Hieraus allein bestimmt sich en Gesetz fur alle Formenbildung… (Here alone is the law for all kinds of form-making…).

This presentation will examine a series of design-build projects from the first-year undergraduate studios at SCI-Arc taught by the firms Oyler Wu and Freeland Buck. The design-build projects asked students to explore single-joint construction methods that would allow for a high range of geometric flexibility and contemporary formal shapes. A winning entry was selected, built and installed by the entire studio for the remainder of the semester. The projects were visually stunning, but more than that, they established at the outset of the students' education an operational dialectic for exploration not unlike the one outlined by Botticher more than 100 years ago. This presentation will further theorize the connections from the design-build projects to this long-standing discourse on tectonics, and the ways in which tectonics have defined architecture, architectural education, and the terms for future architectural innovation. It will understand and reinforce the idea that architectural education must always span both: past and present, design and build.

SPACE AND STRUCTURE

Georg Rafailidis, University At Buffalo, SUNY

This paper documents first year student work which emerged from a syllabus based on "generative spatial processes". The studio course introduced students to architectural space as a multifaceted entity. With each assignment, the investigative lens shifted to focus on the subject of space from a different perspective, to uncover a new distinct spatial dimension. This paper documents work which emerged from a four week long design-build assignment, which investigated space through the lens of structure and material behaviour.

The design-build component was the final assignment in the semester and expanded upon earlier explorations of thin shell structures that were done in scale models. Students formed groups of seven and investigated the structural potential and performance of thin shell structures as a generative process at full scale. By working at 1:1, students were able to investigate the relationship between material behavior, structure and space/form. Structural logics generated form and space.

Students were asked to cast a thin shell of an existing part of their actual, physical environment – their studio spaces - at 1:1 (e.g. corner, wall, niches, arch, I-beam, window, etc.). The existing space acted as form work. They then removed the shell and repositioned it (flipped, rotated, moved, etc.) to create a space where the entire team could be accommodated inside or underneath. The development of a clear strategy about how the cast volume was positioned in relation to the original (the real space) was emphasized. Space was created by the specific relation between cast shell and original building part.

Students roamed their everyday studio spaces for forms which seemed to provide both a specific spatial experience and structural performance (certain forms obviously performed better structurally than others). Students had to think spatially and structurally at the same time. Thin shells acquire their structural strength through deformation of their surface. The less "flat" a surface is the more stiff it gets. This is a principle about which students developed understanding empirically.

Each of the twelve student groups received one of the following six materials: hydrocal, twine, paper pulp, paper mache, latex and wax. Each material has its own specific properties, implied fabrication techniques and appearances. Students were able to compare their work with that of other groups and expand on the question about how materials influence form, structural behavior and space.

The task to create such a large span with such weak material in such a short time frame forced students to focus solely on the relationship between structure, form and space and not get side-tracked by external concepts. The full-scale artifact offered a performative dimension (span, sag, failure, etc.) as well as an experiential dimension.
This assignment allowed students to develop critical beginning design skills which were all anchored in their reading and response to an everyday space.

The main focus of the studio was to avoid a common tendency in design studios - the simplistic dichotomy between the real and the represented. The original, represented, and performative aspects of materiality and space were dissected and reassembled into a new whole.

RESEARCH: MATERIALS

CORIAN AS AN ARCHITECTURAL CLADDING MATERIAL

Andrew Phillip Payne, Indiana State University

Corian® as an architectural cladding material is a study of innovative ways of applying a typical solid surface kitchen and bathroom countertop material to the external and internal skins of buildings. Dr. XXX, Professor of Architecture at XXX, developed a collaborative architecture design studio that focused on materiality, construction detailing and fabrication. The success of this collaborative practice was nontraditional in the sense that participants included product manufacturers, consumer representatives and shop fabricators instead of the typical designer/contractor. This unique experience exposed the students to the full extents of a project from the design phase to fabrication and installation.

Professor XXX led a sponsored studio (XXX) with CH Briggs, Inc., a product representative for solid surface materials, headquartered in Reading, Pennsylvania. The studio mission was to assist in the development of interior and exterior cladding design concepts using DuPont™ Corian®. Using the information and established design criteria provided by CH Briggs, Inc. the XXX team worked in three phases – Opportunity Definition, Design Exploration, and Design Refinement.

Phase I – Opportunity Definition
Phase One consisted of 15 undergraduate seniors and included a visit to the DuPont™ Corian® design studio in Philadelphia for consultations with representatives from CH Briggs, Inc. and engineers from DuPont™. Students conducted case study research to familiarize themselves with solid surface materials and general practices for incorporating Corian® into architectural designs.

Phase II – Design Exploration
Students gained an understanding of the market, users, manufacturing details and the established design criteria in an effort to inform the product development process. The XXX team undertook the task of developing design concepts and explored a wide variety of design proposals including site furniture, façade cladding, signage, and interior details, all of which were pursued in phase III.

During the spring quarter architecture students continued their exploration and were joined by an additional group of eight students in the Craft and Tectonics class (XXX). The Craft students' approach was more hands-on. The students, working in the XXX model shop, physically manipulated samples of the material and tested the limits of bending, cutting, drilling, and installation with various fastening systems. These students produced mock-ups of assemblies and small scale design details which demonstrated the application of the cladding designs. The manipulations ranged from simple power tools to parametric designs and CNC fabrication.

Phase III – Design Refinement and Visualization
The students, from the studio and Craft class, refined their designs which were then included in the DesignPhiladelphia exhibition. The gallery opening was well received and rave reviews were offered by design professionals and invited guests. Student development was enhanced through field trips to view samples of material and completed projects at the Dupont™ Corian® design studio in Philadelphia, Pa., ASST Fabricators, Inc. in Harrisburg, Pa., and the Hilton Hotel in downtown Baltimore, Md.

LOTECH/LABORINTENSIVE

W. Geoff Gjertson, University of Louisiana - Lafayette

LOTECH/LABORINTENSIVE fabrication by digit (hand) & a proposal for a synthetic masonry system

The digital-fabrication and mass-customization movement within architectural education and some architectural practices (IE SHOP and Kieran Timberlake,) emphasizes speed, efficiency, and the reduction of the labor. And although these processes have great promise in the highly-developed regions of the world, a majority will not have access to these technologies for the foreseeable future. What these undeveloped and developing regions of the world have are exploding populations with an enormous labor pool. Can architecture begin to create economies and jobs in these regions? Can a building system be developed that utilizes one component for structure and finish? and specifically a component that is sustainable, lightweight, easy to erect, and inexpensive?

The author proposes a synthetic masonry unit (SMU) made of composite materials (recycled plastic and wood fiber) which is stacked with only an adhesive, has an integral vapor/water-barrier, and is reinforced with closed-cell foam. Simplified and low-tech building systems like SMU's have potentially much greater traction throughout a majority of the world which lacks skills and resources. And the one resource they have in abundance, man and women-power, are not typically utilized and are often marginalized by automated processes and complex high-tech materials/systems. Labor-intensive but accessible systems like SMU's will generate community-interaction, produce skills, and create jobs in addition to actually building homes and businesses. Through leveraging new low-tech and simplified building systems like synthetic masonry and maximizing volunteer and unskilled labor, larger global problems such as population growth and lack of jobs can potentially be addressed.

SATURDAY, OCTOBER 18, 2014 - 9:00AM - 10:30AM

RESEARCH: MATERIALS

MODULAR ROOFING FOR SOCIAL GOOD – RESILIENT MODULAR SYSTEMS [RMS]

Wendy W. Fok, Harvard University
Natalie Rodriguez, University of Houston

Focusing on emerging markets, Resilient Modular Systems [RMS] is a collaborative project ventures that seeks to be a leader in innovative building components and sustainable composite materials. Many residents in emerging countries live in homes that provide wholly inadequate protection from the elements, and that are made of materials produced with large quantities of non-renewable energy sources. [RMS] seeks to solve this age-old problem through the provision of simple yet resilient, "green" building materials at affordable prices.

This paper focuses on the process, research and development of a business plan and design exercise. [RMS] was selected as a finalist for the Dean's Design Challenge, and is a research venture that involves the Graduate School of Design, Business School, and Graduate School of Arts and Sciences (Engineering). With construction and engineering partners in the private sector, such as Prenova and AECOM, and NGOs, like Un Techo Para Mi Pais to pilot the minimum viable product this coming summer, this project explores opportunities to develop modular building for social good addressing the societal pain point starting from the 369,000 pounds of excess plastic waste that is produced every day in Latin America alone. While the decay of solid waste accounts for 5% of greenhouse gases annually, [RMS] harnesses research and development of a product which uses a combination of thoughtful engineering, architectural, and design principals to provide an alternative to the corrugated metal and fiber cement roofing currently used throughout the developing world.

From February – May 2014, our team made onsite visits to Colombia and the Dominican Republic to provide groundwork research to better understand the social and manufacturing pain points. [RMS] uses recycled plastic as an input to create a modular plastic solution. Built-in air pockets provide much-needed insulation, Japanese joinery building techniques avoid using nails, and a modular design allows for ease of self-installation and adaptation to various dwellings. In addition, homeowners can customize their roofs with options including solar panels, sky lights, colors, etc. Through the collaborative opportunity of building and thinking together, [RMS] utilized the value between the multifaceted backgrounds of the team to leverage consumer target research and developed partnerships with city officials and policy makers to better understand the target consumer for designing and developing the project.

Our paper will discuss onsite research and interviews with local urban planning officials, residents, and contractors, and discuss the saturation of demographics where developing countries typically have very few rich citizens and many more poor. These individuals still reside in homes that use corrugated metal or fiber cement, but they are seeking ways to upgrade through additions or remodeling. Therefore, our team is discussing design and feasibility with a Dominican Republican based developer on offering the product for government-subsidized houses. Additionally, to pilot the project, our efforts will be made to donate and build a free roof to the local community center in targeted communities, within Dominican Republic this summer, with the help of volunteers from Un Techo Para Mi Pais and the local civil and structural engineer community.

THINKING THROUGH MAKING: ORNAMENTAL BLOCK PROTOTYPES FOR TROPICAL ARCHITECTURE

Maria G. Flores, Universidad De Puerto Rico

Contemporary vernacular architecture has increasingly lost skilled labor in the local construction industry, yet digital manufacturing machinery can assist in bringing back the craft and singularity of specialized projects that would otherwise require the assistance of the master builder. Readily available to architecture students, designers and 'makers' in general, novel prototyping techniques can infuse projects with a 'design + build' mentality. Thinking through making at the small scale of rudimentary building blocks can be a design strategy to introduce both theory and practice to the education of the architect. Recently completed coursework consisting of explorations on the variations of concrete 'ornamental block', a perennial component of building in Puerto Rico, opens a dialogue on the pedagogical practices and opportunities of design + build in tropical architecture.

Four student projects will be presented, alongside global case studies that emphasize design considerations such as security, fencing, privacy, passive ventilation and shading strategies, as well as the fabrication techniques of mold-making and the performative aspects and constraints of the material, in this case, concrete. A discussion of the use of computer-controlled cutting, printing and milling machines, vacuum forming, mylar sheet folding patterns, foam carvings, and textile formwork explorations as micro-manufacturing techniques to the means of iterative prototype production will be brought forward as a way to expand and rethink the education of the architect to include technical knowhow and entrepreneurial opportunities in building.

SATURDAY, OCTOBER 18, 2014 - 11:00AM - 12:30PM

BUILT WORKS 5

DESIGN PLUS CHILDREN: AN APPROACH TO CLIENT AND USER-CENTERED DESIGN IN THE MUNCIE CHILDREN'S MUSEUM TOT SPOT

Pamela Harwood, Ball State University

The Tot Spot, a major new exhibit celebrating the power of infant and toddler's learning through play has been researched, developed, and constructed by students and faculty at a local Children's Museum. During the two-year process of schematic design to final construction, work progressed through sequential design/build studios. Seven different thematically-designed, interactive activity settings connected with children's literature were built: The Giving Tree Gross Motor Area, Hot Air Balloon Reading Circle, Crawl-Through Caterpillar Block and Small Manipulative Play Area, Tugboat Creative Play Area, Tower Dramatic Play Area, Funcie Farm Garden Stand, and The Gravity Wall and Ball Drop Science Activity Area. Tot Spot's primary goal is to offer open-ended, interactive learning experiences involving settings and objects that children need to develop motor skills and engage in creativity, exploration, and discovery of the world around them. This paper documents the collaborative, community-oriented applied teaching and immersive learning model that students experienced in the design/build of the 1000 square foot area of Tot Spot.

The work exemplifies constructionism and user-centered design in the researching, designing, developing, prototyping, and fabricating. Architecture students constructed and reconstructed knowledge out of first hand experiences with materials, full-scale mockups, infant/toddler prototype testing, and community participatory design interaction. Constructionism is both a theory of learning and a strategy for architectural design education, asserting that knowledge is not simply transmitted from teacher to student, but actively constructed by the mind of the learner when engaged in making artifacts they can reflect on and share with others. Learners don't get ideas; they make ideas. Students learn through the construction of knowledge in the context of making personally meaningful things. User-centered design is a way of understanding how design and making takes place with considerations of how the inhabitants of a constructed environment interact with the place. This paper presents a strategy for connectivity in responding to the needs of multiple, flexible, learning centered spaces and objects, as generated by the dynamic of uses and users, in this case, infants, toddlers, parents, caregivers, and educators. Evidence-based design research methods have been employed to connect the multiple stakeholders with the aesthetics of design.

The design/build studio accomplished three goals. First, it provided an alternative design process in which thinking and making are integrated as interrelated components. The studio demonstrates at full scale the implications of students' design ideas and measures the quality of this thinking against the rigorous standard of built reality. Second, we crafted new ways of working together, exploiting collaboration between fabricators, product representatives, professionals, stakeholders, and graduate and undergraduate students of differing disciplines, ages and skill levels. With individual responsibility and expertise identified, students demonstrate learner-leader attitudes as they bring ideas to fruition cooperatively, in the shared act of designing and making. Third, students learn while giving back to the community, gaining respect for various points of view. The Tot Spot is a remarkable story to tell because of this committed collaborative effort of the university, the students, the museum, and the community!

MEMORY HOUSE/DESIRE HOUSE

Ronit Z. Eisenbach, University of Maryland

"Memory House/Desire House," is an installation/performance that resulted from two specially designed courses. The work was commissioned by the University's Performing Arts Center as a complement to the inaugural performance of "A Chinese Home" by the Kronos Quartet. The goal was to create a "public engagement" project that would draw out themes from "A Chinese Home" and involve the audience as well as students and faculty from multiple disciplines in reflection. Ultimately, the project provided a vehicle for participants to explore themes of home, place and being through interrelated aspects of exhibition design, architectural structure, ritual and performance.

The Desire House Installation drew its inspiration from two main sources: the beauty and flexibility of bamboo as well as the organization, structure, and elements of the Yin Yu Tang House (Hall of Plentiful Shelter), the traditional courtyard house that also inspired "A Chinese Home" and had been dismantled and moved to the US where it is exhibited. The delineation of space with line found in the bare Chinese Desire Houses, Asian bamboo scaffolding and temporary bamboo Opera houses found in China is reiterated in this bamboo structure. The installation structure reinterprets, the Yin Yu Tang House's post and beam structure, revealed during its deconstruction. Students constructed the large bamboo installation guided by the architecture faculty member who conceived of the project.

At a time when the foreclosure crisis was peaking in the US and many Haitians had lost their homes due to the recent earthquake, student participants from the fields of both dance and architecture explored the value and meanings of home across cultures. Historic Chinese 'Desire Homes,' which are ritually burned to honor and thank one's ancestors for one's own good fortune were reinterpreted by the students who created their own personal "Desire Houses" appropriate for the current situation. These contemporary "Desire Houses" were installed in the larger installation sited at the Performing Arts Center. The work culminated in an exhibition and a site-specific dance choreographed by the Dance Professor and inspired by the installation and project themes. This dance included a public procession and ritual burning of one "Desire House." It was performed at the Clarice Smith Center as a prequel to Kronos' performance of "A Chinese Home."

This work explored the potential of design/build projects in several ways: 1) The project created a meaningful collaboration that brought together internationally renowned musicians, and students and faculty from multiple disciplines; 2) Participants were engaged as both novices and experts, required to stretch both within and beyond their own disciplines. For example, the students constructed a very large structure out of an unfamiliar material that they harvested themselves and they also performed. For one group the former was more comfortable for the other the latter, for both they were experiences that extended their reach; 3) The project created an opportunity for public reflection around the meaning of home across cultures and created a shared experience to mark the loss of home that many people were experiencing at that time.

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DESIGN-BUILD WITHIN AN EDUCATIONAL CONTEXT, REFLECTIONS ON EXPERIENCES GAINED FROM TWO EXPERIMENTAL NET-ZERO-ENERGY HOUSING PROJECTS

Steven Van Dessel, Worcester Polytechnic Institute

Embedding design-build components into the curriculum of architectural and engineering educational programs can nurture a multitude of skills beneficial to future architects and engineers. This paper compares two recently completed academic design-build projects for research intensive net-zero-energy housing. In addition to illustrating project architectural and engineering features, we explain how some of the contextual differences affected project development and delivery. The first project involved a student driven design-build project whereby faculty members served as advisors to the project. The second project involved a faculty driven design-build project whereby students served in an apprentice role to the project. The advantages and disadvantages of both approaches are discussed and related to the differences in the educational frameworks and programs of the partner universities in Europe and the USA. The deliberate experimental nature of the net-zero-energy housing projects included components that required research and international collaboration between various partners and disciplines, including architecture, civil, mechanical, electrical, and architectural engineering. The projects also included marketing and outreach activities. An overview is provided of the various hurdles encountered during these collaborations, which included constraints of preset academic schedules and curricular outcomes, and how the project tasks became integrated into the curriculum to cope with these challenges. Successes and failures of curricular integration are discussed, and mirrored against faculty academic loads and scholarly expectations. Both projects required substantial outreach and fundraising which, due to the different location of the partner universities, resulted in different strategies and outcomes. Engaging external stakeholders, such as trade schools and other community partners, was one of the more positive and surprising outcomes. We discuss the effect of the two design-build projects on the future career paths of some of the key students, including their short term post-graduation plans. The paper concludes with a description of future efforts to embed a design-build curricular component in a newly established architectural engineering program. The “architectural engineering project center” is discussed as a means to integrate an apprentice type education and research component into a more technically focused architectural engineering curriculum.

Keywords: education, architecture, engineering, design-build, net-zero-energy, housing

RESEARCH

R. BUCKMINSTER FULLER'S PROTOTYPES AND MANUALS: A PEDAGOGY OF DESIGNING AND BUILDING

Daniel Lopez-Perez, University of San Diego

R. Buckminster Fuller was a pioneer in design/build education. Travelling tirelessly across many schools of architecture and design, Fuller worked alongside students, building large-scale geodesic constructions whose form and complex geometry tested the limits of numerous materials. Experts have observed how "no single construction system has been built in so many sizes and of such diverse materials – wood, pipes, sheets of plastic and metal, foam panels, cardboard, plywood, bamboo, fiberglass, concrete and even bicycle wheels and the tops of junked cars." Forfeiting conventional architectural drawings, Fuller also developed an original culture of representation. One that resulted in annotated assembly "manuals" whose goal was to succinctly describe the different constituent parts that formed these geodesic structures, while also illustrating their prototypical part-to-whole relationships. By challenging architectural conventions of form, materials and representation, Fuller's extraordinary geodesic experiments with students can be understood as an original design/build pedagogy that resulted in both unique prototypes and new building systems.

Among the many photographs of Fuller working alongside his students, perhaps one of the earliest is at Black Mountain College in the summer of 1949. In the photograph, Fuller can be seen holding a manual standing next to students. Their puzzled gaze signaled the challenge in deciphering the differences between a sturdy geodesic dome model made of what appears to be Venetian blinds measuring three feet in diameter; and its flat equivalent, unable to gain any curvature at a much larger diameter. Students exclaimed how they had "worked like the devil all summer and waited for the dome to rise like the second coming of Moses, but it laid there like a bowl of wet spaghetti." As illustrated by this image, on the one hand, drawings alone could not be the medium to test the limits of design. On the other, neither were materials enough to adequately challenge those of building. Fuller's lesson, and way out of this paradox, was to simultaneously explore the irreducible nature of drawing and building. Rather than prioritizing design, or building, Fuller's pedagogy cut productively across both as a way to tap into their potential.

This paper proposes to study a number of Fuller's geodesic prototypes, and their assembly in these "manuals" as a way to explore the irreducible nature of design and building. If annotated drawings were designed to convey the geometric and material protocols that give rise to these as assemblies, both as unique instances but also larger systems, the built constructions were shaped to reflect their process of assembly and thus, their systematic logic.

The paper will focus on original documentation, including Popko's Geodesics (1968); Khan's Domebook 1 (1970) and 2 (1974), Fuller's own Inventions (1983), and The Artifacts of R. Buckminster Fuller (1985); as well as a number of contemporary examples and research projects that have followed this tradition, including Engel's Structuture Systems (2007) and Moussavi's Function of Form (2009), as a way to trace the legacy of Fuller's design/build pedagogy today and into the future.

"FIELD GUIDE" AS A CATALYST FOR STUDENT-INITIATED DESIGN BUILD RESEARCH

William Connor O'Grady

This process account demonstrates how a student-led, peer-to-peer learning design/build initiative is transforming the University of Waterloo School of Architecture's academic experience. The paper outlines how F_RMlab (Digital Research and Media)–a research collective founded by a core group of graduate students in Waterloo's self-directed masters program–is rapidly acquiring leading agency and resources for advanced computational design utilizing a research/design/build approach.

F_RMlab reflects the spirit of the student body; demonstrating interest in customizing facets of the academic experience in an adaptable manner. Using student-initiated design/build projects as an effective means to inform research and to broaden technical skillsets F_RMlab aims to improve the proliferation of computation skills in regards to architectural design. This is cultivated through keen student awareness of professional practice, a skill honed by the invaluable cooperative education work placements that occur throughout the undergraduate program. The alternation between taught academic terms and paid professional internships establishes a feedback loop between practice and research, and F_RMlab explicitly acknowledges the role of design/build projects as a valuable platform for experimentation. F_RMlab aims to foster the relationships between digital and physical craft, while cultivating innovative and entrepreneurial attitudes. In this manner, F_RMlab uses the research/design/build/research model as a means to enable a horizontal student-led model of peer-to-peer learning. Students are empowered to experiment with adaptive learning models, allowing for theoretical and technical investigations within design while advocating for an individualized educational path as an active contributor in sharing knowledge.

The paper outlines the process and development of the "Field Guide" series—one of F_RMlab's ongoing and evolving projects. This investigation analyses the progress and effects F_RMlab has had within the school and the potentials of a student-driven design/build project can have for the exploration of unfamiliar skill-sets. "Field Guide", an interactive canopy first exhibited at Toronto's Gladstone Hotel, facilitated the acquisition of new skills in robotics and component fabrication, F_RMlab's internal collaborative working process coupled with local community partnerships allowed a multitude of research questions to be tested. The development of "Field Guide", along with its iterations, demonstrate the potentials of design/build/research as a peer-to-peer teaching model, resulting in several "daughter projects" for art and design exhibitions.
Through knowledge exchange, community outreach and learning-through-making, F_RMlab enables students to challenge themselves beginning with conceptual design, continually through construction and craft of a tangible, spatial investigation. This model is the foundation for a sustainable model of design experimentation; allowing for continual exploration in computational thinking and responsive architecture. In this manner, F_RMlab has proven to be an important academic resource in improving the accessibility of specialized research and to infuse design/build projects deliberately into the informal learning practice at Waterloo Architecture. F_RMlab is an innovative model; student-directed, project-based design that focuses on the development of computational design investigations into fabricated environments.

RESEARCH

DESIGN-BUILD AS A REVERSAL OF PROFESSIONAL PRACTICE

Mike Christenson, North Dakota State University
Peter Atwood, North Dakota State University
Malini Srivastava, dandelab (Design and Energy Laboratory, LLC)

This paper explores the question of whether University design/build courses and studios can become an effective vehicle for research and development in the construction sector and in the professional practice of architecture.

Our project was structured as a graduate-level elective studio and seminar incorporated in a professional architecture degree program. It involved 22 students in the design, research, analysis and construction of a full-scale, pre-certified demonstration Passive House which was ultimately exhibited in a public forum attracting over 250,000 visitors over a 10-day period.

In this paper, we discuss our project in terms of reciprocal relationships which exist between design/build, construction, and professional practice, and we ask whether industry could benefit from selective adaptation of tactics developed within design/build. We establish that Design/Build studio and professional practices create their identity in how they deal with common concerns such as limited time, budget and material resources, issues of liability, group design processes and dynamics, collaborative solution creation and the constructive inclusion of clients, consultants and contractors in the design process.

Yet, the most significant distinguishing feature of the Design/Build scenario is a reversal of conditions in professional practice and construction. In professional practice, labor costs are at a premium. Typical construction processes are moving away from their traditional position as crafts and becoming instead processes of assembly of pre-made parts. In the Design/Build scenario the opposite is true. The typical design/build project in the context of a professional architectural curriculum incorporates several hundred person-hours from highly-skilled, craft-oriented, innovative individuals, most or all of whom are highly motivated to pursue a design process where analysis, creation, ideation, discussions and decisions occur through the making of at-scale and full-scale representational artifacts, followed by a construction process which is not only highly detail-oriented but is overseen and/or carried out by many of the same individuals involved in design.

In short, design/build is not a small version of professional practice, but is in many respects is its reciprocal or counterpoint. In our paper, we question whether professional practice and construction could benefit from the adaptation of specific tactics such as direct involvement of designers in construction, role-trading to create targeted and close collaborations between craftspeople and designers, and full-scale prototyping in the design process.

"NEW DESIGN/BUILD DIRECTIONS" -- TRAINING THE ARCHITECT AS A PRODUCT DESIGNER

Farzana Gandhi, New York Institute of Technology
Jason Van Nest, New York Institute of Technology

While many architecture schools have introduced design-build as an active component in their curricula in recent years, most follow in the footsteps of the pioneering model demonstrated by Samuel Mockbee for the Rural Studio at Auburn University. These traditional design-build programs address the "make-believe" abstraction of architectural education by matching students with a real client in an immediate socio-economic context along with construction experience from start to finish. However, as students increasingly embrace complex, interdisciplinary design problems, it is critical that architectural education question what constitutes design-build and whether alternative models exist -- ones where projects are client-less, site-less, and program-less, but offer a different set of equally rigorous "real-world" constraints via a research-driven process of designing and building a product.

This paper proposes one such alternative model in the context of a product-oriented design-build project based at the New York Institute of Technology. Professors at NYIT challenged students to develop a kit-of-parts disaster-relief shelter package, where all architectural building materials (roofing purlins and roofing tiles) are up-cycled from reconstituting a patented shipping pallet and the water bottles it ships.

This structure requires that a design-build studio be run in a fundamentally different way–as one that focuses on building assembly system/product design (not singular architectural artifact), on programmatic/performance requirements throughout a product's life-cycle (not singular use), and on visual communication for investing audiences through social media and crowd-funding (not singular client).

If one of the goals of traditional design-build education is to offer hands-on experience with construction, materials, and craftsmanship, an architectural student wearing a product design hat finds himself similarly in unknown, but fruitful territory, confronted by fabrication limitations down to the scale of connection detail. In the absence of customary client-architect-contractor constituents, students are also asked to define both project scope and constraints as well as target audience and sites, continually walking a line between short-term research activities (building a proof-of-concept prototype for a locally specific client and site) and long-term aspirations (leveraging existing shipping, distribution, and disaster relief networks to reach masses in need). This encourages unique research for a societal-focused "big picture" view that, in turn, informs appropriate approaches to design, materials, and fabrication.

Funding design-build studios has always been a problem and in the economic downturn of the last five years, this problem is more acute. Without a specific client and site, financial support for this alternative design-build model requires students to pursue unconventional channels for sponsorship and to build project awareness. Crowd-funding through web platforms such as Kickstarter and Indiegogo are already popular vehicles for supporting product design. In the case of product meets architecture, students learn that targeted visual communication is key in positioning the project for its environmental, humanitarian, and also economic values. This coupled with ongoing social media updates (twitter, facebook, blog posts) can reach varying investor audiences and provide funding success.

Through the discussion of the challenges, outcomes, and opportunities of this product-oriented design experiment, the authors aim to discuss potentials for this alternative model for design-build education.

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PEDAGOGY: ANALYSIS

DO TODAY'S LEARNING APTITUDES HAVE TO BE DIGITAL/ TECHNOLOGY-BASED?

Andrew Phillip Payne, Indiana State University

This paper starts with questioning teaching effectiveness by considering "do digital technologies make low-tech, hands-on activities and manipulatives outdated?" If the answer is no, then are there benefits to incorporating both high-tech and low-tech methods? We have to wonder what questions we should be asking ourselves when making decisions about effective integration of technology and hands-on activities in the architecture design studio!

When discussing the notion of design through the process of architectural education, previously, many techniques professed by the Ecole des Beaux-Arts were demonstrated without the use of advanced technologies and computer support. The argument is not should schools venture towards only digital or only analog but rather how to mix the methods to provide a stronger balance of knowledge. As educators, we should consider what role hands-on making, manipulating, testing and understanding have in the computer-age classroom/design studio. Have new technologies changed the way we teach and learn the basics of natural systems, craft, materiality, and physical or spatial perceptions, etc.?

A recent UCLA Teacher Education Program Inquiry Project on high-tech versus low-tech teaching in the urban classroom shows increased student engagement with high-tech teaching strategies. However, the project results also show an equal understanding of the content between both strategies. The project continues by implying that teachers who primarily use low-tech strategies are more able to present information in multiple ways, enabling students who possess less logical and mathematical or spatial intelligence to benefit from the presentation of information in various formats such as white- and black-board lectures.

The purpose of this paper is to compare and evaluate examples of learning exercises, teaching methods and tools. With the ever increasing abilities of the computer and software, students are often left relying on digital output rather than the manual process of achieving a desired solution. Calculating sun angles, developing compound curves, selecting materiality and understanding accessibility have now been reduced to the click of a mouse and have removed students from hands-on exercises that previously fully immersed them in the design experience.

The process of laser cut models, 3-D printing, CNC fabrication, and animation/rendered graphics is often preferred by the students and can be a very strong supplement to the long-hand method of basic material manipulations. This paper does not argue against the computer, but rather for the fundamental tools and methods that demonstrate effective integration of technology into hands-on activities. Architectural design and technology professors contribute with suggestions for the future of this hybrid teaching/learning process.

Evidence from this collective teaching and learning process is demonstrated through student work in the Craft and Tectonics (design/make) studio, Project outputs include handcrafted and digital outputs, large and small.

EAT: DESIGN-BUILD AS A METHOD FOR ADVANCING THE PHYSICAL CONSTRUCTS OF THE SLOW FOOD MOVEMENT

Rebecca O'Neal Dagg, Auburn University

An underlying structure of architecture and designed landscapes exists as a complex spatial armature for the grass roots Slow Food USA movement. Architectural research and drawn analysis of these underlays is critical for establishing a baseline for understanding specifically if design-build as a method for project design delivery can be a significant factor in influencing the future growth of the movement in the United States, and if so what are the characteristics of the most successful design-build delivery for Slow Food spaces. From farmers' markets and public school edible gardens, to local fare restaurants and small farms, the current role of design-build for creating built architecture and landscapes associated with Slow Food USA has not previously been comprehensively documented and analyzed. The Slow Food USA movement is inextricably linked to physical infrastructures and manifestations at varying scales, and this paper describes research and analysis of community-based design-build as an often used method for actualizing the spaces for Slow Food activities and educational spaces.

This paper describes drawn analytical research and investigative graphic representation which communicate a layered taxonomy of existing underlying architectures associated with Slow Food USA. Then it isolates projects that specifically utilize design-build for actualization and characterizes the specific design-build delivery process. The research then analyzes a sample of these design-build "foodspace" projects in comparison to traditionally delivered architectural projects. Funded by a modest intramural grant from xxx university, the research pairs the drawing analysis with interviews conducted with advocates and leaders of Slow Food USA in the Southeast and in the Northeast. This research aims to assist the advocates and leaders in determining best design practices and best design-build delivery practices for advancing the movement at different scales. Utilization of the visual medium of drawing analysis makes the information accessible to people not trained in architecture or design by offering easily digestible image-based analysis not only to the audience of involved designers, but also to non-designers, Slow Food USA leaders and members. This identification of best design practices and best design-build delivery practices has the potential to assist the leaders, farmers, and affiliates in the Slow Food USA organization in their ongoing and future efforts to mitigate environmental impacts of contemporary slow food production systems, to promote issues of food justice and food security, and to advance health and wellnesss of citizens in communities affiliated with the physical infrastructures of the Slow Food USA movement.

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PEDAGOGY: ANALYSIS

FACTS AND FIGMENTS. IMAGINATION AND REALITY IN DESIGNBUILD EDUCATION

Jane Catherine Anderson, Oxford Brookes University

Conventional architectural pedagogies have evolved to fit the design studio model. With the increasing use of DesignBuild / Live Projects in contemporary architectural education, we need to develop a theory of learning and teaching appropriate to the particular contexts and opportunities of DesignBuild education. Design studio projects are ostensibly (although rarely entirely) freed from the constraints of reality. DesignBuild projects are ostensibly totally immersed and engaged with reality. One possible critique of DesignBuild projects is that the difficulty in realising the design can limit the imagination and ambition of the project. This paper draws upon the author's observations that suggest that DesignBuild / live projects are not as real as they are perceived to be (Anderson, forthcoming 2014).

This paper takes the position that any portrayal of design studio and DesignBuild projects as a dichotomy is misleading. Both are predictive pursuits that use imagination to engage with the reality of the future context that they hope to occupy. Through analysis of two case studies carried out at Oxford Brookes School of Architecture for a community archaeological group and The Story Museum, Oxford (Anderson and Priest, 2012), the paper discusses the particular relationship between reality and imagination that is stimulated by a live project design process and the benefits to learning that emerge when the thresholds between imagination and reality are articulated. This is related to learning theory via Vygotsky's (1996) insights into human development of concrete and abstract thought within a social world.

Students are highly motivated by live projects (Morrow, Parnell and Torrington, 2004). The paper hypothesises that students are stimulated by the immersive experience of the authentic context in which they are active. Although the context is certainly authentic, the paper analyses the component parts of a DesignBuild project to demonstrate how it differs from both professional practice and the design studio. With reference to Lave and Wenger's (1995, p. 54) writing on the "sociocultural character" of learning, the paper describes the significance of what the author terms the Dual Context of Live Project Pedagogy. This dual context consists of the educational institution and the world. It shapes the experience of DesignBuild projects and alters the relationship between reality and imagination that exists in each context when they are separated.
The significance of experience and the ways that students are able to access it to develop their learning and creativity is discussed in relation to John Hejduk's (1987) subtle reflections on imagination and reality and the manifestation of this in his students' DesignBuild projects. A Dual-context and Experience-led design process is proposed that makes explicit the interaction between imagination and reality within architectural DesignBuild and live project pedagogy.

THE ISSUE OF SCALE

Hans Curtis Herrmann, Mississippi State University

This paper explores the value of better understanding the particular issue of Scale in design-build and the affects with regard to pedagogy. Drawing upon best practices realized through numerous nationally recognized personally coordinated design-build or design/construct courses, as referred to herein, this paper considers how The Issue of Scale may be wielded as the operable parameter for the design and the undertaking of a design/construct course. The catalyst of this inquiry is the question: How might one Scale the collaborations, tasks, durations, student roles, and general unfolding of the project to ensure all students learn and not just work.

Assuming an institution is reliant upon clients "bringing" a design/construct project to the program the result is often a set of parameters, if not mandates, with regard to the scale of the undertaking. Commitments inclusive of faculty efforts, institutional support, cross-disciplinary collaboration, and so forth are often a component of the projects negotiated award and in so doing the faculty involved may be tethered by these obligations. Additionally, a consequence of scale is the likely dictation of a particular type or level of student preparation necessary to assume the project. While always interesting and educational (to varying degrees) this model generally leads pedagogies to be subservient of project scale.

This paper proposes a case study of an interdisciplinary design/construct team approach illustrating how one institution is addressing The Issue of Scale. Concepts for work sharing, co-working, and how they, as a methodology for pedagogical and project design, engage Lev Vygotsky's Zone of Proximal Development1. Special focus will be given to the matter of meta-lessons. A term developed to describe the intangible or ill-defined lessons learned during a design/construct course. Construction management issues such as coordination, scheduling, and material supply management are fused with design resulting in a direct feedback loop in the design and tectonic resolution process. The resulting fusion is considered as a critical intent. Iteratively developed methods for illustrating or scaling-up these "fusion activities" will be elaborated upon within the paper.

Just as paper-based projects have been developed in accordance to an understanding of what scale of project a student is able to manage this paper documents how Design/Construct projects may also be scaled to afford a greater degree of student engagement and learning.

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RESEARCH: EVIDENCE/BASED DESIGN

FIVE YEARS ON: EXAMINING THE VALUE OF EVALUATION

Phoebe Crisman, University of Virginia

Most built architecture receives the greatest attention immediately after construction is complete. Flattering photos and rave reviews record a specific moment in time before human inhabitation and weathering affect the pristine object. Careful and critical evaluation several years after completion is essential, however, for a full understanding of an architectural project. Architecture schools are particularly well suited to monitor and evaluate their design/build projects, in order to share research knowledge and refine pedagogy and future projects. This evaluation process is crucial for design/build projects that experiment with innovative energy and water systems and sustainable materials. While a typical post-occupancy evaluation focuses on issues that are easily evaluated using quantitative methods, qualitative considerations such as tactility and other aesthetic issues must be given full attention and integrated with the overall analysis. This paper begins by discussing several theoretical considerations and evaluation methods, in order to establish a framework for assessing an award-winning university design/build project five years after completion. How has the project fared after the NCARB prize and AIA, ACSA, and USGBC awards? How well does the project support and enrich people's daily activities? As a catalyst for action and platform for community engagement, does the project fulfill its goal of providing sustainability education both through its physical design and educational programs? Do the photovoltaic, wind and solar thermal energy systems perform as projected? Does the integrated water system of rainwater collection and native plant gray water filtration function as planned? Are the carefully selected green materials weathering well and achieving their teaching objectives? How could the research and design/build pedagogy and process be improved for future projects? These are just a few of the issues that the paper examines and reflects upon in a critical way.

RE_BUILDING IN HAITI: WITH AND WITHOUT GOVERNANCE

Mark Stephen Taylor, University of Illinois, Urbana-Champaign

Designing and building in the context of a Developing Nation offers unique opportunities and challenges, both for students and faculty. This paper draws on the experience of a design build project conducted at the epicenter of the 2010 Haitian Earthquake, and asks the question: "How can an intervention in a community provide long lasting benefit beyond the construction of just one building?"

It is estimated that over 3,000 non-governmental organizations (NGOs) were in operation in Haiti soon after the 2010 Earthquake. That led some to refer to Haiti as a "Republic of NGOs". With access to financial resources and infrastructural support away from the affected region, International NGO's often wittingly, or unwittingly set the agenda of a recovery effort. The contracts they secure determine who benefits and what needs are met. In that process numerous small indigenous organizations, and fragile government agencies, are sidelined in the need to complete certain goals and objectives prescribed by board members and donors who have never received endorsement from the people of Haiti. In such a climate how should a Professor from an American University engage in a rebuilding effort?

By observing some of the common failures in collapsed buildings it was clear to a trained building professional that additional resources would be required to ensure that what is reconstructed, perform better than what was destroyed. In some cases those resources would need to be material, however the knowledge in how to design and construct connections would also be something faculty and students could contribute. Drawing on the experiences the author had building a small midwifery training facility on a Hospital campus in the town of Leogane, suggestions are made as to what can be addressed, and what improvements could be made if appropriate collaborations are established early in the process. The reflections of the author are a frank and honest account of issues that were addressed, and issues that should have been addressed but due to teaching commitments back in the US unfortunately were not fully resolved.

The designing and construction of the 1000 sq/ft facility was a great learning experience for all involved, however it is questionable as to whether the endeavor orchestrated significant long-term change beyond those intimately involved in the project. In conclusion, suggestions will be made as to how a more resilient design build process could be established, and how benefits can be reaped beyond the construction of just one building.

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RESEARCH: EVIDENCE/BASED DESIGN

RESPONDING TO THE ALMOST THERE: EVIDENCE-BASED DESIGN IN DESIGN-BUILD EDUCATION AND PRACTICE

Robert Todd Ferry, Portland State University

The success or failure of a design-build project within an underserved community often hinges upon the amount of community input during the design process. As a result, public interest designers have experimented with everything from adaptation of traditional models of the community design charrette, to web-based open-source formats that allow participation from designers and citizens around the world, all in the interest of inclusivity. While these efforts are laudable and have resulted in meaningful work, there is a significant, if subtle, means of communication between the community and architect that is too often left out of the discussion, namely, the message of community desires through the evidence of minor physical adaptation. This evidence might be defined as the "almost there" within a community; the physical manifestation of behavior aimed at responding to the need of an individual or community.

The "almost there" is so often overlooked because its identifiable features are nearly always architecturally intangible, informal and impermanent, so we are rarely even conscious of them. Additionally, when these indicators are noticed, they often appear at odds with the permanent elements present in a space. Yet the action by an individual or the community (perhaps unspoken or done without thinking, such as a playing child moving a fruit-crate-turned-chair slightly into the shade) is a very important clue to some significant programmatic opportunities. These clues are essential for more interactive social spaces and provide evidence of use and desire that don't always come out in interviews or charrettes, but may respond to the greatest programmatic needs of a community. To use an example, left-over space being used as a momentary soccer pitch by passers-by may not simply indicate a desire for play, but perhaps central social spaces of exchange. In the absence of observable behavior, two sticks left upright in the ground with a certain relationship to one another and the surrounding area may also offer similar evidence useful to a designer. Evaluating physical evidence is necessary because the presence of the design team will very likely alter the behavior of the citizens while they are present. Using these observations to respond to the way people actually live through built intervention offers a much greater likelihood of a project being a success in a community.

This paper will not only discuss these opportunities, but will illustrate them in detail using a specific project where architecture students used this method of responding to the "almost there" to transform the living conditions at an orphanage in Haiti, creating the most dynamic and used spaces in the area. The author proposes that teaching this method as a primary means of research and design can ensure that crucial information is available to designers that might otherwise be difficult to obtain when working with communities with different languages, culture, and values from the design team. Furthermore, this essay discusses this method in the greater context of architectural education and argues that design-build programs are uniquely suited to bring this approach to the greater field of architecture.

VITRUVIAN MECHANICS: A MODEL FOR EVALUATING, ASSESSING, AND DISSEMINATING THE DESIGN+BUILD EXPERIENCE

Daniel Nevin Harding, Clemson University
Dave Pastre, Clemson University
Paul Russell, Clemson University

We need to establish a better mechanism to systematically evaluate projects and service learning experiences so that we are not always reinventing the proverbial wheel.[1]

Clear, precise, and tested models for assessment, evaluation, and dissemination for design+build community-centric projects in the academy eludes most design studios. This paper presents the rigorous development and application of a unique model and framework for critical assessment and poignant student evaluation in this venue of design education. Predicated on the Vitruvian principals of firmness, commodity, and delight, the presented model will both outline the theory and driving constructs for the framework while also demonstrating its ability to push innovation, entrepreneurship, design+build practice, and social impact design. Specifically the argument will be substantiated by the work produced through several years of faculty and student collaborative efforts in the craft and design of a series of studios that engage a multidisciplinary approach to design+build, hands-on education. Also chronicled will be the creation of a specialized certificate program within a graduate school of architecture. This program establishes itself as a transformative certificate in an NAAB accredited architecture program through its tactical curriculum and course sequence, proven pedagogical approach, and engagement of diverse university centers and off-campus locations.

To this end, design+build architecture education has an unparalleled opportunity and responsibility to inhabit a place between the learned and the intuitive, while simultaneously examining the value of commodity and innovation. This place of tension, friction, and truth is also a threshold indicative of constant flux and genuinely difficult to assess and navigate relative to traditional methods of evaluation. Unfortunately, design+build theory and activities in the academy can often be categorized as either objective vocational exercises void of scholarship and research, or worse, subjective musings irresponsibly suggesting to any participating architecture faculty or student yielding a hammer that all things must look like a nail.

Typically, some of these projects can garnish support or praise simply because they were "built." To the critically acute, there is a desire to cultivate rigor in this field of research and scholarship by developing collaborative companionship with larger philosophical and theoretical constructs that will obviously include but also go beyond material, making, and our relationship with implements. An argument must be made for appropriation and advancement in the landscape of design+build assessment, evaluation, and the mechanics of dissemination.

1. Angotti, Doble, Horrigan. Service-Learning in Design and Planning: educating at the boundaries. New Village Press, Oakland, CA