(Re)defining the Dash:
Design-Build Perception and Pedagogy

A Design-Build focused curriculum defines order, semblance, and linkage between scale, scope, and pedagogical directives. Design-Build opportunities allow students to see beyond initial fears and constraints as a place to be innovative. The hyphen (dash) between design and build becomes shorthand for the literary microcosm energizing thinkers and doers, creators and makers, designers and builders to appreciate, anticipate, and activate architecture.

INTRODUCTION: THE PUNCTUATION

Individual words, specific arrangements of words, and placement of punctuation craft phrases, sentences, and paragraphs to implicitly or explicitly define ideas, concepts, or philosophies. Two words fused by proximity or punctuation create a hybridized and connotative definition. Design and build, while simple to define separately, are catapult to the deep end of academic and professional opinion pools when placed adjacent to one another or linked through a variety of punctuation (-, /, +, etc.). Historical approaches to and perceptions of Design-Build curricula can be revisited and redefined to address current learning styles and more effectively teach the associative art, craft, and science of architecture.

The punctuation, defined as a hyphen (dash) for this paper, is symbolic of both words reaching out to connect; to bridge the gap and soften the separatist nature of the sometimes-opposing white-collar and blue-collar occupations. A dash or hyphen in literature expresses intent to describe something more precisely.[1] Therefore, the first word may be assumed more prominent or the beginning of a span of time proceeded by a dash as found on a tombstone. The dash represents both sides agreeing to work together, but the dash does not define how it is accomplished or how it might address current or future requirements. Regardless of punctuation or lack thereof, the proximity and association of the two words define linkage and codependency. Either academically speaking of faculty, students, and communities physically creating space with full-scale materials or the professional practice side of project delivery; the overriding theme joins the two entities into one concept and relevant pedagogy.

PERCEPTION AND PEDAGOGY

Approaching Design-Build projects through innovative pedagogy can affect perception of space and materials. Academic Design-Build projects may require innovative solutions to address current and future technology, learning styles, and effectively teach the craft of architecture. In the vain and spirit of "re" in the 21st century, as

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exemplified in the words recycle and repurpose, both academic and professional fields can redefine the pedagogy and perception of physically creating and making architecture while addressing current economic and social influences. George Elvin, author of <u>Integrated Practice in Architecture,</u> makes the simple observation concerning architects' involvement, "Many architects are reclaiming some of the control and rewards they relinquished in the twentieth century by adopting Design-Build project delivery." [2] Redefining often implies change as Pritzker Prize winning architect Thom Mayne states, "If you want to survive, you're going to change; if you don't, you're going to perish. It's as simple as that." [3] When discussing how or why to redefine the dash, change is embedded in the approach.

Change is not always welcomed or valued. Change can be in response to learning styles, input from practitioners, or birthed from disgust/discontent for current conditions. Singer songwriter Sam Cooke shared his optimistic hope for the future as he penned "A Change is Gonna Come," which helps convey the hopeful human spirit and belief in better days.[4] Michael Jackson told us, in his song "Man in the Mirror," if we wanted change we needed to start with ourselves. [5] Titles either express intent or provide a sense of mystery as to what the author(s) are attempting to convey. Likewise, this paper's secondary title words, perception and pedagogy, are the metric and framework for the definition and redefinition of the dash. Perception relates to "what does it look like?" and pedagogy infers "how is it teaching students?" while supporting creative, knowledgeable, and sensitive architecture. Professor Geoff Gjertson's paper *A House Divided* makes the following plea:

> "First, Design-Build studios should be a required part of the curriculum of all architecture programs. Until faculty and administrations make this determination and the ACSA and NAAB promote and require this change, Design-Build will always be marginalized." [6]

To simplify the potential for an exhaustive history, connotations, and subsequent viability of the unassuming yet highly loaded term Design-Build, Walter Gropius' following challenge is appropriate: "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." [7] Continuing Mr. Gropius's stance, current Design-Build projects often stir opinions and subsequently shake the trees of traditional teaching and academic policies. Two fundamental questions arise concerning the project type, introducing critical evaluation and analysis:

> 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?

The answers not only reside in defining the dash, but actively redefining it for pedagogical and industry relevancy. The active sense of designing and building becomes integrated and an outpouring of simultaneous creating and making. Per Mr. Gropius's choice of words above, "let us" not independently associate [designing with creating] or [building with making]. The terms are not linear or singular – they are describing the iterative process which floats somewhere between a need, an initial concept, and the final construct as it relates to human interaction. Rowan Moore, author of <u>Why We Build</u>, offers the following insight:

> "A building is not a sentence, which in principle has the ability to match and express a thought closely. It is not linear, like language. Compared to the fluidity of words, a building is atrociously clumsy, but it can be lived and inhabited as books cannot be." [8]

In her book <u>From the Studio to the Streets</u>, author Mary Hardin states, "Though architecture has long fostered learning by doing, it is only recently that the field's hands-on aspects have been subjected to more systematic appraisal." [9] There seems to be a divide between those who subscribe to the educational benefits of Design-Build opportunities and the often calloused-handed, hammer swinging, sawdust covered blue-collar worker image. Formal instruction under the name of architecture, once taught as the mother of all arts with direct understanding and proficiency of both design and construction as a master builder, is often criticized for producing students without a sense of reality or do not know how buildings go together. Architect Martin Sell expands the history of Design-Build by stating:

> "The tremendous growth in the acceptance of Design-Build delivery in the United States has occurred only since the late 1980s... since the American Institute of Architects (AIA) Code of Ethics and Professional Conduct suggested that architects should not be permitted to participate in the construction aspects of any project, including Design-Build project delivery... until the ethical prohibition was repealed in 1978." [10]

The Architect's Handbook of Professional Practice informs "the Design-Build approach returns American Architects to their pre-World War II role, in which they oversaw construction as well as design." [11] Returning to the master builder is once again warranted.

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 sketching out and building both small and full-scale prototypes. 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 academically defined as the architectural terminology creating-making. Educators cannot plead ignorance on this topic – a decision to not have a Design-Build program or not offer Design-Build opportunities to students is equal to a vote against it.

**ACTIVATING THE SPACE BETWEEN**

Development and appreciation of architecture is dependent upon space and connections, so articulation between mass and void is critical to successfully activating scales of space. Voids and discontinuities exist in both micro and macro scales. Entire inhabitable rooms are spaces while wall assembly discontinuities are smaller parts of the internal workings to increase performance such as thermal efficiency, acoustical separation, and air circulation. The dash in Design-Build is the element (or void) which informs the reader the two words are associating with each other. As an exercise to introduce mass and void analysis in full-scale modeling and prototypes, teams of four architecture students worked together to produce display units during a four week assignment within the Spring 2014 Design IV studio (Figure 1).

The dash between design and build becomes shorthand for the literary microcosm; energizing thinkers and doers, creators and makers, designers and builders to appreciate, anticipate, and activate architecture. Examples of architecture relating design intent in context of mass and void are prevalent in academics and practice. Architect Rick Joy, once a working musician, strengthens the viewpoint of the dash as a link by quoting Miles Davis saying "Music is the space between the notes. It's not the notes you play; it's the notes you don't play" [12] which follows a similar quote
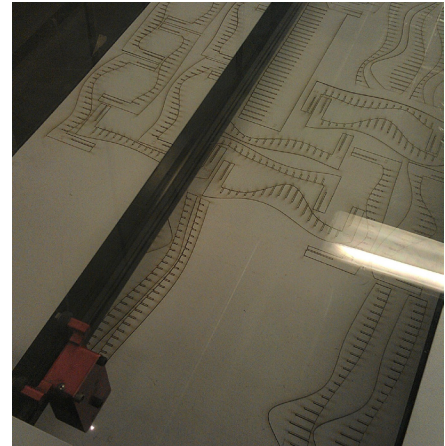
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Figure 1: Second year architecture students working in groups to produce full scale display units blending digital fabrication, and hand craft. (Spring 2014, Professors Butko and Cricchio)
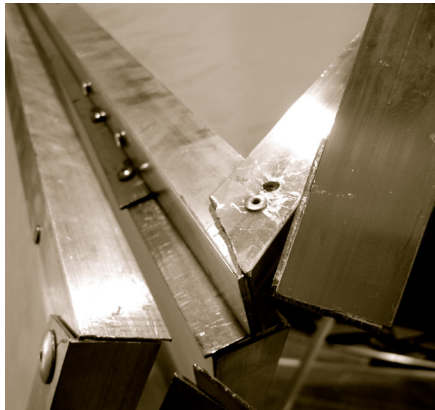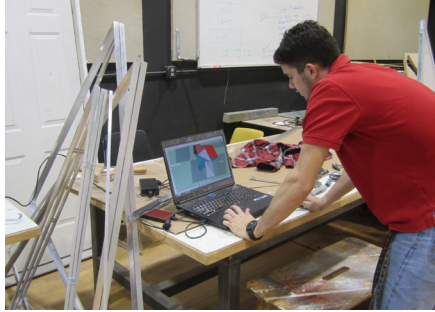
from the French composer, Claude Debussy. The space between objects, analogous to architecture, also defines intimacy and separation. Synonymous to music, the pedagogy and appreciation of architecture is rooted in an understanding of space defined by materials.

The scale and scope of Design-Build opportunities are critical to learning. Beginners should start with smaller projects achievable within short time frames (few weeks) and work up to larger projects spanning many months or years. Possibilities include individual or separate projects where students and faculty approach one project at a time. These projects can range in size, cost, and duration but ultimately they are either the focus of dedicated courses or components within required NAAB-driven courses. As stated in the ACSA 2014 Fall Conference call for papers:

> "It [Design-Build] is now included in over 70% of our curricula. Design-Build can be as big as the entire curriculum or as small as an elective; it can take place in a school's courtyard or halfway across the world; it can be demolished at the end of the semester or become a permanent part of a community; and it can innovate in all imaginable ways." [13]

Design-Build opportunities define order, semblance, and linkage between scale, scope, and pedagogical directives as embodied in an independent three week extra curricular project entitled *Interactive Synchronicity* (Figure 2). Developed as an interactive installation during a week-long College of Architecture showcase of creativity, the final construct luminously interacts with acoustical impulses.

The relevancy and pedagogical benefits of students learning through Design-Build as a service to society is demonstrated in another hyphenated term: service-learning. While service-learning opportunities provide tangible results to communities in need, students also begin to understand clients, budgets, schedules, and safety requirements in real time, allowing immediate activation of design in the inhabitable form. Students experience the impact of design and client appreciation without regard for economic standing. As stated in Bryan Bell's book <u>Good Deeds, Good Design</u>, "The general public, the 98% without access to architecture, often do not understand what we do and what we can do for them. As Mockbee used to say, Architecture has been put on the top shelf, out of reach of most." [14] Approaching Design-Build opportunities as a method to share the importance and power of architecture teaches students how clients activate the resultant construct(s) and offers exploration of alternative materials.

Critics will debate the often pragmatic or banal nature of the final product, but the pedagogical benefits of the Design-Build process must be valued. As Gjertson continues, "Design-Build cannot be seen as only service. Although there is great value in providing design and construction services for those who may not be able to afford it, the "learning aspect" of service-learning should be equally represented." [6] Students learn not only through the process of producing a tangible construct, but continued communication about how the installation is weathering and the client's post-occupancy comments help students understand the results of time and usage. Students begin to learn future effects of design decisions. As authors Moos and Trechsel state, "The Rural Studio is an educational program. Its mission concerns the education of the architect, the citizen architect, who fully realizes the importance of the decision he [/she] makes." [15] As students and educators collaborate, authors Moore and Wang offer the following advice, "When service-learning is viewed solely through the lens of 'academic entrepreneurship,' the balanced reciprocity between service and learning is often compromised, resulting in less than desirable learning experiences for students, and often less than the desired commodity for the

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Figure 2: Authors of paper working on a Design-Build installation using aluminum, acrylic, cellophane, audio interfaces, and LED lights. (COA C3 Week, Professor Butko, Spring 2013)

community client." [9] Bell helps explain how architects should interact with clients by stating:

> "While designers may be familiar with the design process, too often clients are expecting to start a design process on blind faith. Design requires enough faith – because the end product is initially unknown – without increasing client anxiety and confusion through an unclear process." [14]

Educators must allow the pedagogical aspects of Design-Build to drive the final result while also regulating appropriate boundaries.

Two recent service-learning projects dealing with local clients in which University of Oklahoma students and faculty contributed time and resources yielded the simultaneous construction and completion of two adjacent and equal volume residences (Figure 3). A partnership with Cleveland County Habitat for Humanity combined with funding from the EPA P3 organization, allowed the multidisciplinary team to design and build one wood framed residence and one Compressed Earth Block residence for thermal, structural, acoustical, and energy efficiency comparison. The entire research project, construction, and data collection began Fall 2010 and will proceed through 2015. Figure 3 also shows students and faculty during a recent Design-Build Society student organization (formerly Freedom By Design at OU) two day deck and ramp installation for elderly, economically challenged women in NE Oklahoma.
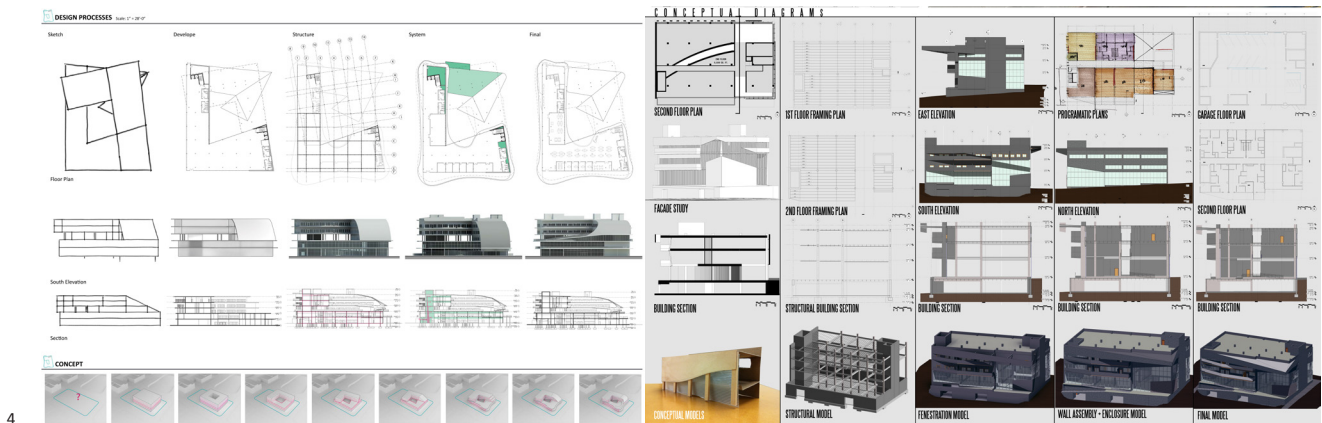
ACADEMIC ITERATIONS

An education in architecture allows exposure to and an understanding of what has been tried, what has worked, what to try, how to try it, and what rules need be applied to each process. Design-Build opportunities challenge students to put ideas and talents into a big pot and mix personal anticipation for the resultant stew of collaborative design. Design-Build pedagogy is a melting pot aligning various experiences and expertise with specific NAAB-defined learning objectives and requirements. Learning architecture is a process defined by and a resultant of iterations, experience, and examples as described in the old adage, "practice makes perfect." The authors of this paper have experienced first hand subscribers to this approach complete specific tasks faster, better, and more efficiently, while fostering philosophical and theoretical associations to other disciplines. As architect Louis Kahn indicated, "A great building must begin with the immeasurable, must go through measurable means when it is being designed, and in the end must be unmeasured." [16] The pedagogy of Design-Build should embrace and embody this process of discovery introduced in lower level design studios.

Beginning design students often lack confidence to execute complete designs

Figure 3: Community based service-learning opportunities spanning short time frame volunteer projects through multiple semesters 2011-2014 (Cleveland County Habitat for Humanity CEB residence under construction top left photo, adjacent wood frame and CEB residences top right photo, and Freedom By Design deck and ramp design and installation project bottom photos). Professor Butko, CO-PI and faculty advisor

because they have not yet gained knowledge of materials and construction techniques. As students attempt to physically build full-scale constructs from drawings, they realize complexity beyond their understanding. As sole designer and builder, students learn quickly to adapt designs into what they know at that moment. Iterations develop initial understanding of basic concepts into a broad palette of knowledge. Unable to address all iterations of the design process at once, students fill the gaps and subsequently learn new and innovative methods of production. The process of developing ideas through physical materials occurs with iterations, which stem from either student or faculty belief the project could improve or investigation to determine if it could benefit from another pass. Programs offering Design-Build opportunities and a sensitivity to how ideas are vetted through iterations and full-scale materials produce students with a stronger and more developed understanding of material properties and limitations.

At first, students may view doing something again as failure, but experience with failing teaches how to assimilate concepts through physical boundaries. Iterations are not necessarily the result of failure, but failure could be the catalyst for iterations. The adage "if at first you don't succeed, try try again" is apropos – ultimately making the final product better or the unexpected realization earlier versions were stronger. Berry Gordy, founder of the *Motown* record label, expressed his surprise with mixing music several times during a *Motown* documentary. [17] After dozens of mixes on one particular song, he realized one of the first mixes communicated the best arrangement of voices and instruments. Refinement of architecture can be compared to music arrangement; allowing the final product to develop. Figure 4 depicts the iterative design process through a timeline of initial to final plans, sec-

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tions, and elevations during Fall 2012 and Fall 2013 Design VII mixed-use projects. Similar to the numerous drafts of this paper, sometimes it takes multiple passes to learn what works and does not work. The nonlinear and sometime cyclical process of thinking, doing, designing, and building allows students experimentation for deeper comprehension. Design-Build opportunities allow students to see beyond initial fears and constraints as a place to be innovative.

Class trips to construction site, buildings, and manufacturers help students connect the dots between designing with materials and physical implementation, helping students understand buildings are not simply the first and only concept designed solely by the famous architect. As defined through on-site exhibits, *Exploration Place* in Wichita, Kansas by Moshe Safdie and *The Salk Institute* in La Jolla, California by Louis Kahn are two examples of well-known buildings openly displaying iterations

Figure 4: Portions of 4th year undergraduate final projects depicting various iterations of the semester mixed-use project spanning numerous weeks of design process and revisions. (Professors Butko and Fithian, Fall 2012 and 2013).

of the design process as results of interaction with clients – a bold yet honest move to show the public the final inhabitable constructs were not the first concept nor the only structural, material, and volumetric possibilities. Students quickly realize even "starchitects" go through the iterative process .

STUDENTS LEARNING FROM STUDENTS

Design-Build opportunities allow students to share knowledge and mentor lower year levels through collaboration. This helps students better understand process and break down barriers between year levels. Beginning design students typically think the upper level students have it all together, therefore approach any kind of social or educational relationships between levels with trepidation. Working together cohesively in vertically-based learning environments (combining multiple year levels) helps soften the awkwardness often associated with grouping or associating various year levels. A group-based assignment focused toward one result is not a formula to allow the weak and shy to hide but a method of pulling from each person's strengths while eliminating their weaknesses. David Foster Wallace equates meaning from experience by stating, "Learning how to think" really means learning how to exercise some control over how and what you think. It means being conscious and aware enough to choose what you pay attention to and to choose how you construct meaning from experience. [18] Students exercise control over how and what they think compared to other students' opinions.

Students become instructors and mentors through vertical learning environments often offered in Design-Build opportunities or interaction with other students in model shops and lab type settings. Bell states, "Participation in design needs to serve multiple objectives and allow for flexibility to respond to unforeseen challenges and opportunities." [14] The overlapping of knowledge and approach allows students to see potential and discover how crafting materials from overall dimensions down 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. At first, physical connections and materials may intimidate students or seem like a demanding learning curve, but working with upper division students, the shop/lab manager, professors, and other classmates allows students exploration and experience to ultimately ask "what if" and learn the process of innovation is key to means and methods. They quickly learn material and tool limitations which directly impacts design decisions.

A 3 1/2 week Summer 2012 intersession course in which four enrolled and four volunteer students designed and built a playhouse to be raffled during the annual CASA Playhouse Parade display in the Oklahoma City Penn Square Mall, showcased collaboration and experiential learning (Figure 5). Students from all five year levels participated, creating a vertical learning environment within a short time frame and $500 budget, yielding necessity to make quick decisions and incorporate salvaged and reused materials.

Most students are proud of their finished product(s), but the pedagogy of comparing initial sketches and/or scale-models throughout numerous iterations allows students to understand what developed and influenced the final version. They either realize the design improved when it became a work-in-progress or they learn where design was flawed but still proud of what they learned. The 80/20 rule is validated in Design-Build projects. A well thought out design will retain 80% of the original design with 20% of it re-designed during the construction process, defining Design-Build as a work in progress. At first students may be annoyed to change the design

but in the end they realize the adapted 20% makes 80% of the final construct. This is because the students actually learned design as they constructed the 80%. They learned what the boundaries are, often confused with limits, and how to go beyond them. The 20% is a result of the 80%.

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Figure 5: CASA Playhouse course involving students and faculty to design, construct, and assemble a children's playhouse for 10 day raffle to benefit the charitable organization. Photos depict Design-Build process, display in shopping mall, and final interior view of salvaged cedar, cypress, and acrylic (Professor Butko, Summer 2012).

Christine Macy, Dalhousie University Dean of Architecture and Planning, describes the School's Free Labs, "It is all about hands-on learning – learning by doing. Free Lab throws students into the world of architecture with no holds barred." [19] Full-scale Free Lab projects span an average of two weeks within a vertical learning environment. "The philosophy behind it is that there are things that you learn in reality that you don't learn on the drawing board and that you learn things working in full scale that you don't learn making a little model," says Instructor Emanuel Jannasch. [20] "It's an opportunity to test the imagination and get adventurous," Mr. Jannasch explains. "It's actually about dealing with the unexpected in many cases." Dalhousie Professor Ted Cavanagh continues, "It's the dilemma of our field [that] we spend a lot of time in the studio, imagining buildings. To imagine and do at the same time is pretty rare." [19] When describing a project entitled *Mov-ibles*, Professor Marie-Paule Macdonald continues:

> "Many free labs call on the venerable tradition of the architectural folly. This is a work of architecture with no purpose other than its own architectural idea. In the eighteenth century, follies were often garden pavilions laden with evocative historical or symbolic meanings. In the late twentieth century, Hans Peter Worndl and other architects created follies to explore architecture's rhetorical potentials. Freed from purpose, a folly can sometimes unleash the most surprising possibilities and new experiences." [19]

The coauthor of this paper, Haven Hardage a 5th year student, is directly involved with designing, building, and installing numerous projects in a variety of roles. Hardage has contributed to successful projects as an enrolled student within a vertical studio, a leader of an independent project including a faculty member as an advisor, an integral part of student organizations, and a mentor to students as both an upper division student and an employee of the Creating_Making Lab (model shop). He has intentionally aligned himself with projects through development of concepts, offering suggestions and advice to other students as someone who has either done something similar or how his experience has influenced his method(s) of approach. Someone doesn't truly learn something unless they physically do the task and learn through iterations. As a student, Hardage has built upon curricular assignments while continuing to hone his knowledge base. He believes in an approach which accounts for the students' visions without immediately telling them it will not work. Aside from defining basic safety requirements, he will allow them to try something and learn from the experience, regardless if it succeeds or fails. He subscribes to "if you fail and then you succeed then you know why it works." Hardage

encourages talking and thinking through ideas and will offer comments like "I don't know every way to accomplish that task, but I know a tool or method we can try." [21] His enthusiasm for learning proves he embodies the idea of learning through doing.

Individual student collaboration occurs one on one, where a student asks a friend or classmate for assistance. Group collaboration exists where multiple students either begin and end a project together or the schedule of the project spans multiple semesters, allowing students to float in and out at varied periods either as enrolled students, volunteers, or paid research assistants. Regardless of the year level, enrollment status, or compensation, student collaboration becomes a ladder or conduit between the student and the professor, facilitating the flow of ideas and talent.

INFORMATION VS. KNOWLEDGE

An old Chinese proverb simply states, "I hear and I forget; I see and I remember; I do and I understand." [22] Seeing photos or drawings of materials and joinery is informative, but actually making a connection with physical full-scale materials fuels the skill set and knowledge of a topic. By no means does this statement imply lecture courses do not instill knowledge, but knowledge is furthered and validated by experience; the result of doing something wrong and then doing it again to learn from mistakes or merely learn from the process. This "doing again" may not be merely one time, it may be the result of numerous attempts of which all contribute to the final product. Selection of materials, honing of materials, and placement of those materials are the manifestation of ideas. Charles Dickens offers the following insight: "The whole difference between construction and creation is exactly this: that a thing constructed can only be loved after it is constructed; but a thing created is loved before it exists." [23]

Students graduate with an understanding of design and believe they are prepared for the workplace. Unfortunately, reports show their performance is sometimes inadequate and causes an increased amount of time spent in the field addressing drawings into something that can actually be built. This can all be changed by increasing students' knowledge of building technology and construction, including diversity, teamwork, the relationship between education and practice, design and creative problem solving skills, international recognition of qualifications, and the justification of established professional roles. [24] Architects and builders need to learn from each other, so having a Design-Build component integrated into education provides opportunities for students to gain practical building experience. Author Bob Fowles states:

> "Based in the 'real world' a Design-Build project differs significantly from the traditional studio-based design exercise. In particular it has the added ingredient of the tactile experience, which as defined here is more than just the direct physical contact with materials, but encompasses and emphasizes the closeness of the students to the processes of decision making, designing, and building. [25]

Architects often rely upon contractors' material and construction knowledge to fill in design gaps while contractors may then depend upon office-based architects to solve issues in the field. Author Chris Hendrickson states:

> "In the planning of facilities, it is important to recognize the close relationship between design and construction. These processes can best be viewed as an integrated system. In an integrated system, the planning for both design and construction can proceed almost simultaneously, examining various alternatives which are desirable from both viewpoints and thus eliminating the necessity of extensive revisions under the guise of value engineering." [26]

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The more designers and builders experience and experiment with materials, the more effective the collaboration. As noted in a video documentary, architect Jeanne Gang emphasizes the importance of collaborating with engineers, consultants, and contractors early in the design phase. Her talent for coaxing poetry from prosaic is linked to the innate importance for sketching ideas in model and material form. When discussing interaction with craftsmen, Gang states "They know their material and once they understand the idea and vision, we start to invent." [27] Collaborative discovery is the essence of architecture.

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 focus upon creating and making is strengthened by the non-linear allowance for making and creating through the use of mockups.

Physical mockups are not merely the aesthetic manifestation of ideas into tangible materials; they are the real time three-dimensional sketchpads for architects, contractors, consultants, and clients to work through connections, compatibility, and site collaboration. The collaboration becomes a four-dimensional design tool as revisions are developed over time. Actively sketching cultivates design through discovery. Sketching with full-scale materials can be as simple as initially making a connection between two pieces of material followed by the introduction of a third element. The pedagogy of insertion and composition is paramount. Some students may be new to this process but quickly learn not to approach it as a linear process but one that incorporates the initial idea to the first cut with the last piece of material.

Sometimes the project can be something new to a student, without prior ability or knowledge of a subject and materials. The element of surprise, innovation, and ingenuity jump start the learning process into a love-hate relationship. Forced into the unknown arena of building something full-scale may frighten some students. It serves not as a weed-out tool, but as a method of self-evaluation and introspection. Students may begin to ask "do I like this?" but should focus on the more important question "does the result align with the intent and need?" The results from Design-Build projects are astonishing and not under pretense that all students get a gold star for effort. The effort must result in functionality, durability, material awareness, and safety.

SUMMARY/CONCLUSION

Simply stated, "Whatever good things we build end up building us." [28] Design-Build opportunities range in size between an annual, rite-of-passage type of project where students flock to a particular architecture program because they too seek the lime light of contribution to a high profile endeavor with historical momentum and clout or a small, short time frame off-shoot project within the typical parameters of a design studio. Either extreme or a happy medium challenges students, faculty, and the community to band together on a learning expedition; instilling practical hands-on experiences to design principles, site conditions, time and budget constraints, and connecting the dots between thinking and doing.

The dash is not merely a placeholder between two words – it embodies the learning process and considers the following in various stages: safety, people, place, economy, materiality, iterations, sustainability (repurpose, recycle), functionality,

current millennial student learning styles, digital and physical fabrication, ingenuity, innovation, traveling, site visits, accessibility, and adaptability. It is the students' and teachers' responsibility to address these components throughout the process. Design-Build opportunities and curriculums can offer students a glimpse of the human interaction – how a construct is built and inhabited, be it tactile/haptic, aural, aromatic, visual - it is all sensory inhabitation. Lecture classes and scale models may also help ask these questions but seldom result in the long term learning afforded through full-scale Design-Build constructs. Students get a thrill being able to actually build something. They want to tell their friends, take selfie photos with it, and revisit it over time to learn the durability and maintenance. The thrill extends the learning beyond the classroom or the original time frame of the class or project, but more importantly the pedagogy continues and is itself a catalyst for subsequent learning.

Concluding, revisiting, and expounding upon Mr. Gropius' challenge and how it speaks to the pedagogy and perception of Design-Build opportunities, let us simply occupy the dash. Let us plant ourselves intentionally, boldly, and excitedly exactly in the middle of designing and building while continuing to account for the constant evolution of technology, service to society, and environmental concerns.

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