1 to 1: Human Experience and the Process of Making Buildings

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Abstract

Reconsidering the requirements of NAAB integration, this paper outlines a studio method that begins at 1:1 full scale assemblies and moves backwards towards the overall project. Using a reversal of a more traditional linear process, this approach works from spatial perception and material technologies as the basis of project development. A pair of studios explore material choices and assemblies as conceptual ideas that connect building technology to human experience.

Process and Integration

Process as a design tool demands a suspension of disbelief. The result proposes that by advancing in steps you can find ideas that would otherwise have been unavailable to you. Perry Kulper says there is an outrageous abundance of possibility in even the simplest mapping of two ideas that otherwise would never have met.[1] Remapping the process is a necessary part of any pedagogical assessment.

In the mid 1990's I was given a project that no-one really wanted in the office, a 2,000-car parking garage combined with a daycare and a bus stop. Assurances were made that this would not be a long-term situation and better projects would arrive. This project took four years. The next two "better" projects were a tile warehouse and a 1,600-car parking garage which included a 5,000-ton chiller plant. It turns out that these three ungainly projects were some of the best projects of my career. The majority of the effort spent was based in material decisions, structural options, specifications, assembly details, and working with fabricators, suppliers, and contractors – essentially in the technology of making buildings and how that drove design decisions. This is not what I was taught in school. My first job out of school was as a "designer" and I handed off pictures of buildings to the "production team". They put them together into something largely unrecognizable, realized though the full process of decisions I had no experience with or idea how to approach. It was the worst job I ever had.

In a curious parallel I was given the task of coordinating the comprehensive design studio sequence at my school. Assurances were made that this would not be a permanent assignment. I believe this was in 2004 & I'm currently still the coordinator of the integrated design studios. The pedagogy of advanced integrated design courses is a thorny issue, they demand more precise deliverables than any other studio and are governed by external performance metrics, currently NAAB Student Criteria + Student Learning Objectives and Outcomes (SC) 5&6.

Integration in studio as required by NAAB SC 5&6[2] has modified curricula across every school under these standards and meeting the intent is a moving target that can shut down innovation. The criteria are both broad and slightly vague:

SC.5 ***Design Synthesis****— Ability to make design decisions within architectural projects while demonstrating synthesis of user requirements, regulatory requirements, site conditions, and accessible design, and consideration of the measurable environmental impacts of their design decisions.*

SC.6 ***Building Integration****— Ability to make design decisions within architectural projects while demonstrating integration of building envelope systems and assemblies, structural systems, environmental control systems, life safety systems, and the measurable outcomes of building performance.*

These fall under the Ability category, so evidence must be provided of the skills, and NAAB has an additional assessment and continual improvement requirement that demands strict attention. I mention this because we've repeatedly met the criteria, however in multiple reviews a concern has been not the results but the method of assessment and plan to improve. The accreditation process attempts to not specifically dictate the method of teaching or stifle the pedagogy of the program, but in practice this isn't always the case and the negotiation between the design goals of studio and necessity to meet the criteria often gets confused.

Curricular Models and Self Critique

Our graduate program at UF, like most schools, has a particular pedagogical focus. We're a 4 plus 2 program with a Bachelors of Design in Architecture and the NAAB accredited Master of Architecture. The majority of our M.Arch students are from our undergraduate B.Des program and they are highly skilled at formal systems, seductive process imagery, making physical models, and digital post production of parametric drawings (fig. 1).

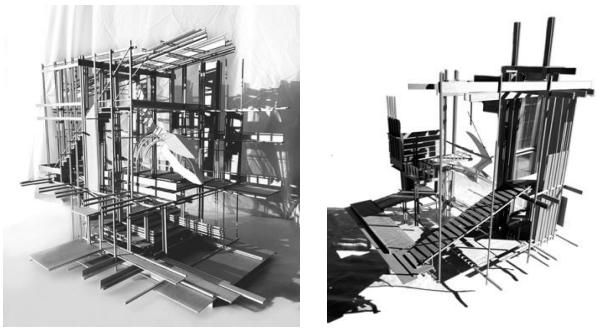


Fig. 1: 2nd year undergraduate door, window, stair models, Design 3

This isn't that novel but it's done in an arguably formulaic way that leads to predictable results. Beautiful results, but we know what we're getting and it isn't always a technically driven and conceived building proposal (fig. 2). Process stopped being a tool that led to an unpredictable result, quite the opposite.

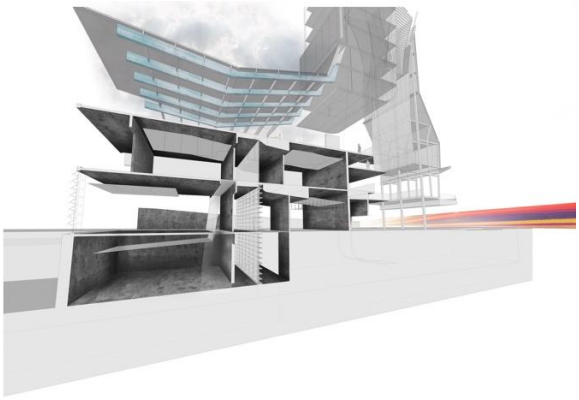


Fig. 2: 1st year graduate studio schematic building section

The UF B.Des is a pre-professional degree and focuses on thinking and form-making with the vestigial course remnants of a 5-year B.Arch program that ended in the 1970's – eight studios, two structures courses, two environmental technologies courses, two materials and methods of construction courses, two history courses, two theory courses, plus electives (we still have faculty lamenting the loss of the third 4-credit structures course). We're integrating technologies and have improved the overall sequence, but it retains the legacy of much older accreditation standards it no longer serves. Our students have gorgeous design portfolios and half the graduating class goes to elite and ivy M.Arch programs. I'm sure every school measures success differently, but this achievement underserves our students.

In crafting an integrated studio that responds to our M.Arch students and accreditation we had three goals:

1. Cover the NAAB criteria.

2. Keep it a Design studio that serves both our undergraduates and those joining from other schools.

3. Find human experience in a complex technology and regulatory based project.

The third point is least obvious, but based on a larger concern that our studios were advancing image over space or inhabitation, and that an integrated studio should meet a higher standard of completion that includes people. Understanding human scale and the experiential qualities of a project seemed to be the consistently missing piece of our undergraduate work. We wanted to start with something large and then work towards the overall project, approaching tactile qualities of perception as more important than visual perception in creating real buildings.

We consider ourselves a making school in a "think with your hands" way that is rooted both in a Bauhaus Vorkurs tradition and from the view of craft as a way of seeing the world. Richard Sennet summarizes it well.

"Two centuries ago, Immanuel Kant casually remarked: 'The hand is the window on to the mind.' Modern science has sought to make good on this observation. Of all our limbs, the hands make the most varied movements, movements that can be controlled at will. Science has sought to show how these motions, plus the hand's different ways of gripping and the sense of touch, affect the ways we think." [3]

I also need to defer to Juhani Pallasmaa's description of the senses and how the maker becomes the site of the work as a motivation.

"In creative work, both the artist and craftsman are directly engaged with their bodies and their existential experiences rather than focusing on an external and objectified problem. A wise architect works with his/her entire body and sense of self. While working on a building or an object, the architect is simultaneously engaged in a reverse perspective, his/her self-image, or more precisely, existential experience. In creative work, a powerful identification and projection takes place; the entire bodily and mental constitution of the maker becomes the site of the work." [4]

Studio, Practice, and Linear Progressions

With these as motivators we began to deconstruct the sequence of studio progression, in particular the linear approach from large scale to progressively smaller scale issues. Integrated studio is often presented as "closer to practice" or design development that gets further into a project than a regular studio, with the suggestion that by resolving schematic design earlier we can get to the technical bits at the end. In school we frequently use a zero-in approach similar to a practice model – site and program analysis, regulatory concerns, form-finding, massing, circulation, structure, envelope, materials, assemblies, and ultimately details if times allows (feel free to modify and substitute, but you get the idea). From someone who believes material choices and assemblies are fundamentally conceptual ideas, it's a frustration to leave arguably the most important part of integrated design to last and as a "deliverable" rather than a driver. Most technically knowledgeable design faculty are adept at getting the most out of this progression, but it doesn't actually map the professional process even though the steps seem the same. Often the initial moves in practice are based on budgets and materials or reactions to the individual needs of a client (absent in school settings). Peter Zumthor is an excellent example of an architect who frequently begins from material choices and the logic they apply to subsequent sets of decisions. A process of working from a starting point other than site or program.

"I work a little bit like a sculptor. When I start, my first idea for a building is with the material. I believe architecture is about that. It's not about paper, it's not about forms. It's about space and material." [5]

Tom Leslie had a revelation in his Chicago Skyscrapers book that I think best describes the motivation and process of making buildings from a material point of view. It described how the rise of glass building envelopes during Chicago's tower boom were largely a product of cost and availability. Plate glass production moved from Pittsburg to central Indiana during the post-fire reconstruction, making it readily available and inexpensive.

"During Chicago's post-fire reconstruction boom, entrepreneurs moved the plate glass industry to central Indiana. For 10 years, the world center of plate glass production was in Kokomo where it fed Chicago directly."

Because Chicago's plate glass windows were the prototype for the modern skyscraper's glass curtain wall, historians had maintained that the Chicago architects used plate glass intentionally as an expression of the modern.

"In reality, it was just that the glass was cheap because it was manufactured nearby. And, it was the easiest way to light the interiors of these buildings," [6]

For anyone who's worked extensively in practice this rings true. Major material decisions made at the outset of a project due to cost or availability are incredibly common. These decisions often have more impact on the development and design of the project than any other. This is how making buildings in practice works and it was important to map a process that did not presume an absolutely linear process.

We decided to also start from a different point and reverse the zero-in process, starting at 1:1 full scale drawings of a perceptual experience and asking the students to create a human scale image based on a narrative prompt. This drawing represents qualities of light, material, texture, density, scale, and color – but it's meant as a sketch for a full-scale assembly model that the students construct in response to the drawing (fig. 3).

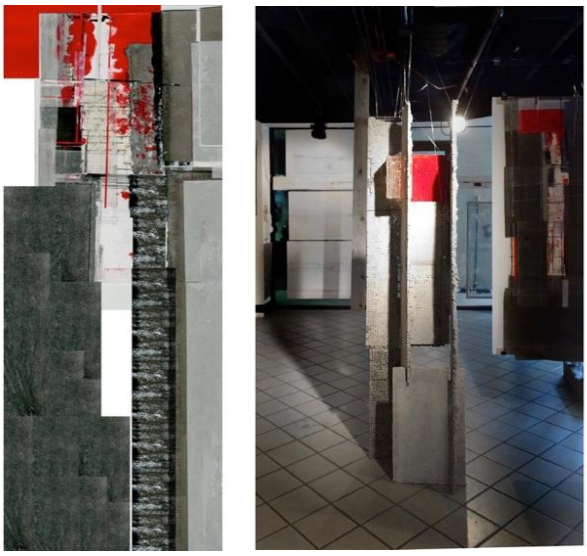


Fig. 3: Initial full-scale drawing & construction of a building condition

The constructions are also sketches, but made with the intent of creating a spatial moment in a building. Below is the prompt for this 1:1 drawing construct exercise:

You will create a speculative drawing that is scaled and positioned in relation to the human body. This 2-dimensional drawing focuses on a part of an implied larger design project; It is a fragment of a façade, interior wall, roof, ceiling, or a combination. Your drawing should dynamically express materials + assembly (seams, overlaps), design intent (narrative, light and shadow), scale (range including fasteners, surface texture) and measure (incorporate multiple systems of measure).

The students have the program for the building in advance of making the models and begin to work backwards from the spatial prompt towards the space that houses the moment. Subsequent steps reverse the process by working outward from the first space to arranging other parts of the program, and then to assembly details, material decisions, system selections, circulation, building envelope, form, and site considerations (fig. 4).

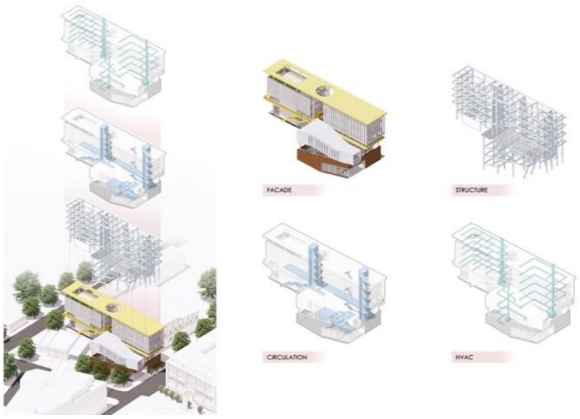


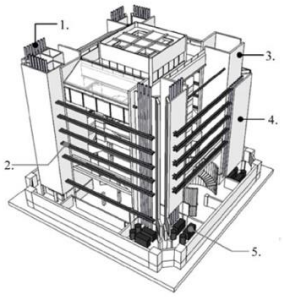
Fig. 4: Graduate Project integration drawings.

While all of this seems counterintuitive, unproductive, or even not possible, the resulting projects are typically more integrated and complete than when we use a more traditional progression starting with site analysis and moving on to the program and planning. Students are aware of the site and regulatory requirements, they just don't drive the projects with those as the first or primary considerations. The end of this semester results in ½" detailed models of building assemblies that are fragments driven from the interior qualities over the external look of the project (fig. 5).

Fig. 5: Large scale ½"=1'-0" model of building/spatial assembly.

The idea isn't to propose that we always work backward, but that the linear large scale to small detail sequence is not the only way to order the steps and tends to miss developmental drivers for projects that are often based in technical aspects that create the most important experiential qualities of buildings.

We also decided to make integrated studio two semesters. NAAB Student Criteria states that students need to show ability to make design decisions in architectural projects, *plural*, so we run SC 5 primarily in the fall studio (Advanced Grad 1) and SC 6 primarily in the spring studio (Advanced Grad 2). In the second semester we work more traditionally forward, but with each technical step being a driver of design; structure, mechanical systems, materials, egress, even fire suppression has to telegraph the diagram and design intent. We run a parallel course in integrated building technologies that has weekly deliverables related to studio projects. The pacing of the second semester is high and the students have a much greater understanding of how technical decisions not only impact the operations of buildings, but how they demonstrate design intent. One of the classic examples we frequently show is Louis Kahn's Exeter Library, and in particular the layered order of systems from the brick cladding, to the aluminum mechanical ring, to the reinforced concrete structure, to the inner atrium (fig. 6).



1. Vertical piping distribution
2. Horizontal aluminum A/C piping
3. Vertical transmission unit (RC load-bearing wall)
4. Vertical transmission unit (brick wall)
5. Basement machine room

Fig. 6: Louis Kahn's Exeter Library. Defined layers of systemic clarity.[7]

Kahn's ability to use system integration as a tool for design advancement is the lesson we're trying to convey and his belief in both organizational and material clarity. As Vincent Scully states, "Kahn would never design anything the shape of which didn't derive from its structural character ... You feel the materials thrumming with tension...".[8] The form (including the shape) and materials are a clear driver of the design intent.

In an effort to work clearly from technology to design we order the Grad 2 spring semester weeks based on the stages of development.

Week

1- Zoning / Site Analysis

2- Site Planning / Resiliency Standards

3- Program Analysis / Passive Systems

4- Program Diagramming

5- Accessible / Universal Design / Building Codes

6- Structures 1: systems, materials, foundations

7- Structures 2: framing, lateral loads, shear

8- Life Safety / Fire / Egress

9- Environmental Systems / MEP / Lighting

10- Acoustics / Materials / Specs

11- Walls / Roofs

12- Shell / Cladding / Details

13- Large Section Drawings

This list is not unique at all, often gets out of order, is ahead or behind studio, and is constantly evolving based on the project and pacing of the classes. The subjects are presented as design issues that require a direct response in how they impact project development (fig. 7). After the first semester of working backwards, the students are familiar with each issue and can more easily see the influence on overall design.

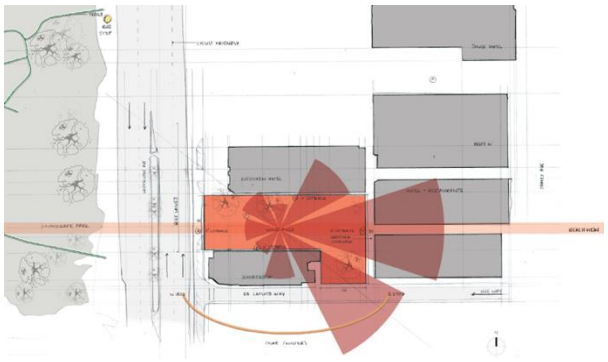


Fig. 7: Initial site analysis diagram sketch, parallel grad integrated tech class.

The last assignment is a large-scale spatial assembly section, drawn at ½"=1'0". This is a drawing that must go from foundation to sky, include at least ten feet of interior volume, and show how the assembly and making of the project affects the quality of the space (figs. 8 & 9).

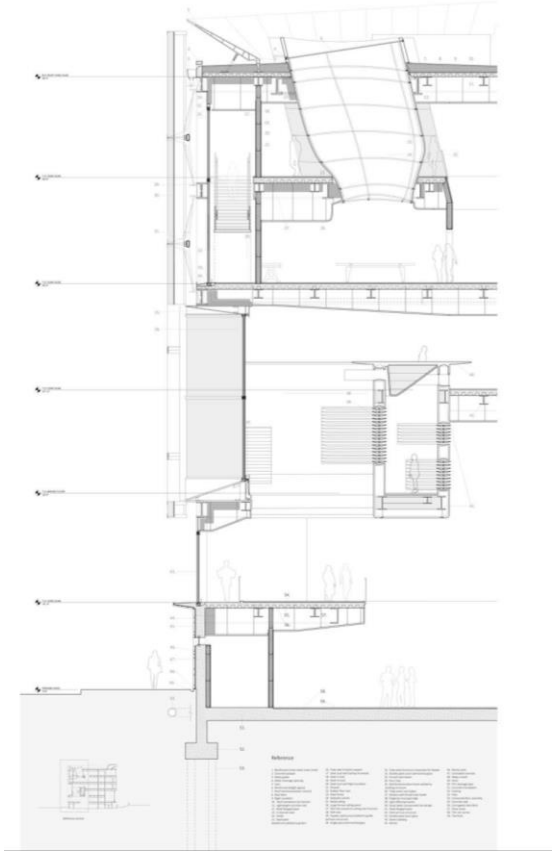


Fig. 8: Large Scale Spatial/Construction Section, Grad 2

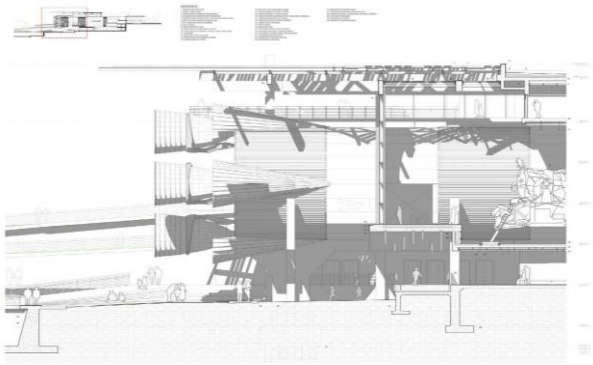


Fig. 9: Large Scale Spatial/Construction Section, Grad 2

We've found this drawing has by far the greatest impression on students and ties together the very first assignment of the full-scale drawing/construct into the making of buildings. We had previously made large section construction drawings in a technical assemblies course, but they lacked qualities of inhabitation and were disconnected from design intent. Creating large scale spatial/technical drawings is not a new process. It was a common requirement in the Ecole des Beaux-Arts to do a large technical section with a fully rendered interior (fig. 10). As Niall Walsh notes in his essay on Beaux Arts and Bauhaus representation:

"Architectural visualization at the Beaux-Arts was grounded in traditional hand-drawing techniques that emphasized the skilled depiction of scale, proportion, and composition. Students were encouraged to visualize structures through complex renderings that demonstrated not only structural design but also architectural details and an envisioned ambiance. Beaux-Arts drawings were showcased to the public for their intricate line work, depth, and attention to the full experience of a building." [9]

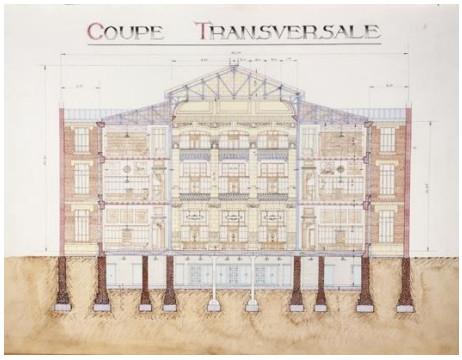


Fig. 10: Ecole des Beaux Arts Competition drawing.[10]

In the Bauhaus representation shifted from atmospheric renderings of ambiance to perspectival and axonometric views. These were much more abstract but still favored spatial qualities drawn from color, form, scale, and material decisions (fig. 11).

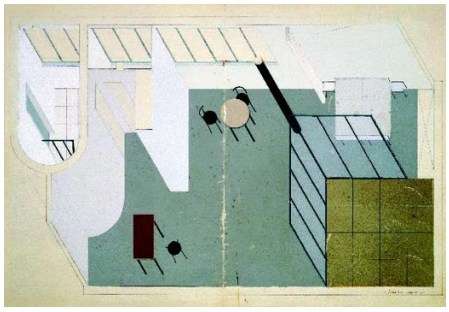


Fig. 11: Wilheim Hess, plan of a studio apartment in Dessau. Study for the course with Ludwig Mies van der Rohe, 1932.

The entire process starting from first semester full scale drawings and assemblies, to ending the second semester with large scale drawings is a recursive loop that addresses all of the technical issues from NAAB multiple times and from different perspectives. It's an ongoing experiment in pedagogy trying to find deeper design meaning in technology, regulatory requirements, building performance, systems, and material logics. All process elements are tools, each one applied to advance an idea. The requirements of making buildings is the driver with form at the service of the process. This proposes that integration is not a further step of the progression from schematic design to design development, rather a

synthetic consideration that design is not a clean linear process but something that ties human-scale experience to the technology of making buildings.

Notes:

1 Croixe, “Drawing Architecture – Conversation with Perry Kulper*”, Archinect*. *WAI Architecture Think Tank*, August 5, 2012. https://archinect.com/news/article/54767042/drawing-architecture-conversation-with-perry-kulper.

2 NAAB 2020 Conditions for Accreditation and Procedures for Accreditation: SC. 5 Design Synthesis & SC. 6 Building Integration. pp 3-4. 2020 NAAB Conditions for Accreditation Rev 20240901 2.pdf

3 Sennet, Richard, “Labours of Love”, *The Guardian,* February 2, 2008.

4 Pallasmaa, Juhani, *The Eyes of the Skin : Architecture and the Senses*, (John Wiley & Sons, Inc, 2012), p 13.

5 Peter Zumthor, “Presence in Architecture – Seven Personal Observations”, Lecture at Tel Aviv University, November 10, 2013

6 Thomas Leslie, “ISU architecture professor's new book reveals the backstory of early Chicago skyscrapers” Interview from Iowa State Daily, June 4, 2013

7 Image from Chih-Ming Shih, Fang-Jar Liou & Robert E. Johanson (2010) The Tectonic Integration of Louis I. Kahn′s Exeter Library, Journal of Asian Architecture and Building Engineering, 9:1, 31-37

8 Scully, Vince, “Louis I. Kahn and the Ruins of Rome”, *Modern Architecture and Other Essays*, (Princeton University Press, 2003), p 300.

9 Walsh, Niall Patrick, “Beaux-Arts to Bauhaus: How Two Schools Shaped Architectural Visualization”, *Archinect*, November_13_2024. https://archinect.com/features/article/150451144/beaux-arts-to-bauhaus-how-two-schools-shaped-architectural-visualization

10 Image from Ecole des Beaux Arts Competition drawings for a French national bank (May Collection 1987.33b; cat. 7.1)