‘Installing’ a Studio-Based Collective Intelligence

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Abstract

Digital tools have had an undeniable influence on design intent, for better and worse. While the now common use of digital fabrication tools has reintroduced material processes with digital processes, they have also extended the seduction of formal novelty enabled by digital tools. This critical evaluation of three installation based studios considers how these tools can impact a wider environmental knowing. Rather than seeing the studio as a room of individuals, emphasized through the one-on-one desk-crit, these studio installations suggest a kind of collective-intelligence: progress by way of differentiation, integration, competition and collaboration. This challenges the notion of authorship of the singular hand, even if extended through digital prosthetics, suggesting a more collective, discursive, and experimental ‘think-tank’ bound through the installation and enabled by the precision and scalar shifts of digital fabrication tools. In testing design as full-size installations, judgment shifts from the designer’s ‘intent’ to the authenticity of experience.

Life Size: Environmental Knowing

Contemporary theories of embodied cognition mark a shift from a representational model to an active model of cognition. The developmental psychologist JJ Gibson has demonstrated that *perception is active*. Furthermore, through his theory of affordances, tools and the environment they are situated in suggest certain criteria and issues from which perception is actively developed (Gibson). Rather than seeing technology, including the use of it, as a demonstration of ‘intelligence,’ technology may be better understood as a structure from which we develop our understanding of the world (Krueger 2000). The integration of digital and physical tools enables this understanding to shift studio teaching from the more singular and internal digital space to the external physical environment, which includes the wider social network of actors and actants, including the tools as well as the environment design is situated in. Inspired from Russian developmental psychologist Lev Vygotsky’s Zone of Proximal Development, philosopher Andy Clark presents the exploitation of external structures, environment, and culture as scaffolding (Clark). Scaffolding sup-

Tangible Bits: Crafting the Digital Design Workshop *Fall 2006*
Students work across multiple scales from sketch models, to large scale model prototypes to preliminary mock-ups for user feedback.

ports actions which would otherwise be impossible, or unthought of, without such scaffolding. In suggesting that these digital fabrication tools are part of the scaffolded environment of the contemporary design studio, the intent is to place these tools at the periphery of discussion, instead focusing on the material, social, and environmental knowledge they support.

Design Cultures

The three studio-based installations presented here were developed over a period of a year and a half at three different schools, each with unique design cultures. As Clark suggests, scaffolding extends to culture, and so too the design intent of these installations develops from the scaffolded contexts they are in. The intent is not to polarize, critique, or isolate any one school, but rather, to suggest that they each represent different aspects of one design culture. Critical evaluation was established not only from the projects themselves, but through my own ethonographic documentation of the studio process, the student's required studio blogs, student generated "post-occupancy evaluations" of the installations, through recorded installation debriefing discussions and finally, exit interviews. Each installation developed over a matter of weeks as an introductory project in the design studio.

Due to space limitations of this format, I will summarize the results of

Critical Joint: *failed joint study in concrete, successful joint in wood.*

Barn Raising: *bending PVC stucture involved cooperation from multiple teams to raise in one lift.*

all three installations, rather than present them separately.

Material Play

A 'materials first' tactic was employed through which design strategies and systems could develop enabled by the precision and scalability of digital tools. In contrast to the first more object oriented installations, a spirit of structured and cooperative play was motivated through simple criteria to do more with less employing a technique of expanding pattern, to ideally the elimination of waste in a self-structural system as design criteria. Paired with this criteria, the ease of manipulation of thin sheet material encouraged a 'willingness to experiment'. Rather than impose rigid constraints from the outset, working from the flexibility of Zerox paper to index cards and manila folders, and ultimately to cardboard, the experimentation within this structured play worked into material constraints.

Physical Sketch Models

While easy to overlook in the digital design process, physical sketch models were an essential extension of material play into the design context. Most importantly, as large collaboration projects, these rough physical sketch models acted as social artifacts in which design discussions were literally worked out with many hands. A digital master model that each team member would contribut to was encouraged in the first installations. In actuality, a single individual developed the digital model creating team ten-

Full Scale Sketch Model? *This team quickly modeled the vertical ribs, but believed their digital model rather than testing joints or the way they assumed materials would bend.*

Material Waste: *material economy became an explicit goal for each subsequent installation.*

From Scale Model to Full Size: *what was easy was done quickly, but testing how materials curve across the vertical elements was avoided.*

Prefab Components: *ready for installation, prefab components went together very quickly.*

Final Sketch Model: *this team developed numerous sketch models bonding the team.*

Model as Prototype: *model scale based on material thickness. Wood bents measured at scale and then digitally modeled.*

sions in the two teams that relied on their digital models.

Scalar Shifts

Perhaps the most significant aspect of digital fabrication tools on the design process is their scalability. One can work with the model as a scaled working prototype and test it out at full scale as a proof of concept with minimal effort. This proved to be problematic as well, as the lack of full scale testing in the earliest installations, with one case in particular, meant the project was essentially a full scale sketch model. Nonetheless, the presence of at least three scales, from small sketch models, to larger prototype models, to full scale proof of concept, is an encouraging reminder of the human dimension of built work, even while working at smaller scales. Scale is not determined from one abstract unit of measure to another, bur rather scale is determined by thickness of model material to actual material size (e.g. if building from 3/4" plywood and using 1/8" model material, the model scale is 1/6). As one student articulated that the ability to shift from small scale to test it out at full scale *made risk manageable*.

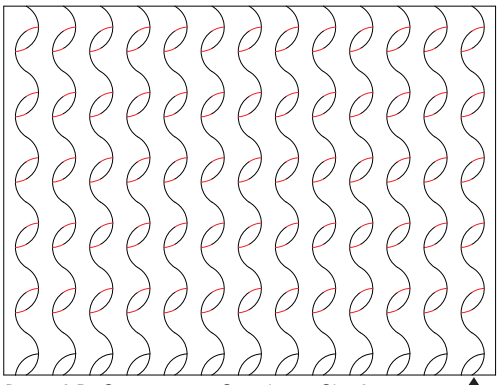
Peer Review and Public Acceptance

An unanticipated result of these installations was the encouragement and pressure of informal peer review – extending beyond the familiarity of on-looking architecture peers during reviews. In the first installation, a student in the studio came across a LiveJournal blog entry praising these

Simple Structure Complex Behavior: *after user testing of a preliminary rigid seat mock-up, a flexible spring joint was added which was then connected to a flexible skin. When one user leaned back in their seat, the skin moved effecting others in the circle.*

A spring joint at bottom and slotted joint at top allowed for movement.

Material Play: manual *play to understand how the expanding pattern operates.*



Digital Refinement: refined cut file from selected pattern and laser cut production.

"ridiculously awesome" installations from an unknown student at the school. In the on-line comments that followed this post, one of the four installations was not received as well, causing an emotional breakdown for one of these team members. The fact that these structures were so well received by the engineering community was an inspiration to the students, and yet the negative reaction to one was perhaps more real than I anticipated.

In the second installation, the studio selected a site that was the entry foyer between the architecture department and the art department as an explicit attempt to bridge these two programs – Architecture and the Allied Arts were apparently no longer 'allied.' The fact that the work was life-size gave these students the opportunity to situate their work for a couple of weeks in the public realm as a means to foster dialogue between two academic departments.

Authorship vs. Ownership

While each installation is an exhaustive effort, the student's commitment and energy put into them is inspiring. Particularly compelling is that individual authorship was never an issue, but rather the installation itself bound the studio through their willingness to experiment and their desire to work at full scale. Most evident in the last two installations, as a result of the clear design objectives, ownership was

Collaborative Patterns *Winter 2007: developed in an interior architecture studio, a technique of expanding pattern was used focusing on material economy and ceiling and wall surfaces.*

developed through lateral research – the opportunity to test out options, even if not used, fostered a sense of ownership in the studio.

Conclusion

Looking across all three installations over an extended period of time, many of the significant similarities and influences are summarized above. A critical difference, however, is how the results of one installation shaped how I framed the next. My own pedagogical influence evolved from a more explicit method oriented 'how-to' in the first installations to a proposition oriented 'what-for'. Shocked by the lack of craft and material waste in the first installations, craft became understood to be more than the result of skills, but based on *crafting curiosity* through a solid proposition, in which developing material economies became that proposition. As one student summarized, "more process, less material."

References

Clark, Andy. *Being There: Putting Brain, Body, and World Together Again.* The MIT Press, 1998.

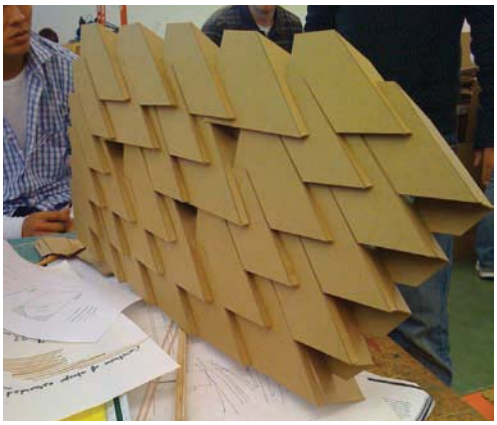
Gibson, James J. *The Ecological Approach to Visual Perception.* Lawrence Erlbaum Associates, 1987.

Krueger, Ted. *"There is no Intelligence." Art, Technology, Consciousness: mind @ large,* ed Roy Ascott. Intellect Books, Bristol, UK , 2000 accessed at *www.itaucultural.org.br/invencao/papers/Krueger.htm*

Site Selection: *selecting an installation site was part of the projects programmatic development. Ultimately the studio chose this entry foyer, used by both architecture and art students, as a means to generate communication between the these two departments.*

From Material Play to Full Scale Installation: *the precision of digital fabrication tools enables material play to be refined and developed at full scale very quickly.*

Moveable Feast *Spring 2008: this two week installation developed from the previous two. Further description of this project can be found in a companion paper in this proceedings.*



Scalar Shifts: *refined model hand cut from 2d cut files studying openings in system. Further developed cut file with variations and full scale assembly from flat pieces.*