DIGIT(al) EXPLOR-ations: 2 + 2 = [more than] 4

JULIE JU-YOUN KIM
University of Detroit Mercy

THE QUESTIONS

> Technology is therefore no mere means. Technology is a way of revealing. The word stems from the Greek. Technikon means that which belongs to techne. We must observe two things with respect to the meaning of this word. One is that techne is the name not only for the activities and skills of the craftsman, but also for the arts of the mind and the fine arts. Techne belongs to bringing-forth, to poiesis; it is something poetic.[1]

As evidenced by the built environment, architectural expression is a state of perpetual change. It is through architecture that we as humans record the predominant optimisms or pessimisms of a time. What does not change, though, is that architecture is about human experience. Architecture engages the five senses, and when it captures the elusive sixth sense, the sum of the parts is, indeed, greater than the whole.[2] It is about the touch of rough concrete, the smell of freshly sawn wood, the recognition of modulated light through a skin, or the sound of voices reverberating off smooth granite. Even as methods of representation or investigation change with developing technologies, the one truth remaining constant is that architecture is a vessel for events, experience and discovery.

Even as developments in technology pervade our existence from WebTV™ to the ubiquitous cellular digital phone, questions of how to integrate technology into the architectural design process still linger. Polished, photo-realistic images generated from the fastest computers face us from marketing brochures and advertisements. In these situations, the digital model has been used to simply simulate what we expect to see. And perhaps, for those applications, these images are appropriate. The question arises, however, when one wonders how and what level we as designers address the electronic medium for not only final production but also as an important and critical measure of a design process? I find it somewhat disconcerting that even with all that has been written on the "digital design studio," there still exists some very basic pedagogical questions. What does "digital design" really mean? And how do we use this new ever-evolving medium of communication and representation? How can technology be used and integrated into the design studio as part of the design process . . . not just as a final production tool? These questions still persist even after this studio for me and will continue to be explored in subsequent semesters.

In fact, I am caught in a strange schism between two worlds. I appreciate and am consumed by the art of making. I understand the effects of an incision in chipboard or how to "build" a drawing with graphite. I emphasize the journey one takes through an unchoreographed exploration. Some of the most wonderful architectural moves occur unintentionally when crafting and examining a physical sketch model. Such accidents are, perhaps, not revealed as easily when the focus of building in the computer is primarily on accuracy. But, what happens when the focus is not on accuracy but on discovery? I am intrigued by the potential of electronic medium and exploring what happens when the gap between the physical and the digital is collapsed. What are the possibilities when the skills of the craftsman are merged with technology?

Using an industrial facility for human-powered transport, students spent the duration of a semester addressing these questions of the appropriate weaving of technology on several levels and seeking beginnings of answers. The tools of exploration for the students included traditional ones of sketching and physical models, both study and finished, as well as the addition of 400mHz computers at each station, loaded with 3D Studio Viz™ and AutoCAD™ Release 14. I asked the students to take a conceptual idea and to transform it into a built expression, capturing the essence of this idea as well as accommodating the programmatic requirements. In fact, one of the most challenging endeavors is to synthesize an idea into a multi-layered creative and innovative tectonic expression. By synthesis, I mean more than a competently arranged program diagram and also more than a formal expression of an image-driven idea. To successfully harmonize an idea is to elevate the sensory experience capturing the spirit and the heart of the inhabitants. The methodology by which one reaches this goal is through rigorous and intense

exploration via execution, evaluation and reflection. Constantly, through the design process, the student questions assumptions; challenges individual thought; and critically reflects upon the generated product.

As Heidegger suggests, technology is not the means . . . it is a way of revealing.[3] It is this definition of technology which is supported in this studio. Integrating the technology as a way to further inspire the design process, students were able to engage in a critical exploration leading to more sophisticated design proposals.

THE DESIGN VEHICLE

> PROCESS. 1a: PROGRESS, ADVANCE b: something going on:
> PROCEEDING. 2a: a natural phenomenon marked by gradual changes that lead toward a particular result. b: a series of actions or operations conducing to an end: a continuous operation or treatment.
>
> *- from Webster's Ninth New Collegiate Dictionary*[4]

In developing the syllabus for this design studio, I was interested in re-defining the perception of the "digital design studio." I believe one of the problems right from the start is to differentiate a digital design studio from a "traditional" design studio. I contend the design tools are not singularly exclusive to one "type" of studio or another. Rather, just as a pencil is a tool powered by human effort, the computer is the same. However, unlike the pencil, the computer can be an environment of possibilities and methods. Yes, physical study does allow for the unexpected detection of a unique or unusual instance. However, if the computer is not used as a short cut to an accurate "simulation" of a product, and if the pedagogy advocates an environment of critical inquiry and accidental discovery within the computer, and if the computer is seen as an extension of a set of design tools at hand, then the work of the student has the opportunity to be compelling and poetic. The rigor and intensity of study is what drives the design process and ultimately leads to a thoughtful and articulate proposal. The intention of this studio was for students to develop a critical and creative architectural attitude through experiential and conceptual explorations in both digital and analog media. Through a series of static images, the students would choreograph a "digital film strip" documenting the design process. This image series is also supported by physical models and drawings.

The work of this studio critically investigates and reconsiders, through the design of an industrial facility for human-powered transport, the relationship between technology and the craftsman. The spirit of this studio effort defines and develops design strategies for an industrial site located in Detroit, Michigan at the intersection of Fort and Clark Streets, one mile southwest of the Central Business District of the downtown. Currently, there is a vacant warehouse and the crumbling remains of an old factory on the site. The students were challenged to incorporate the steel skeleton of the old factory into their proposals. The vacant warehouse on the site would remain as part of the context.

The 94,000+ square-foot program for the facility includes a main production area 45,960 square-feet accommodating a process line, storage, and final assembly area; and headquarters are 48,000 square-feet, including retail, prototype engineering, exhibition/reception, and cafeteria. Site articulations include a testing track and outdoor collective spaces.

Through the term, the questions the students explored include:

1) Construing/Constructing/Craft;
2) The assembly process relating to the fabrication of an object;
3) The notion of parts to a whole (and how the whole is assembled of the parts);
4) Connections/Joints;
5) Working joints, as in the human body;
6) The development of "culture/community" within the facility and within the urban context;
7) The development of an attitude towards the relationship of the building to its setting;
8) Physical and experiential qualities of materials;
9) Conceptualization - Discovery - Invention - Poetics of Space; and
10) The relationship between man and the machine.

THE PROCESS

Students began the semester by visiting the Trek Bicycle Factory in Whitewater, Wisconsin. Some of the questions they were encouraged to consider were that of the product related to the factory and of the technology of manufacturing the bicycles. Also, they were challenged to think about the necessity of man to power the machine; the machine being the bicycle in this particular case and similarly the machine being the computer in the design studio.

I should note the studio course was designed around the presupposition that each work area would have a desktop computer in addition to the traditional desk. By having the appropriate software, students would be able to seamlessly go back and forth between sketching an idea on trace and "sketching" an idea in the computer. One of the misconceptions students fall into is to believe he or she is a "better" designer because of technological competence. Likewise, the student who is not as agile with the software may become discouraged because of an inability to execute a design effort. By having computers at each station, and by stressing the actual process of design, the playing ground is made level, so to speak. Regardless of chosen medium, I find the most rewarding efforts are by those students who are already passionate about architectural investigations. This attitude is directly related to quality of the work and exploration.

The studio pursued initial strategies evaluating the site and exploring the idea of threshold. I define threshold as the zone in-between, where one is both inside and outside or both in one place and another. Thresholds are characterized by a shift in the movement and are experienced both in plan and in section. Through a series of sketch models and drawings, students looked at defining these areas of transition. As Charles and Ray Eames suggest in *Powers of Ten*,[5] places and events are all linked to each other concurrently at the macro and micro scales. This theory is particularly useful in weaving meaningful events into an architectural intervention. The building itself is a threshold between the collective public spaces and the space claimed by the building. By examining the relationship of the building to its setting, students became sensitive to the creation of interstitial "left-over" space.

Students studied transitional areas by generating a series of building cross sections which were used as an underlay for a three-dimensional working model. By taking the two-dimensional section sketch, which is, in fact, representation of three-dimensional space, and "building the model" in electronic space, students were challenged to re-think their own assumptions of conventions of architectural explorations. Likewise, students were challenged to re-define conventional "fly-throughs". The intention of these design exercises was for the students to think of three-dimensional space as two-dimensional "slices", or layers, which could be extended or collapsed, horizontally or vertically. By engaging in initial architectural strategies using the 3D Studio Viz™ as an integral part of the design process, students were able to quickly generate and evaluate various ideas and concepts. What I found particularly useful about this method is that the computer was seamlessly incorporated into the intuitive process of design. And, because the process as opposed to skills was emphasized, students were stimulated to further their projects to another level.

Having established the varying levels of threshold of the building to the site, the next step in the evolution of this project was to examine the process of manufacturing and of movement in and through the building and the site. The three-dimensional conceptual computer model is well-suited to explore this question. Using the three-dimensional descriptive drawing, students were asked to examine and develop how workers, product, trucks, people, bicycles, and others move through the site and the building. As the students were developing their projects, they were reminded to consider the following fundamental issues of public/ private . . . . . access . . . . . transparencies / opacities . . . . . place / path . . . . . order . . . . . .form . . . . . rhythm . . . . . color . . . . . .edges / centers . . . . . inside versus outside . . . . . thresholds . . . . . relationships . . . . site . . . . . light/dark . . . . . ground . . . . sky . . . . . .heavy/light . . . . . openings . . . . . pattern . . . . . intensification . . . . . framework. . . tectonics . . . .layering of space in plan and in section . . . exploring the relationship between the construction and the experience.

As the students explored these issues using their computer models, they started to develop fairly sophisticated concepts and ideas. As the project transformed, students moved seamlessly and effortlessly between generating a quick sketch on trace capturing the essence of the idea; taking the sketch into the computer and adding three dimensionality to it; and then physically building a model of the solution. Each step added more and more complexity to the individual proposals. Students discovered that they were able to pursue a variety of solutions and test them quickly to decide on the most successful possibility. Just as one builds a drawing beginning with construction lines, the students, in fact, built their digital models. To begin to successfully integrate the computer into the design process, one must first recognize the limitations of the computer alone. Human power enhances and enriches the machine. The same principles of experience, materiality, craft, and making apply to any process, whether it be analog or digital. It was particularly exciting for me to see how the computer and the physical study together gave the students a unique and fluid testing environment. The results of this studio model were richly textured and layered computer "sketches" and physical models ultimately leading towards inventive and descriptive proposals, eliciting critical discourse on the appropriate role of technology with the craftsman.

The following visual timeline describes the process in which the students engaged, using and manipulating the various tools and software to "push" their projects to increasingly levels of sophistication and development. Although the work is presented in this paper sequentially, the actual generation of study happened in physical and digital media concurrently.

FINAL THOUGHTS [OR THE NEXT BEGINNING]

I began thinking about this design studio relative to these issues and questions of communication, representation, and execution. I believe electronic media can both stimulate and expand a traditional design process, taking it a new revolutionary level. We as architects and teachers have the

EVOLUTION OF WORK, PART ONE

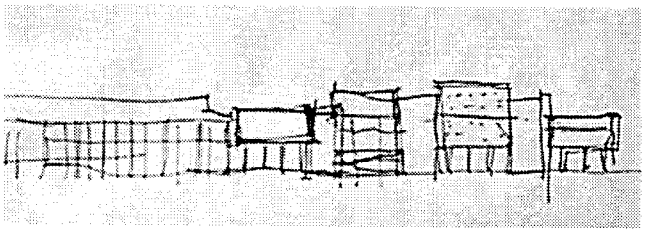

Fig. 1. Initial conceptual sketch, M. Taylor.

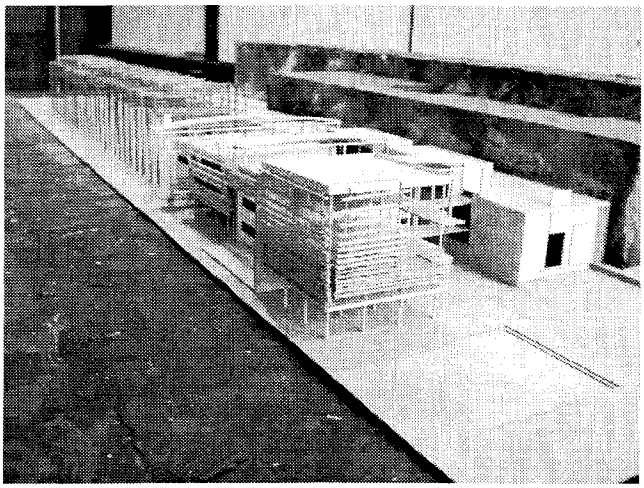

Fig. 2. Site strategy model. M. Taylor.

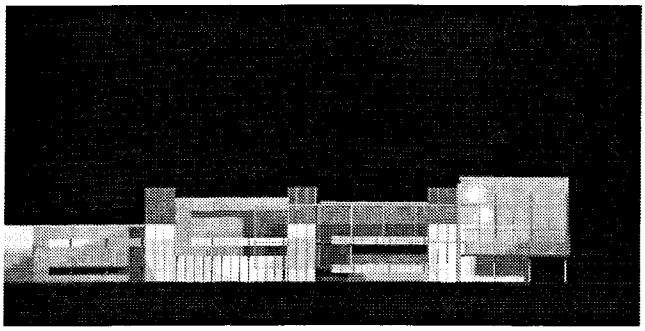

Fig.3. Digital model elevation study, built in 3D Studio Viz™. M. Taylor.

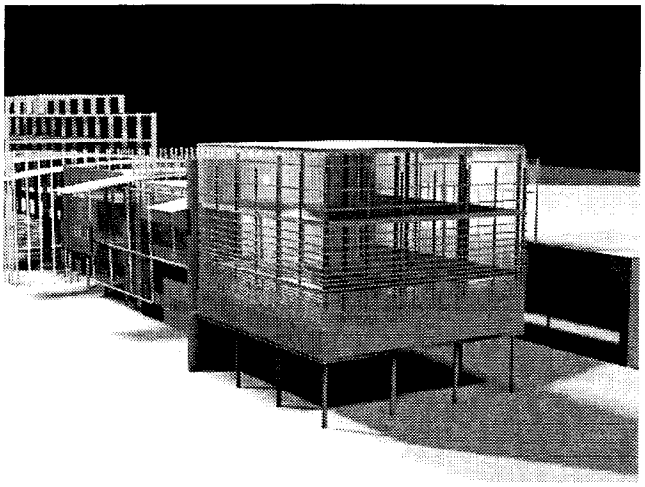

Fig.4. Digital model study, built in 3D Studio Viz™. M. Taylor.

EVOLUTION OF WORK, PART TWO

I continued to test the possibilities of integrating the computer seamlessly as a design mechanism during the second term of the academic year. Similar to the first term, the students were challenged to explore the relationship of the digital and the physical, using pen, X-acto blade, and mouse. Again, for clarity, the work is presented sequentially.

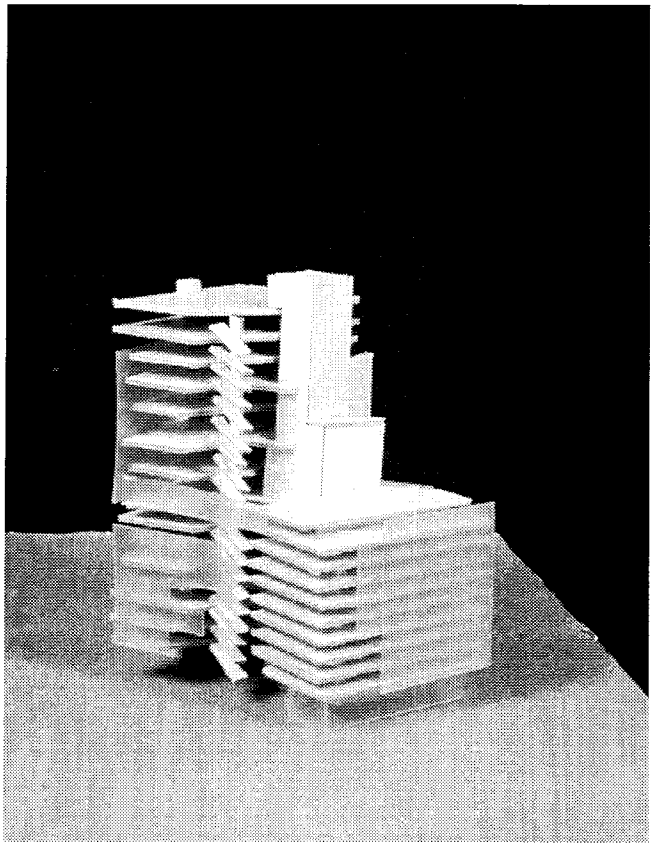

Fig. 5. Initial conceptual sketch model. R. McFadden.

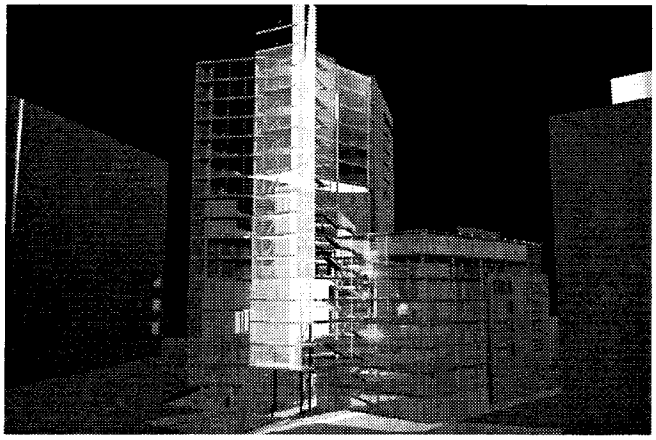

Fig.6. Digital model study, built in 3D Studio Viz™. R. McFadden

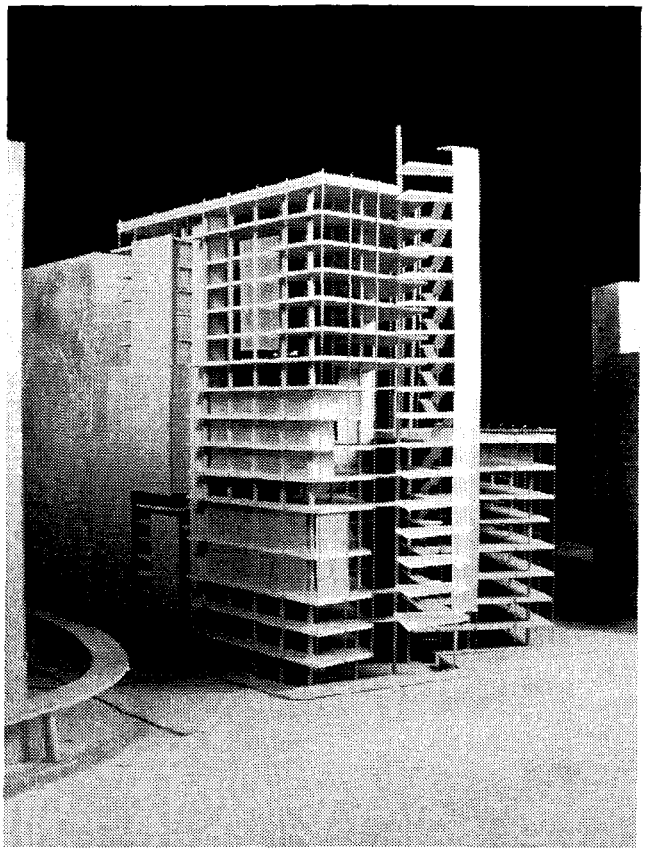

Fig.7. Physical model study. R. McFadden.

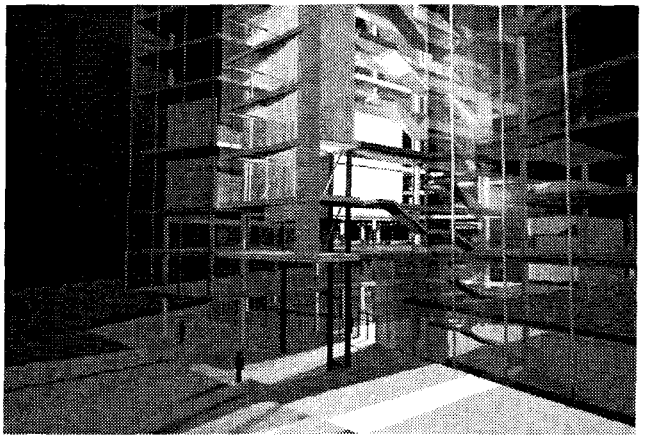

Fig.8. Digital model study, built in 3D Studio Viz™. R. McFadden.

unique opportunity to be on the forefront of a new way of doing things. The computer holds much more potential when it is envisioned as more than a "recorder" of lines and objects. This seemingly innocuous container of motherboards, daughterboards, and RAM has the power to be, in fact, an opening . . . a beginning. This design studio was a first experiment to propose an evocative and complex model defined by a rigorous, provocative, and process-driven methodology, collapsing the gap between physical and digital. One of my pedagogical objectives is to emphasize the art of crafting...of making...of building. In future studios, I am interested in continuing to "push" the software and further blur the separation between the electronic and tectonic.

Concurrently, my interests lie in continuing to understand and explore architecture as the material and physical relationship between skin, skeleton, and connective tissue. And to probe below the surface to dissect these relationships with "de-lamination" animations, presenting alternatives to the "tired" traditional fly-throughs. The possibilities of where we can go are virtually endless.

We are witness to an extraordinary time where technology offers us the ability to be connected to disparate places simultaneously. Because of advancements in electronic media, we are able to achieve astonishingly realistic imagery of places, both real and imagined. Because of the increasingly sophisticated machines and software, there is an opportunity to re-define how the "wired" studio is incorporated into the design process, where inventiveness and accidental discovery are, in fact, encouraged. As design studios in schools continue to look to the future, we must also challenge how we practice architecture. The computer in the design studio, both academic and professional, opens up opportunities to re-direct how we develop and conceptualize a design effort, from the initial sketch on trace or screen to the final documentation of the project. The computer model, initially developed to study the design, becomes the vehicle through which the construction documents are "sliced." We must continue to anticipate the change in this evolving arena and search for innovative ways to teach and incorporate digital media as part of the exploration and unearthing of the experiential and the poetic.

NOTES/REFERENCES

[1] Martin Heidegger, *The Questions Concerning Technology* (New York: Harper Torch Books, 1977).

[2] Marvin Minsky, *The Society of Mind* (New York: Simon & Schuster, 1986).

[3] Martin Heidegger, *The Questions Concerning Technology* (New York: Harper Torch Books, 1977).

[4] Frederick C. Mish, editor-in-chief, *Webster's Ninth New Collegiate Dictionary* (Springfield: Merriam Webster, Inc., 1985).

[5] Philip and Phylis Morrison and The Office of Charles and Ray Eames, *Powers of Ten*. (New York: Scientific American Library, 1982).