Towards a Paperless Studio

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Abstract

The infusion of digital media into the practice of architecture is changing how we design as well as what we design. Digital media has altered the process of design and the culture of design education. The question before us is how does one transition from a completely analog system of representation to one of complete computer immersion or the "paperless studio". Schools of Architecture have already begun to struggle with the physical issues of integration of new media (infrastructure and economics). But the pedagogical integration of new media should be of a greater concern. New media and its forms of representation are challenging traditional skills of communication and representation, (i.e., sketching, hand drawing and physical model making). The paradox facing architectural practice today is the integration of new media into a realm where traditional or manual forms of representation are ingrained into how we think, produce and communicate. We must ask ourselves, must new media be held to the traditional forms of representation?

1   Introduction

Changes in practice as well as design education should look to new media particularly modeling and time-based media, with the opportunity for further exploration of our ideas, the creation of new forms, and a new vocabulary. The creation of new forms comes with a responsibility of seeking new forms of representation. Julio Bermudez writes in a paper for ACADIA in 1998, (Media Interaction and Design Process: Establishing a Knowledge Base) that the integration of computers must be a "negotiation between centuries-old analog design methods and the new digital systems of production"(Bermudez 1998). He goes on to say that academia has reacted to the trend of fully computer integrated practices to the extent of updating curricula to respond to the new digital tools. I would argue that yes many schools have reacted to the change but not all schools have allowed for the integration at a curricular level or allowed digital media to change the process of design. To achieve a level of fully digital investigations, a foundation in the area of new media must be provided for in today's demanding curricula. It is my position that if digital media is considered a tool for design inquiry then it must be integrated at an appropriate level where fundamental design methods are taught. The problems facing the integration of digital media stem from the fact our field is dominated by traditional methods of process, communication, and presentation.

I would argue that a digital immersion studio offers an opportunity for exploration unlike a traditional design studio (Figure 1). But before studios take that step forward towards a paperless studio environment, a knowledge base in digital media must be in place.

This paper seeks to identify where that knowledge base in digital media should be applied and why digital media should be seen as a tool for architectural investigations. This paper will also touch on how the integration of digital media into existing programs through the use of workshops and electives fail to respond to the need for changes at the curricular level that address the changes relevant to our time.

2   Why Paperless?

The "paperless" studio concept is not a new venture. Since the early 1990's, studios in graduate programs like those at Columbia University have experimented and have fully integrated digital immersion environments for design exploration. It must be noted that this paper is written from the viewpoint of one seeking change within a program which until recently has been firmly entrenched in teaching traditional methods of design communication and exploration. It is from this position that this paper seeks to understand the process that would allow for the integration of a paperless studio into a curriculum of traditional design exploration.

For ACADIA this also is not a new topic. As early as 1988, Professor Robert Dvorak described in his paper, "Designing in the CAD Studio", a completely electronic environment in which students were to fully engaging the computer as a tool for design. (Dvorak 1988) In the same ACADIA proceedings a paper written by Professors Bruce Haglund and Brian Sumpton related to us how in 1984 they began the integration of computers with a single workstation and by the Spring of 1985 this had grown to a microcomputer lab. The position I find myself in dealt directly with how one moves to fully digital environment when you find yourself somewhere between 1985 and the present. (Haglund 1988). Yes, computers can be found, (physically), in labs around the school as well in the studio themselves, but to what extent are computers playing a roll in the process of de-

Figure 1. Traditional Design Studio

sign. What roll can the computer play other than a presentation tool if the fundamental design methods taught early in education does not provide the proper training in the integration of digital media. (Figure 2).

First we may ask, why is it necessary to provide a digital immersion environment in which traditional methods for design exploration such as physical models and drawings would be excluded? I would answer that question with the question, why does it seem satisfactory to exclude digital media when exploring with traditional methods. The validity of a "paperless" studio lies in the idea that digital media can change the process of design, the forms of design and how we communicate our design ideas. A comparison could be drawn between a "paperless" studio, one in which all other forms of representation and investigation is excluded, to a studio that has been instructed that the only medium for exploration will be casting. A casting studio would force change in ones process, forms, and experience. To draw a parallel to the digital immersion studio, one needs to become aware of the unique abilities of digital media, the process that must be altered, and the forms that now can be explored.

3   Integration: Building a Knowledge Base

To begin this discussion it must be agreed upon that digital media, specifically digital model making, is a tool for the exploration and investigation of space. Furthermore, it must be agreed that if digital investigations are tools to be employed for design inquiry then they must be taught as such

and placed within a design schools curriculum where tools for exploring are taught. The initial stage of design, the concept, has the opportunity to engage the computer as an apparatus for investigation (figure 3). The introduction of digital media at an early level of design education provides the opportunity for the student to comprehend the use of the computer as a design tool instead of a tool solely for drafting.

With the aid of digital media the way in which we as designers convey or communicate is changing. Three-dimensional models communicate sequencing, materials transitions and assemblage (figure 5). As digital media is incorporated into the design process the student's ability to test and investigate ideas more thoroughly will lead to foreseen construction and material conflicts and a more informed builder. With the freedom of exploration in digital media and the complexities that arise comes the responsibility of documenting our designs for construction. Digital models and web-based project sites are becoming normal practice within the "real" world of building construction. As we become a more global society, the ability to transfer or communicate our ideas in a clear and timely manner is ever increasing.

Time-based media in the last few years has come to the forefront of digital exploration and inquiry. Software like Softimage, Maya, and Alias Studio Tools has become mainstream due to their use by Hollywood movie houses in the production of CG or computer generated graphics. These CG elements can be anything from people, toys, and scenes, to complete environments. The marriage between reality and the CG objects is reaching the point of seamless integration. I would like to offer two rationales for the use of time-based media in design education. The first and sim-
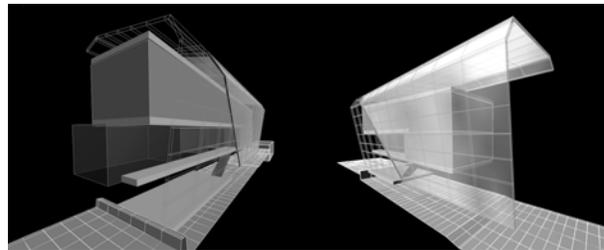

Figure 2. Computer Laboratory.

Figure 3. Future House concept sketch.

plest to conceive is having the ability to create or simulate reality. As designers of the built environment, we seek ways in which to test our ideas. Working in a realm of artificial reality through the use of drawings, models and sketches we seek to convey some sense of the built environment. Animation software allows one to approach, to test and to investigate a simulated reality or "virtual" reality. The second rationale for the use of time-based media as a tool for investigation is the understanding of how time-based media can influence how and what we design. The ability to explore new forms and new connections to technology all is afforded to us in time-based media. The use of time-based media and high-end modeling software offer designers the ability to understand objects in space as having certain properties and influences over other objects. The assigned properties beyond objects' color and texture allow for pressures, strengths, and resistance to be tested against oneself as well other objects in a scene. Our sites for intervention have identifiable pressures that can be categorized and quantified. The application of these pressures can begin to shape and form the environments in which we design. The use of high-end animation and modeling software pushes us to explore new thoughts of materials and understanding of structure vs. skin. More attention to industrial design and the process of skin or shell as structure is open to investigation with the use of software such as Alias Studio Tools.

The use of animation tools in the design of our environments must be done with the understanding of the computer as a tool for inquiry and exploration. The labeling of software as a "pet" should be mentioned at this time (Lynn 1999). Lynn describes the use of software in this way because pets are domesticated and so should our use of the computer. The haphazard application of tools such as animation software allows the designer to be removed from the process and the software to be in control of the outcome. As designers we must be able to control the software and outcome. The ability to push the computer as a tool for design comes with a responsibility of understanding its' limits and its' role as a tool for inquiry.

4 Process

Digital media is finding its way into design studios around the world. The question is will digital media become part of the process of design and is it truly being integrated into the culture of architectural education? Traditionally, design curriculums have stressed "process" through the use of physical modeling, orthographic drawing, and sketching. This process is seen through the use of multiple drawings in various media and the revisiting or revising of previous studies. A unique characteristic of the physical process is the trace or recording is left visible. The layering of information provides certain richness to the exploration. The ability to see where one is presently and where he or she came from seems to be a benefit of working in a physical or tangible medium. Digital media can offers those same benefits as well. The history of a project and process of design must be evident in the techniques we employ. How is this accomplished in digital media where the original is ever changing and inherent in the process nothing is tangible? Erasing and revising a digital file causes the history of an object to be lost. One solution to this dilemma is demonstrated in a two-week study of an urban house. The study uses the modeling software to the benefit of "process"(figure 4). Each time the file was opened and each time revisions were made a new file would be saved, providing a record of the past. New ideas for exploration were saved out, establishing another recording. Recordings, throughout the design process, allow one to see the evolution of a project from various concepts to design development.

5 Presentation

Traditional methods of representing or communicating our ideas have employed drawing, casting, gluing, and cutting. These physical skills allow us to construct vehicles of representation from the charcoal drawing, to the form-core model, to the ink-wash perspective, to the hard-line plan, section, and elevation. These methods are employed to provide the viewer with a glimpse of one's thoughts and concepts of space. The products of these methods find there way onto boards and under plexi-glass vitrines. The ease with which one can critique a project that sits physi-

cally before us has provided a comfort level not easily removed when the methods of representation change to the intangible products of digital media. A challenge for digital media is in the area of presentation. Traditionally, physical models and drawing have been the vehicles of communication. Will digital media continue to be held to the traditional forms of presenting or will we search for new forms of presenting digital media. As one investigates the changes in design education and the influence digital media are having on the design process, the form of representation must be questioned as well. Traditional forms of representation must not set the standard to which digital media must conform; instead digital media must be allowed its own form of representation.

6 Traditional forms of representation vs. Digital media opportunities

The forms of representation in the traditional design studio have been the use of physical models, hand-drawings, and even to some extent the use of two-dimensional CAD applications providing orthographic drawings. As the tools for inquiry change so should the products of this inquiry. As we transition from the physical/tangible forms of traditional media to digital media, new opportunities of representation must be investigated. These new methods may include real-time
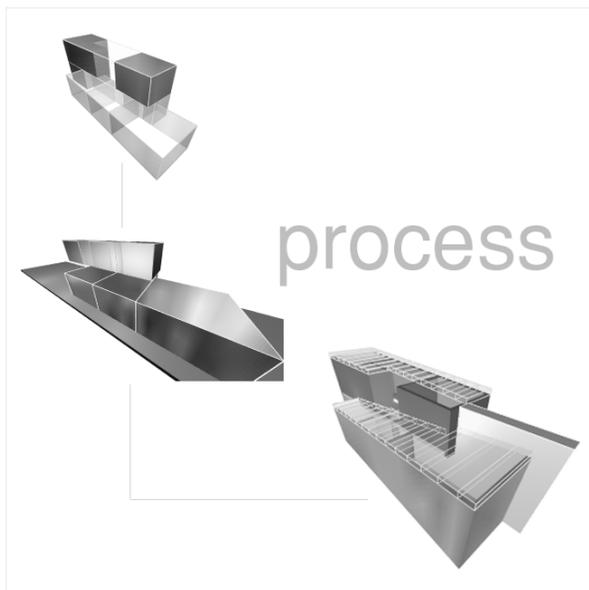
modeling, web-based interactive models, QTVR and animations. Digital media, particularly three-dimensional modeling, allows for technology transfer between design and industry, from digital to physical, through the use of rapid prototyping machines. This fusion between industry and architecture will allow for the investigation of new forms and new materials. The use of new media, the construction of new forms, and new techniques for provide a new ground for critique.
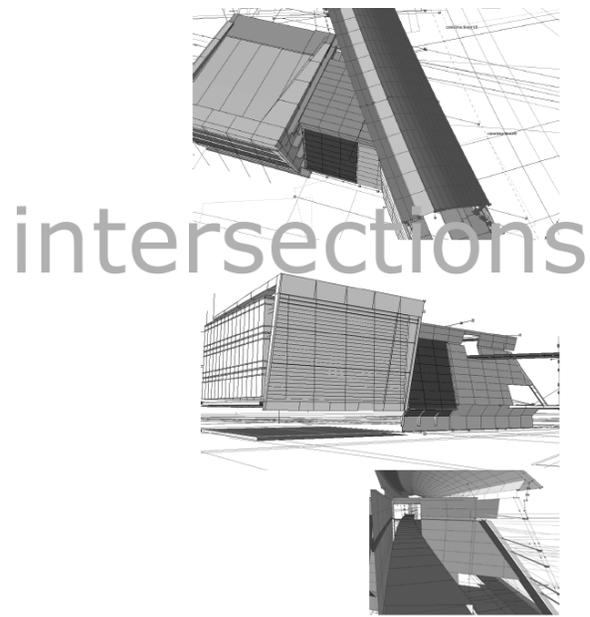

Figure 5. Intersection modeling.

Figure 4. Process sketch.

Figure 6. Integrated Studio Environments

7   Computers in the Studio

Moving toward a "paperless" studio, the question of how to physically place computers into the studio is not the issue, that is a financial dilemma on the part of the college or the student, the larger issue is a pedagogical one of integration. Earl Mark describes in his paper that the "proliferation [of computers] alone may not be a good measure of the computer's impact on the curriculum" (Mark 2000). Mark goes on to say that the progress is misleading if we look to the quantity of computers as our gage of computer integration and that "mere presence of computers does not ensure that the underlying approach to design is transforming" (Mark 2000).

How to infuse the computer into a design process, becomes the greater question (Figure 6). Within the culture of design education where does new media find its place? I would argue that its' place is at the beginning. The computer is a tool for inquiry and as educators our curriculum provides those tools in the lower division design sequence. The success of a "paperless" studio will rely on the ability of its students and faculty to implement these new digital tools and change the culture of the studio environment. In many cases students want to incorporate digital media, animation, and modeling into their studio work, but the schools do an inadequate job of providing the needed knowledge base. If students are not adequately taught the digital design skills at the appropriate level in their education, digital media will not become part of a process of design and upper-level studios will be degraded to instructional labs for software training. In many cases upper-level students are forced to teach themselves software at the detriment to their studio investigations. Through technology initiatives such as workshops, electives and most importantly curricular changes the ability to build a knowledge base becomes a viable opportunity for the digital exploration of architecture.

7.1 Workshops

Workshops for digital media provide a quick fix in many cases but offer the least amount of change from a culture deeply, rooted in traditional methods of design inquiry. Workshops in new media do provide the first step toward building a knowledge base, but do not acknowledge new media as an integral tool for design. Workshops, while providing a limited introduction to new methods of design, offer little in the way integration into a design process.

7.2 Electives

Electives in digital media such Form•Z, 3D StudioMax, Softimage, Alias provide the needed time and focused effort to understand and become knowledgeable in a particular application. The greatest problem with electives is that they are often not made available early within a design curriculum thus students are left to take these electives at a senior level. Delaying the introduction of digital media only weakens the pedagogical endeavor that digital media can provide to the education of today's design professionals. Students seek technology electives as a means of becoming more marketable not as a means of altering ones process of design. As educators we have the opportunity to put forward the idea that digital media is a design tool to be integrated into the process from the beginning. As educators we should stress to students that digital media are design tools to be integrated into the process from the beginning.

7.3 Curricular changes

Wholesale curricular changes that incorporate digital media into the student's foundation years are necessary to move into an environment where computers become a transparent tool for architectural inquiry. By changing curricula, schools are acknowledging digital media and actively seeking its integration with the culture of design education. This paper has sought to point out that digital media is another tool for design inquiry. If in fact digital media is a tool for design, one must ask, where is the most appropriate level for teaching design tools. Early in the development of designers we seek to provide them skills necessary for investigation, exploration and testing. The advances in digital media over the last five years have been phenomenal and what the next five years will bring can only be imagined. Design communication courses currently being taught in the early years of design education must evolve and reconcile the integration problems of digital media for the success of a program seek-

ing to merge traditional media and new media. With the knowledge base built early within the design sequence opportunity for skill development and true integration within a students process of design is accomplished and a step toward the paperless studio is made.

8   Conclusion

As the practice of architecture changes so do the tools with which architects employ as tools for design inquiry. As new media and digital tools become more prevalent within schools of architecture a foundation in digital processes must be addressed. Digital tools offer design students new opportunities for design exploration but students must first be provided with a foundation that includes digital processes as part of ones toolset for design inquiry. As I look forward to a future digital emersion studio I must first address the issue of integration not at the level of providing quantities of machines to our students but truly integrated computers to the process of design. Earlier in this paper I asked, wither new media would have to be held to the traditional forms of representation? Meaning that the computer only replaces the pencil for orthographic drawing or that it replaces the color pencil and marker rendering as a tool for making "artist depictions" of space. The simple answer is no, the more complicated and difficult task is to seek ways in which digital media can move beyond its traditional counterparts and provide a new way of thinking and making in architecture.

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Illustrations

Figure 1, "Traditional Design Stuidos." Image from Second Year Design Studios at Ball State University, Spring 2001.

Figure 2, "Future House Sketch." Images a concepts for a future urban house. June 2000 Frederick Norman author.

Figure 3. "Computer Laboratory." Image from Third Year computer laboratory at Ball State University, Spring 2001.

Figure 4, "Process Sketch." Images from Green Houses Competition, City of Chicago, July 2000, Frederick Norman author.

Figure 5, "Intersections" Images from the Telenor Competition, NBBJ-Seattle, 1998, Joey Myers and Frederick Norman authors.

Figure 6. "Integrated Studio Environment." Image from Fifth Year Design Studio at Ball State University, Spring 2001.