

Collaborative Design and Multimedia Usage in Virtual Design Studio

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Abstract

The virtual design studio (VDS) points to a new way of practicing and teaching architectural design. As a new phenomenon, little research has been done to evaluate design collaboration and multimedia usage in a distributed workplace like the virtual design studio. Our research provides empirical data on how students actually use multiple media during architectural collaborative design.

Design studio is the core of architectural education. Traditional architectural curriculum have been based on the design studio model which emphasize learning by doing. Design studio is a type of professional education in which students undertake a design project under the supervision of an instructor. Students work in an environment similar to what would be experienced in practice. In the course of the semester, students undertake one or more design projects. Each student is to develop a unique version of the design, recording results in preliminary sketches, detailed drawings and models. At the end of the project, there is traditionally a critique or “crit” at which students present their designs to both the instructor and to a group of out side critics known as the “Jury”. At intervals throughout the project, the instructor holds individual or group reviews with students.

Keywords: *e-studio, digital design, architectural design education, design methods.*

1 Theoretical Framework

Since the late 1980s many experiments using computers in design studios have taken place. Using digital media in architectural education has been lengthily debated among scholars. Literature on this issue falls in two main categories: first, the instrumental view, which treats digital media as value-free tools that enable and facilitate architectural design (Achten, 2003; Asperdt & Diamond, 1998; Blazquez & Hardin, 1998; Carrara et al., 1999; Neiman & Bermudez, 1997). This literature focuses on the technical issues of the media and how it can enhance architectural design or improve its quality. Most of this literature is found in the proceedings of associations such as ACADIA (Association of Computer-Aided Design in America), eCAADe (Education in Computer-Aided Architectural Design in Europe), and CAADRIA (Association for Computer-Aided architectural Design Research in Asia). The second view is the critical view. Critical scholars challenge the instrumental conceptualization of digital media and highlight the bias of the media, its negative influence on architectural design education and practice (Piotrowski, 1998), and its inappropriateness as a design tool (Robbins, 1994; Lawson, 1994).

As a result of these two conceptualizations of digital media, our current understanding of digital media and how it affects architectural design education and practice remains fragmented and there exists no general framework to tie all the diverse views together. Neither of these polarized views is very helpful for us to understand digital media and its influence on architectural design and education. Instead of the "good" or "bad" characterization laid down by digital media utopians and dystopians, there is a need for a framework that enable us to examine all aspects of media influences on architectural design.

The complex relationship between digital media and architectural design is very elusive. One way to examine the e-studio practices and how digital media is altering our conception of designing and design education is to apply McLuhan's law of media as a framework of analysis (McLuhan, 1988). The law of media provides a balanced analysis framework that goes beyond the simplistic utopian and dystopian views.

McLuhan believe that there have been three dominant modes of communications throughout human history: oral/speech, writing/printing press, and the electronic medium. Each mode of communication has created dramatically different physical and psychic impacts on individuals and society as a whole. They succinctly summarized these impacts as the law of media which has four major elements (McLuhan, 1988). According to McLuhan (1988), developments and innovations in the dominant mode of communication media will (a) intensify/enhance certain aspects of human faculties or a given culture while at the same time (b) making certain aspects of human mental abilities or cultural practices obsolete. Furthermore, all media innovations also (c) retrieve a phase of certain human capabilities or cultural practices long-ago pushed aside and (d) undergo a reversal when extended beyond the limits of their potential.

The core of McLuhan and McLuhan's law of media is that the effects of media on society are increasingly paradoxical. Such effects defy the simplistic good or bad characterization of media. The implicit message of McLuhan is the social impacts of technology are ambivalent; in the sense that digital media technologies enhance or extend certain kinds of practice or experience whilst inhibiting, restricting or reducing other kinds. Thus, in the context of the e-studio one can argue that digital media not only enhance some practices of the design process or make new practices possible, but also are displacing and making other practices obsolete.

Research on "communities of practice" also provides supports to this framework (Tumid, 2002; Lave and Wenger, 1991). Research in this area has pointed out that learning could be understood as development within a "community of practice" (Wenger, 1998; Tuomi, 2002; Lave & Wenger, 1991, p. 9). In particular, Lave and Wenger (1991) describe the social context of learning as a community of practice or learning where participants – student, instructors and resources external to community- make use of each other to mediate or give meaning to the learning. The distinction between a community of practice or a community of learning is necessarily vague as Lave and Wenger see practice as an essential element of learning. Tuomi (2002) argued that the adoption of new technological tools often depends on the dynamic capabilities and constraints of communities of practice/learning. When a community of practice explores the possibilities of a technological tool, it adopts the tool only if the tool enhance or facilitates existing practice, or if the community is able to change and align its practices according the limitations and constraints of the tool

Based on the above discussion we will analyze the e-studio experience focusing on two aspects: 1) how digital media enhance or extend specific design practices, and 2) how digital media displace or obsolesce other practices.

2 Observations from the E-Studio

2.1 The digital design process

Studio teaching/learning actions have been examined by many, most usefully by Donald Schön (1987). Based on a constructivist view of human perception and thought-processes, Schön (1987) describes design as a reflective conversation with the design situation. According to this view, problems are actively set or "framed" by designers, who take action (make "moves") by using a spatial-action language (sketching and drawing). This action or move improves the (perceived) current situation by revealing new qualities and relations unimagined before, which guides the designer for further moves to refine the situation.

In the e-studio, students seem to engage in a similar interaction or dialogue with the digital medium. However, our observation showed that there are significant differences between the conventional design process as described by Schön and the digital design process as practiced by the e-studio students. Observations revealed that digital media did not simply enhance and extend

certain aspects of the design process but on the contrary, also simultaneously obsolesce other aspects of the current manual design process.

2.1.1 Enhanced or extended practices

Observation at the e-studios revealed that digital media enhanced and extended design process in several aspects. For example, digital media extended students ability to work in an integrative mode. In contrast to the conventional design process in which the design act is segmented into several abstract views, digital design seems to be more integrative in the sense that all design acts and decisions are represented in one digital model that can be seen and evaluated from various points of view at any point of time. When e-studio students were asked about the main advantages of using advanced visualization tools, 92% of the students (n = 49) mentioned enhancing their ability to represent, test, and evaluate the various spatial and formal aspects of their design concurrently and from several points of view. This integrative environment enabled a kind of holistic and organic design approach that provides students with simultaneous understanding and integral awareness of the design situation. For example, students are able to create and manipulate solids and voids while at the same time evaluating texture, lighting, color scheme, proportion, and other anthropometric relations of the proposed solution. From the perspective of McLuhan's law of media, this seems as enhancement over the conventional design mode.

Another enhancement over the conventional design process is the degree of interactivity or responsiveness. Digital design seems to be more interactive in the sense that the results of design changes and actions are ever more immediate. In responding to the questionnaire survey, 91% of e-studio students (n = 48) mentioned 'the ability to manipulate and explore design artifacts interactively and the ability to see the effect of design transformation instantly' as one of the main advantages of using advanced visualization tools such as 3DS Max. As in conventional design, the reflective conversation with the design situation involves several actions such as externalizing design ideas through drawing/modeling, interpreting the consequences of the drawing act, and making moves to a new design situation. In digital design, however, the feedback in the conversation with the design situation is more immediate. The transformation of the "digital artifacts", the movement to a new design situation and the "back-talk" of the situation are more instant. In contrast, tactile media provide a passive or less interactive environment in the sense that feedback on design changes and transformations takes time, due to the fact that design decisions need to be physically created.

Digital media also enhanced students' degree of involvement or immersion in the process. Observations revealed that digital design is immersive in a dual sense. On one hand, advanced parametric modeling tools provided a work environment similar to desktop-VR where students are able to interactively explore and navigate their digital model. In this environment, students were immersed in a designed space in a manner similar to the way in which it would be used. The immersion feeling was improved through LCD projection on a

large screen. At KFUPM, students also projected their animations using VR system (Elumens Visondome). On the other hand, the numerous and versatile design and visualization capabilities of the digital environment provided unlimited choices for design creation which put the student in a complete immersion state. For example, a design student is immersed in a virtual simulation that allows him to model, articulate, and animate movement throughout the design process. In the questionnaire survey 79% of students (n = 42) indicated that the unlimited choices of form generation enabled them to feel completely immersed in the design process. One student commented on his involvement in the process as being "very personal and an indescribable mental state."

Thus, one could argue that digital design represents a new model of design that is integrative, interactive, reflective and immersive. This model enables and facilitates a fluid thinking mode. In such a model, students were able to produce more design artifacts with larger amount of information and complexity. For example, students used complex operations such as several layers of modifiers, sub-object operations, and using NURBS modeling to generate various formal transformations that reflect their particular interest or conditions. Some of the created forms transcended several essential issues such as constructability, materiality, or the cultural and economical context. The complexity of the created forms (see Figure 1) makes it impossible to use orthogonal abstraction conventions as a tool for architectural design representation.

Another enhancement over the conventional design process is designing in 3D. In the e-studio, almost all students designed in three dimensions from the beginning of the design process. Students went beyond the conventional design process in which they worked using abstract conventions (2D plans, sections etc) and started to explore, manipulate, and articulate space in 3D or even 4D, using movement in both time and space. A modeling and animation software, such as 3DS Max, allowed students to explore and examine space, form, texture, lighting, and color as they explored spatial and temporal movement. When students were asked about the advantages of working in 3D, 68% of students (n = 36) mentioned greater fidelity to reality and the ability think and design in a more natural way.

2.1.2 Displaced or obsolesced practices

Digital media, as any other medium, amplify or reduce phenomena in various ways as a result of their constraints and limitations. Postman (1993, p. 13) has reinterpreted McLuhan's statement that "the medium is the message" as meaning that "embedded in every tool is an ideological bias, a predisposition to construct the world as one thing rather than another, to value one thing over another, to amplify one sense or skill or attitude more loudly than another." In the context of the e-studio, this suggests that digital media do not enable us without cost. In other words, digital media not only enhanced some practices of the conventional design process or made new practices possible, but also displaced and made other practices obsolete. As discussed below, many aspects of the conventional

professional practices are no longer the dominant mode. For example, digital media eliminated the need to use physical models. It also upstaged the role of orthogonal abstraction conventions as a tool for architectural design exploration and representation.

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3 Conclusion Remarks

The e-studio provided a valuable opportunity to critically evaluate current design discourse and to reconsider current understandings of the design studio and the digital design practices. It enables us to gain insights into the architectural design process, the design studio praxis, the design outcome, and how digital media affects them.

Observations draw attention to the ambivalent nature of digital media - how digital media, intended to enhance and extend conventional design practices, may have unintended hindering and restricting effects. Observations also showed that digital design appear to represent a new model of design that is immersive, reflective, integrative, and interactive. This model questions several values associated with the conventional design process and brings dramatic changes to it. Digital technology transforms the traditional studio and brings changes to its basic assumptions and practices. It introduces new studio practices that cannot be understood, explained or resolved from a conventional studio paradigm.

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The heading for acknowledgements is the style of a first order heading but is unnumbered.

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