A Technology-Based Online Design Curriculum

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Abstract: This paper is a description of the development of a university level curriculum integrating technology to produce a progressive interior design undergraduate program. This program will require students to have computer literacy, writing and drawing skills, knowledge of the global environment and sustainability, digital presentation and document production. It will integrate multimedia and computer-aided design technologies into a traditional design baccalaureate program that would meet national accreditation standards from the Foundation of Interior Design Education Research (FIDER). The delivery method is online. It is intended to serve the global marketplace. This program will accurately portray the current practice of interior design, preparing students for the practice in architectural and interior design firms. The entry-level courses are delivered through a website, in an asynchronous manner following a traditional college semester system. Both high-achieving and low-achieving students will have the guidance to meet the basic objectives of the course. Advantages of this technology include access to international and rural students; an increased level of communication visuals through audio, video, film and animation; increased emphasis of technology within the design profession; a better understanding of visual spatial skills leading to heightened global design and a closer relationship of education to the practice of interior design.

Need for Project

The growth of technology use within design firms combined with new communication tools afforded by the Internet has created a paradigm shift for interior design. There is a belief that society is evolving from the information age into the *conceptual age,* as theorized by Pink (2005). Asian dominated economic forces are causing a market shift toward globalization. Asynchronous work schedules and learning styles produce economically necessary and effective productivity gains (Joo, Bong & Choe, 2000). Research indicates that online learning is on an ascending growth curve.

Introduction

Within the design profession, two-dimensional drafting has evolved into three-dimensional design and construction documentation. For more than twenty years, computer–aided design and drafting have been changing the practice of design, transitioning from pencil-

based manual drafting to unimagined computed spaces. Today, design firms operate with technology; there is neither practice nor product without it. Technology affords new operational strategies and a new design paradigm.

New digital media is liberating design from its dual concepts (mental, physical) of space into new virtual concepts of space (Liu, 2001). Mental space is contained by our cognitive capacity and physical space is limited by reality. ArchiCAD software and other new media create a third digital-virtual space, which in turn avails new limitless design thought. Designers explore imagination, document ideas and see that they are properly built.

Some schools of architecture, such as SCI-ARC in Los Angeles, are distinguished by their use of leading-edge technology and their ventures into the virtual medium. Few, if any, interior design universities convey a similar distinction. "Scholarship is needed to inform the creativity that enables interior designers…to lift the human spirit" (Eschelman, 2004). Architectural and particularly, interior design education has been slow to embrace technology and recognize its impact. A *connected curriculum* that integrates, applies and provides for the discovery of knowledge within and beyond the architectural profession is recommended by Boyer and Mitgang (1996). Additionally, new multimedia research (Mayer, 2001) has demonstrated that the ability of learners with high spatial skills, a characteristic of design students, can be enhanced.

 "In a culture like ours, long accustomed to splitting and dividing all things as a means of control, it is sometimes a bit of a shock to be reminded that, in operational and practical fact, the medium is the message" (McLuhan, 1964, p.7). The power of design is as McLuhan forecasted. Technology is embraced and then it changes an experience. Among the key differences between computer and traditional representations are the speed of repeating solutions, the options for image transfer and communication, and the added dynamic of time and motion (Laseau, 2000). With all these advantages, the usefulness of technology is slowly being accepted in design practice. In 1999, researchers found that 35% of designers surveyed were using 3D software to create renderings, while 25% were producing animations, commonly termed *fly-throughs* (McClain-Kark, 2000). Many more firms use computer-aided design software today.

Interior design is most appropriately expressed as the vision of both art and science. *Artistic creativity* is now coupled with *scientific creativity*. Artistic creativity is that which reflects inner and imaginative states of the individual, distinct from scientific creativity that mirrors external needs and goals existing outside the individual. With advances in technology, the artistic aspect has greater freedom of expression, while the scientific aspect responds more directly to objective principles (Portillo, 2002).

The primary obstacles to integrating technology with education in interior design are: 1) the limited evidence of online design education (Sagun, Demirkan, & Goktepe, 2001); and 2) the reluctance of design educators to teach online (Bender & Good, 2003). Barriers cited include a dislike of computers and lack of technology resources (Bender, 2005).

In traditional architecture or design classrooms, students are taught within a *studio*, an instructional method from the Ecole des Beaux-Arts, an 18th century French school of design. In the studio method, students practice hands-on skills with the instructor observing and critiquing their work as they progress. Technology affords the same academic interaction, however the online environment requires a different approach for social interaction such as online chats, virtual office hours, group projects and interactive software with live video and audio.

Many architectural schools are and have been headed by prominent practitioners, such as the German *Bauhaus: School of Design*, founded in 1919, which tied together industrial art, fine art and architecture with singular intention to develop creative minds. In Gropius' manifesto (1919): "the decoration of buildings was once the noblest function of fine arts, and fine arts were indispensable to great architecture. Today they exist in complacent isolation…. architects, painters, and sculptors must once again come to know and comprehend the composite character of a building…."

Gropius' vision has merit; the coming together of disciplines that contribute to the built environment is a noble idea, albeit directed at artisans, not interior designers. "Let us create a *new guild*…without the class-distinctions that raise an arrogant barrier between craftsmen and artists" (Gropius, 1919). The sharing of knowledge is a form of education in itself.

Distinct advantages are created with the online university: the opportunity for multidisciplinary projects; working with faculty and professionals from other universities and locations; opportunities for students to collaborate with peers from other universities; students and faculty conversant with the latest technologies; and flexibility of scheduling and teaching from multiple locations and times (Bender, 2005). Essential to design education today is the integration of concepts with practical and theoretical knowledge through collaborative learning (Sagun, Demirkan & Goktepe, 2001).

Specific to the area of design, the following technologies have had significant impact on professional practice: email, voice mail, cell phones, text-messaging, real estate databases, Excel spreadsheets, iPods, Palm Pilots, Blackberry, faxing, PDF files, cross-platform file-sharing, file-sharing of multiple CAD documents, instant messaging, electronic correspondence, Internet product research, international 24-hour project CAD teaming, virtual renderings and fly-throughs, and web-based construction observation, among other impacts (Cramer & Simpson, 2002). All of which have had a significant impact on the speed of delivery of services. If interior design educators are not comfortable with technology, then the current practice of interior design is not being addressed.

Computers have the power to transform the way we educate people (Bork, 2001). With CAD technologies, designers have greater freedom. We benefit from these designs. Design begins with an idea, brings to mind alternatives and opposites, and then works to select the best option from the solutions that emerge (Coyne, 2005).

The advantages of this proposed curriculum are the relatively affordable price for an American design education delivered virtually and the ability to export it to a diverse student group. Further, it offers access and flexibility common to many online programs. It will use discussion boards, testing and video conferencing, taking advantage of software tools used to deliver curriculum over the Internet.

Description of the Target Population

This project specifically focuses on using an online delivery method for instruction. Undergraduates in the global marketplace seeking a BFA in Interior Design constitute the target population. These students would exhibit the following characteristics identified with creative personalities: independence, self-control, self-confidence and introversion (Portillo, 2002). Cultural diversity offers opportunities for new views on design diversity, indigenous environmental practices, historical pattern conventions and more that are not yet apparent. For example, the Chinese language is learned as a series of pictograms, and as a result Chinese thinking is more holistic (Graham & Lam, 2004). Conversely, American children are more likely to have an aptitude for the details (Bond, 2003). There is much to be gained in exploration and collaboration.

The greater community also benefits from this university as design results in higher productivity levels for people in the workplace as well as the human pleasure derived from experiencing highly aesthetic environments. As opposed to a time when design was only for the wealthy, now design is for all people; designers can respond to all cultures. Prospective interior designers can communicate in the global marketplace.

Purpose of the Project

The purpose of this project is to implement online learning, multimedia, computer-aided design and assessments to create the foundation for a four-year design university allowing students to understand complex visual-spatial skills within a virtual learning environment. Within an online environment, the use of area specific content allows efficient learning and provides greater opportunity for multidisciplinary collaborative teaming and one-on-one instruction. Project team members: engineers, contractors, real estate professionals, and building owners will collaborate with students during project assignments. Online instruction with audio, video, film and animation components that only technology can conveniently provide makes abstract design concepts understandable and builds strong retention.

Tools of Online Teaching

With regard to the tools of online teaching, Microsoft office software (Word, Excel, PowerPoint and Access) and Macromedia office software (Illustrator, Dream weaver) will be accompanied by the student's preference of leading computer-aided design and drafting software (AutoCAD and ArchiCAD). Course management systems have been reviewed and will be implemented as a structure for the learning materials. Interactive software such as Breeze, which provides live video and audio, will also be implemented.

Innovations in online collaboration have already begun. At George Washington University, a trial collaboration utilized a customized interactive Web-based program called *Prometheus* (Blossom, Matthews, & Gibson, 2002) has been tested. Other institutions to experiment in collaborative online delivery are Cornell University, Ohio University, Archeworks (Chicago) and Massachusetts Institute of Technology (MIT), National University of Singapore, University of British Columbia and the Swiss Federal Institute of Technology (Zurich) (Sagun, Demirkan & Goktepe, 2001). An interest in collaboration among disciplines prevails. Yet unaddressed, however, is the realization of the effects of digital design on interior design education.

Effects of Digital Design on Education

Imagining the effects of digital design may be difficult for those who have not witnessed computer-aided three-dimensional design. But, for those who have, the impression is unforgettable. "Design must be visualized in order to be understood" (Whyte, 2002, p. 94). Visualizing interior design solutions has replaced manual drafting, rendering the computer as pencil. A designer's ability to express ideas is dependent upon digital tools. Digital design tool selection reveals something about user practice and philosophy. For example, ArchiCAD is one of the most commonly used titles for production software for computer-aided design (Cuff, 2001). It is unique in that it incorporates three-dimensional visualization without the transfer of electronic data to a different title. Designs begin with two-dimensional representation and then can be re-imaged as virtual models accomplished instantly with a single command. This is an effective design tool.
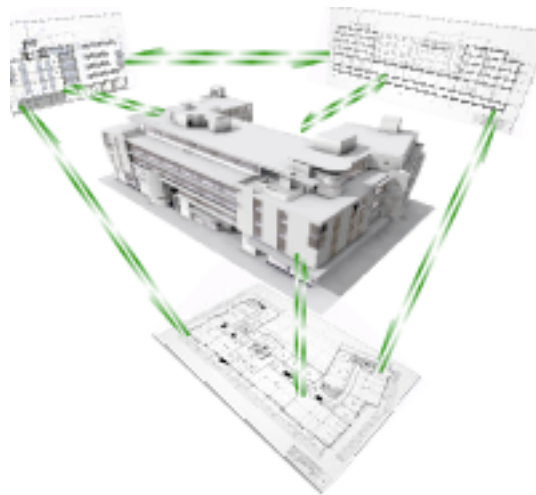
Figure 1. Two-dimensional drawings connected to a three-dimensional model

After building the three-dimensional base information, creating an animated virtual rendering is achieved simply by selecting a number of view locations, camera angles and lighting positions within the same file, connecting the locations sequentially and allowing the software time to memorize the photographic effect. The realism of the three-dimensional image creates and connects the user to a virtual space.

Success in using media is recognized in design communication (Laseau, 2000). Experimentation in practice has led to representation innovations in which conventional processes and electronic media are combined. Lu (2004) teaches digital rendering combining digital media with manual techniques for the purpose of higher-order design analysis. Design study contributes to better design.

Construction documents, previously line on paper, now have evolved into a virtual model downloaded to a single CD-ROM that can be referenced by construction crews at the project site. The virtual images provide full views of the three-dimensional project. In the past, the drawings would be drawn as separate details on different pages. The faculty at Norwegian University of Science and Technology anticipate that the building information modeling associated with ArchiCAD will enable greater pre-fabrication in construction (Khemiani, 2005).

In addition to these advances, the imagination of designers is piqued. CAD affords ease of review during the design process furthering three-dimensional design thought. Design innovations are influenced by opportunities viewed in virtual renderings. "Designers are exploring forms that until recently could only exist in imagination—sinuous curves, sharp angles, syncopated juxtapositions---extremely complex forms that seem to be have been imported from another solar system" (Cramer & Simpson, 2002, p. 7). Advancements in construction of the physical space have been outpaced by the unlimited imagination seen in virtual space (Liu, 2001). General contractors commonly question the *build ability* of these new innovations.

Distance Education and Collaboration

The use of virtual whiteboards, discussion boards, *design boards* as proposed in this research, and other collaborative tools lead to new pedagogies in education (Palloff & Pratt, 1999). Successful collaborative online courses require well-developed collaborative tasks and problems that stimulate peer interaction and encourage peer collaboration. Collaborative learning is in essence, the shared meaning among group members, a view that underscores the *social creation of knowledge as the basis of learning* (Moallem, 2003). Technology is the medium which facilitates the method. Interactivity and collaboration share the virtual world of distance education.

Conclusion

Technology is allowing interior designers to team, to work better with greater efficiencies, and produce greater accuracy. Computer technology is integrally connected to all phases of design. Clients can fully participate in the design process regardless of their travel schedule or global location (Blossom, Matthews, & Gibson, 2002). An online world is the context of the daily practice of interior design, fully integrated with web-based research and digital imaging. Recognizing this new context is central to the importance of the shift toward online learning in design. More over, the prevalent use of computer-aided design and drafting toward three-dimensional design and virtual construction documentation is changing the way designers work and think. CAD makes possible the transitioning of

solutions into unimaginable outcomes of anamorphic forms only made possible by computing software.

Distance learning offers real life videography, interactive education and role-playing directly linked to professional practice, as exemplified in the research on the nursing profession. Technology can provide interaction in learning that is *integrated, essential and a graded part of an online learning environment*, stimulating design students to achieve in ways never before imagined (Moallem, 2003).

Envisioned is an interior design program that can bring together the ideas and perspectives of a multitude of cultures, designers and experts; such a wide birth provides a broad perspective of ideas and insights into developing a new pedagogy for design that uses web-based instruction as its core technology.

With the transformation of the practice of design to a completely online science, realizing a parallel design education is not reality (Bender, 2005). Simultaneously, the significant enrollment in distance education demonstrates a clear demand for online learning (NCES, 2003). In conclusion, several factors have lead to the need for this project:

- Architectural schools are mired in traditional teaching (Bender, 2005).
- Gender biases remain in these professional areas (Portillo, 2002).
- Very few design educators have developed online courses (Blossom, Matthews, & Gibson, 2002)
- Design educators are cautious of online education (Bender & Good, 2003)
- Few fine arts professors are oriented toward technology (Lawn, 1998).
- Students want flexibility in learning while remaining employed (NCES, 2003).

While technology provides expansive ideas, many of the conventional issues of teaching occurred in recent online experiments. The use of technology is an individual experience, despite the collaborative goal (Blossom, Matthews & Gibson, 2002). Collaborating professionals seldom were able to meet the time sensitive demands of the students.

Within interior design, this idea offers students and educators alike, opportunities that would not exist without technology (Rickard, 1999). The development time, unknown though worthy, may partially depend on instructor experience and the level of institutional support (Visser, 2000). As design students and design professionals become more *sophisticated users of interactive, spatial, real-time software* the profession will continue to make its impact on the built environment known (Whyte, 2002). A more connected designer will better contribute to the health, safety and welfare of the public while enhancing the well being of citizens in their communities (Whited, 2003).

Online learning integrating a web-based delivery system directly addresses the digital medium of design. It embraces all levels of learners, leading to an online master of interior design and further scholarly research. It is time for design educators, in partnership with design practitioners to provide this leadership (Guerin & Thompson, 2004). An online collaboration may inspire educators who wish to pursue a new challenge in teaching

(Bender, 2004). A new lexicon of meaning is made possible advancing a scholarship of technology integration and collaboration (Portillo, 2002). The time is right for a transformative technological revolution to occur in interior design education.

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