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Toward the Innovation of Distance Education

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ATTITUDES OF HIGHER EDUCATION INTERIOR DESIGN FACULTY TOWARD THE INNOVATION OF DISTANCE EDUCATION

By

Diane Marie Bender

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ABSTRACT

ATTITUDES OF HIGHER EDUCATION INTERIOR DESIGN FACULTY TOWARD THE INNOVATION OF DISTANCE EDUCATION

By

Diane Marie Bender

The purpose of this investigation was to explore interior design faculty attitudes toward distance education. The need for this investigation was promulgated by the lack of research on educational innovations and the minimal attention given to distance education by faculty members teaching in the arts. Diffusion of innovations conceptual framework argues that the perceptions of an innovation's attributes will predict an individual's intention to adopt an innovation.

The sample for this study included sixty-seven self-selected interior design faculty members from across the United States who had no previous experience with distance education. The experimental treatment was a 15-minute presentation demonstrating interior design instruction using distance education. A Solomon four-group experimental design was used with a questionnaire addressing the attributes of an innovation serving as both the pretest and posttest instrument.

Major findings included: (1) posttest scores compared to pretest scores for relative advantage, compatability, trialability, complexity, and the intention to adopt were higher regardless of whether they were in the treatment group or not; (2) subjects who received the treatment intervention yielded significantly higher posttest means on the variables relative advantage and the intention to adopt

than those not exposed to the treatment intervention; and (3) compatability and trialability are significant predictors of the intention to adopt distance education.

These findings can help explicate the faculty member's perceptions of distance education endeavors. The unique characteristics of interior design faculty members and traditional interior design instructional methods need to be considered when implementing persuasive campaigns for the integration of distance education into interior design curricula. Such an understanding will prove helpful to faculty members and academic administrators who are planning to adopt distance education methodologies into their curriculum. Examining the attributes of an innovation as an approach to determining faculty attitudes toward distance education does appear to have potential. The implications of the findings and directions for future research are discussed.

DEDICATION

This research study is dedicated to the memory of my grandfather,
Edward A. Bender (1908 – 2000), a brilliant and inquisitive scientist,
whose regret of not completing his college education
taught me its inherent value.

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CHAPTER ONE

Introduction

Coping with rapidly accelerating change is one of the most important challenges in today's world. With the multiplicity of new technology tools and multimedia communication methods, today's higher education system is moving from the "industrial age" to the "information age", as these institutions pursue distance education as an alternative mode of instruction. Results of a survey of 4,000 two- and four-year universities by Market Data Retrieval (Eggen, 2000) demonstrate the rush to offer more web-based distance education courses. The percentage of online degrees has more than doubled from 15% in 1998-1999 to 34% in 1999-2000. Likewise, distance education course offerings have also increased from 48% in 1998-1999 to 67% in 1999-2000 (Eggen, 2000). Distance education using the Internet can be considered an innovation because it is new, original, and could supplement or even someday replace the current methods of teaching in higher education. Currently, distance education is not widely accepted. Like any innovation, it will take time to spread, or diffuse, in a social system.

Significance of the Study

Distance education can be defined as the teaching and learning process where half or more of the instruction occurs when faculty members are separated from their students by location and/or by time. Distance education courses are

emerging in many fields of study. This study focuses on the development and instruction of distance education courses by higher education faculty members in the field of interior design. According to research by Abacus Associates (2000) for the National Education Association (NEA), the two educational fields with the highest percentage of distance education faculty involvement are math/science (20%) and social science (15%). Only one percent (1%) of those surveyed teach a distance education course in the area of the arts. No reasons were provided as to either the lack of interest or inability to provide instruction through distance education in these areas (Abacus, 2000).

Many distance education advocates have concentrated their research efforts on the implementation of specific telecommunications technologies, rather than the practice of instruction (Olcott, 1991). The majority of research in the area of distance education focuses on student outcomes, course and program design, and the effectiveness of distance education technologies ("what's the difference", 1999). Yet research addressing faculty concerns and issues is sparse (Visser, 2000). This study will contribute to the body of knowledge involving the perceptions of the faculty body toward distance education.

The focus of this research will be on interior design educators, one of the subsets of the arts. Only one percent of these educators are involved in distance education (Abacus, 2000). Today's interior design education is based on the traditional principles and instructional methods of the Ecole des Beaux-Arts, a French school of design established in 1863. The Beaux-Arts educational approach is based on instruction in small studio settings where design and

artistic demonstrations can take place. Other components of the Beaux-Arts approach include a small student-to-faculty ratio of approximately 20 to 1 ("FIDER accreditation", 2000) and a high level of interaction. Because of their tradition of studio-based instruction, interior design educators may see distance education as inappropriate to serve their instructional needs.

Research on the adoption of an innovation has focused on the adoption rate, or the characteristics of the individual adopters (Rogers, 1995), with only recent studies focusing on the attributes of an innovation as a way to understand an individual's intention to adopt (Moore & Benbasat, 1991; Plouffe, Vandenbosch, & Hulland, 2001). This study contributes to the body of knowledge addressing the attributes of an innovation (relative advantage, trialability, compatability, observability, and complexity).

Based on adoption theory, faculty should be more likely to adopt distance education methodologies if it is recognized as better than traditional education, is compatible with their values, and the results of participation are clearly visible. In addition, if faculty members are given the opportunity to try teaching at a distance and it is not perceived as too complex, it will more likely be adopted. An additional construct addressing the role of peers the gatekeeper in the adoption process is included in this study.

Problem Statement

There is clearly a demand for online learning today (Everhart, 2000). Due to an increase in distance education course offerings over the past 10 years,

interior design educators may soon be pressured to provide design education through distance education methodologies. This study assesses the attitudes of individual interior design faculty members toward the development and delivery of distance education courses, using the attributes of an innovation as a framework in data collection and analysis. This study will aid higher education administrators and other educators to develop strategies to encourage the adoption of distance education as an alternative method of instruction.

CHAPTER TWO

Literature Review

Distance Education

Access to higher education has increased in the past 30 years (Abe, 1988), and the demand for education from formal institutions is greater than the economic capacity to supply them (Mani, 1988). Institutions of higher learning are under public pressure to become more accountable for their educational product and are looking for innovative solutions to meet this increasing demand.

The definition of distance education is continuing to change as the technology used in the delivery of education also continues to change. Most academics would agree that what separates distance education from other forms of education is its reliance on some form of mechanical or electronic communication (Dillon & Walsh, 1992). No universally accepted definition of distance education exists. Consistent with the definition used in the NEA survey (Abacus, 2000), the operational definition of distance education created by the researcher and used in this study is: Distance education refers to a process of instruction where the instructor and student are separated by time or place. More than half of the interaction is in the delivery of synchronous or asynchronous instruction via audio, video, and/or computer technologies.

History and Growth

Distance education has gained heightened awareness though it has a long history in higher education. In 1840, Sir Isaac Pitman, the inventor of shorthand, developed a way to provide correspondence courses by mail (Matthews, 1999). This development continued with the initiation of the United States Postal Service in the early 19th Century and its access across the country ("what's the difference", 1999). In 1892, William Rainey Harper directed the world's first university distance learning program at the University of Chicago (Sherron & Boettcher, 1997). The Industrial Revolution, World War I, and the invention of radio and television opened the arena to more educational opportunities, culminating in the use of computer communication in the last few decades (Moore, 1989). The United Kingdom's Open University, founded in 1969, marked a turning point for distance education with its multimedia approach to education (Matthews, 1999).

Since the late 1960s, acceptance of distance education has continued to grow. The United States Department of Education's report on distance education at postsecondary education institutions (National Center for Education Statistics, 1999) found "1,680 institutions offered a total of about 54,000 online-education courses in 1998, with 1.6 million students enrolled" (p. 4). This is still a fairly small percentage of students compared to the total number of students enrolled in traditional learning environments. However, the 2000 report from the Department of Education found 44% of higher education institutions offered some form of distance education in 1998. This is an increase from 33% reported

in 1995 (Weiss, 2000). A major external force influencing the development and dissemination of distance education courses is the change in student demographics. Today's younger college students have been surrounded by technology for most of their lives. The expectation of quick access to information at all hours of the day and night will increasingly drive the need for education and training on demand (Baird & Monson, 1992).

Instructional Technologies and the Internet

Distance education is being catapulted forward by the integration of technology into the curriculum. Technological developments used in distance education have the potential to revolutionize teaching and learning by enabling target groups to be reached and improving the overall quality of the educational experience (Bates, 1995). The synthesis of computers and telecommunications, the advances in fiber optic cabling, and the growing affordability of sophisticated technology tools increases the potential of delivering superior course content (Dede, 1989). The intention of web-based instruction is not to use technology simply as a substitute for face-to-face interaction or to deliver the same old course in a new way (Rickard, 1999), but as a tool for increased student learning.

The latest study by the United States Department of Education (Moore, 2000) reported institutions would be focusing their efforts on Internet technologies and two-way interactive video more than other forms of technology in the future. Currently, 54% of distance education courses rely primarily on video technology for the relay of instruction and 44% rely on web-based

technology (Abacus, 2000). Courses that rely primarily on the Internet as the medium of communication are often referred to as virtual courses or virtual education, as the form of interaction is often indirect and not dependent on time or place. Use of the Internet in course instruction may vary from having the course materials available on-line to making significant use of Internet technology for class instruction. Virtual courses that rely in some way on the Internet can be divided into three models: independent, collaborative, and broadcast (Russell, 2001).

In the independent model, learning is unscheduled. Also known as asynchronous communication, this model allows students to access the material and interact whenever they wish. Asynchronous communication involves the delivery of information between student and instructor but not at the same time or in the same place. Media often used for delivery of information include: telephone, facsimile, email, television, videotapes, audiotapes, videoconferencing, satellite broadcasts, Internet, and computer software. Advantages of this approach include its flexibility in providing access to the course material from many locations, allowing the student time to reflect, and being cost-effective as text-based asynchronous systems do not require high-end computers to operate (Mason, 1999). A disadvantage is the possibility for social isolation. Students taking distance courses expressed concern of not being able to mix with their peers when taking a distance education course (Eggen, 2000). Ninety percent of students who participated in distance education courses in Iceland in 1995 strongly agreed that there should be some face-to-face

communication in distance courses where they could meet the instructors for both educational content and for the personal contact (Jonasson, 1997).

The synchronous model requires collaboration and communication between students and faculty at prescheduled times. Access to materials may be 24 hours a day, seven days a week, but class participation is at specified times. Synchronous communication occurs when the instructor and the student are both present at the time of instruction, even if they are in different geographical locations. Two forms of synchronous communication are videoconferencing and video animation. Synchronous communication has advantages such as real-time interaction or telepresence, a means to motivate the student to keep pace with the group, and the ability to provide timely feedback from the instructor to the student or between students (Mason, 1999). The expectation in traditional education is that the instructor will provide the information and an appropriate interpretation of that material (Anderson, 1997-98). In distance education, students are expected to take more responsibility for their learning and to collaborate with peers (Baldwin, 1998).

The final model is known as broadcast, in which students access previously recorded lectures on the Internet. This lecture-based form of instruction places little emphasis on feedback from the faculty member or interaction with the instructor and other students. Active participation is limited and time management is essential. The advantage of this model is the self-paced instruction that gives the student freedom to work on a personal time schedule. All forms of Internet instruction have advantages and disadvantages,

but in the end, the use of each depends on learning styles and the larger educational context (Mason, 1999).

Faculty Participation in Distance Education

The NEA study conducted by Abacus (2000) has shed light on faculty participation in distance education endeavors. This research firm compared feelings toward distance education by traditional faculty (n=130) and faculty who teach one or more distance education courses (n=402). The two groups were similar in their demographics, with distance learning faculty being full time (89%), tenured (73%), and holding a masters' degree (48%) rather than a Ph.D. (31%). Both groups were split evenly between full professors (35%) and lecturers and adjuncts (35%). Distance and traditional faculty are from similar academic disciplines, such as math, science, business, education, and arts.

Abacus (2000) noted that 86%of distance education faculty members developed their distance course from a traditional course. Traditional faculty members are less positive toward distance education endeavors (51%) than distance education faculty (72%). A significant portion (28%) of traditional faculty has no opinion about the benefits of distance education (Abacus, 2000). These faculty members are undecided and are waiting to see the impact of distance education on students, faculty, and institutions. In a related study by Betts (1998), 64% of faculty members, representing a variety of disciplines at a large United States (U.S.) university, stated they had never contemplated either teaching, co-teaching, or designing a distance education course. How do faculty

know that a particular pedagogical approach will work as well or better than the present approach? Faculty members want evidence of the success of distance education before making the effort required for potential transition (Duning, Van Kekerix, & Zaborowski, 1993).

Interior Design Education

The methodologies used when teaching at a distance are truly innovative and immersed in technology. Therefore, this instructional model may be unfamiliar and viewed as incompatible with the traditional teaching methods represented in disciplines such as interior design. Today's interior design education practices are based on the principles and instructional methods of the Ecole des Beaux-Arts. Known as both a style of design and a school of design, the Beaux-Arts approach focuses on personal instruction and criticism in addition to a high level of interaction between students and instructors. The cornerstone of the Beaux-Arts approach is the "design problem" given to each student at the beginning of the semester. The student follows steps to analyze the design problem and then continues to develop the design solution under the supervision of master artists and architects ("architecture", 2000). The design problem begins with sketching and ends in final rendered drawings. The final evaluation of the design project often consists of a juried exhibition and critique by invited architects and designers.

Unfortunately, this "school of fine arts" was not consistent in its teaching methodology. It did not provide basic instruction in paintings or graphics, but

catered to the advanced student engaged in official competitions (Boime, 1982). Formal instruction and theory were separate entities of education. In 1863, instruction shifted from the theoretical to the practical and from the private to the public (Boime, 1971). The Ecole des Beaux-Arts expanded its curriculum beyond elementary drawing instruction by dividing into two sections: painting and sculpture, and architecture.

The study of architecture has branched into various professions, one of which is interior design where the concentration is on the more intimately scaled aspects of design. An individual who practices the discipline of interior design is referred to as an interior designer. An interior designer "is qualified by education, experience and examination to enhance the function and quality of interior spaces for the purpose of improving the quality of life, increasing productivity, and protecting the health, safety, and welfare of the public" ("FIDER website", 2000).

Perpetuated by past experience, interior design educators continue to teach in the same format as in the Beaux-Arts tradition, even though there is no evidence to suggest that it is an effective means of instruction (Rapoport, 1984). The current models of teaching and learning in higher education are not used because they illustrate the "right way", but because the method has worked for a long time (Farrington, 1999). Change is being asked of the faculty in two ways. First, they are being asked to adopt new teaching tools. Second, they are being asked to alter the way in which instruction is delivered to the student and to change the form of interaction with the student (Dias, 1999).

Academic fields such as natural science and mathematics have been working with technology tools longer than other areas such as the arts and humanities (Baldwin, 1998). Lawn (1998) also found that disciplines in the arts lag behind the schools of business, engineering, and science in putting digital technology into effect in their curricula. Technology has demonstrated "a significant impact on the way art is taught, studied, and practiced" (Lawn, 1998, p. 56). As expressed in an article by Beaudoin (1990): "Well, those new techniques may work in some other disciplines, but they certainly won't in mine" (p. 25). Distance education may be seen as inappropriate to serve the interests of interior design and therefore faculty in this discipline may be reluctant to pursue the endeavor.

Attitude Change and Behavior Modeling

As indicated by the 28% of faculty in the NEA survey who remain undecided about distance education, there clearly remains a gap between the potential of web-based technology and its full utilization in higher education (Abacus, 2000). The study of attitude and behavior is a complex area of research. An attitude may be defined as a learned predisposition to respond to a given object in a consistently favorable or unfavorable manner (Fishbein & Ajzen, 1975).

As Triandis (1971) states, "attitudes are neither necessary nor sufficient causes of behavior" (p. 15). An individual's attitude toward a specific behavior is a function of the beliefs about the intended consequences of performing the

behavior. An individual's behavioral intention is determined by his attitude toward the innovation's perceived ease of use and awareness of its usefulness (Taylor & Todd, 1995). The practical utility of this variable is based on the fact that perceived usefulness and ease of use are issues under the individual's control (Taylor & Todd, 1995). In addition, the individual's evaluation of these possible consequences is taken into account (Vallerand, Deshaies, Cuerrier, Pelletier, & Mongeau, 1992) and the pre-adoption attitude is based primarily on indirect experience (Karahanna, Straub, & Chervany, 1999).

Research summarized by Millard and Bass (1991) identified attitude change as an obstacle related to the adoption of instructional technology into the curriculum. Attitudinal change is difficult to ascertain as it involves the personal beliefs of a person (Millard & Bass, 1991). Because learning is a relatively permanent change in behavior (Decker, 1986), the goal of implementing a behavioral modeling training program is to influence a person's attitude toward an innovation and encourage a change in subsequent behavior.

Bandura (1977) determined that human behavior is learned observationally through modeling that later serves as a guide for action. The emphasis is on vicarious learning, by which individuals learn by imitating others without receiving an immediate, observable reward. According to social learning theory, four processes govern observational learning (Bandura, 1977). Learning begins with attentional processes. These processes determine what behaviors are noticed and what information is extracted from these observations. Retention processes involve remembering previously observed behavior after the model is

no longer present to provide direction. The third component involves motor reproduction processes, or the conversion of symbolic representations into action. The final component involves motivation. Motivational processes of learning influence the adoption of modeled behavior. If the outcomes of the behavior are valued or rewarded, the behavior will be adopted (Bandura, 1977).

Behavior modeling research has been conducted on interpersonal relationships, corporate training, supervisory roles in business, and adult education (Buchanan & Badham, 1999; Nunns & Bluen, 1992; Gist, Rosen, and Schwoerer, 1988). Decker (1986) found that modeling is superior in training applications because demonstrations can be made both orally and in written format. In their study of 160 computer users, Simon and Werner (1996) determined that training with behavior modeling had a higher rate of user satisfaction than self-paced study or use of a lecturing format. A meta-analysis of 70 studies by Burke & Day (1986, as cited in Goldstein, 1989) demonstrated the effectiveness of behavior modeling as a training method.

Behavioral modeling involves three stages of applied learning: (1) presentation of the role behavior; (2) imitation of the modeled behavior; and (3) positive social reinforcement (Nunns & Bluen, 1992). These stages result in six basic learning states, which are: (1) new attitude; (2) manual skills, (3) social skills; (4) verbal skills; (5) cognitive skills; and (6) memory for factual material (Decker, 1986). Though all six states can be taught in training sessions, all programs of training attempt to have an affect on only one or more state.

Parry and Reich (1984) note several advantages to behavioral modeling, including the ease of learning. Learning by imitation places little demand on the instructor and learners because it is quick and easy. Because training done with this technique is rather structured, instruction is uniform. Well-designed training packages can be created to provide consistency between learning sessions within a set time frame. There are also disadvantages with this type of training. First, the models are simplistic and offer only one solution to a given situation. Second, training tends to focus on the process while ignoring the explanation of the underlying theory. Third, because modeling follows the same format without variation, learning is passive and monotonous. Therefore, the transfer of training may be weak. Even though participants may imitate the desired behaviors in training, they fail to apply these behaviors outside the training arena (Parry & Reich, 1984).

Rogers and Shoemaker (1971) believe the decision process of adopting an innovation begins "when the individual is exposed to the innovation's existence and gains some understanding of how it functions" (p. 104). The process of awareness and learning may occur through behavior modeling training because modeling is recognized as the major vehicle for transmitting innovative behavior in the process of diffusion of innovation (Bandura, 1977). The ability to model a behavior, such as teaching a design course with distance education methodologies, can be achieved through an experimental treatment. The opportunity to visualize this instructional model may influence an interior design educator's intention to adopt distance education.

CHAPTER THREE

Conceptual Framework

Diffusion of Innovations

The conceptual framework for this study is the diffusion of innovations. This is related to attitude change and behavior modification because an individual's beliefs and attitudes about an innovation (such as distance education) have bearing on the individual's decision process in adopting the innovation (Rogers and Shoemaker, 1971). Rogers (1995) defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). An innovation is a creative idea that works. It may be a process, product, method, or system. More than an idea, an innovation is a continuous process put to action. What makes diffusion different from communication in general is its focus on the acceptance process of the innovation.

The innovation of interest in this study is the development and use of distance education courses by interior design faculty members. According to Rogers and Shoemaker (1971), research in the area of educational innovation diffusion is not as prolific as in areas such as business and agriculture, and therefore, it is "rather difficult to count on what is known about the diffusion of educational innovations" (p. 58). Web-based education is known as a technological innovation because it is a new process adopted by institutions of higher education for their own use (Brown, 1981).

Rate of Adoption

One aspect of the diffusion of innovations is the time it takes for a person or groups of persons to adopt an innovation. This process begins with the period of time when the individual passes through the innovation-decision process. This process has five stages: (1) knowledge stage, when an individual learns of an innovation; (2) persuasion stage, which occurs when a favorable or unfavorable attitude toward the innovation is formed; (3) decision stage, when an individual engages in activities which lead to the adoption or rejection of the innovation; (4) implementation stage, which occurs when the innovation is put into use; and (5) confirmation stage, when reinforcement of the adoption decision is sought (Rogers, 1995).

The rate of adoption is the speed with which an individual or group adopts or starts using an innovation. An individual's perception of an innovation, not the innovation itself, affects an innovation's rate of adoption. Most innovations have an S-curve rate of adoption (see Figure 1). This is usually measured by the length of time (X-axis) with the percentage of individuals who adopt the innovation (Y-axis). As time increases, so does the percentage of adopters.

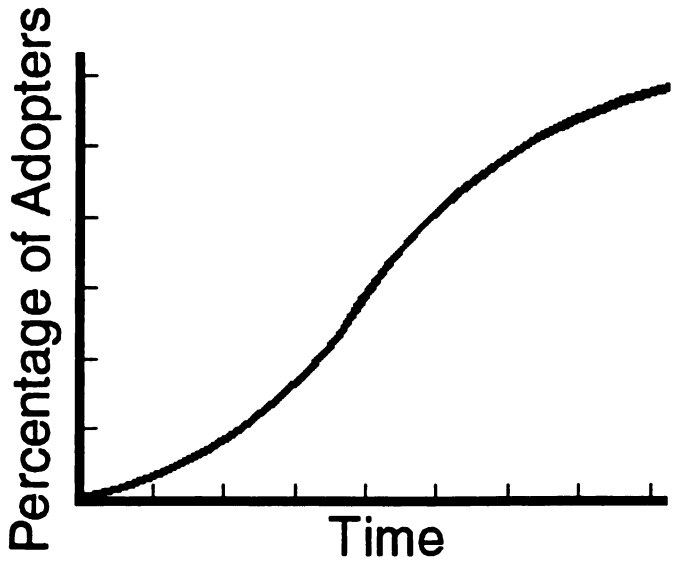


Figure 1: S-Curve Rate of Adoption

There is an obvious variation in the slope of the "S" from innovation to innovation and even with the same innovation but in different social systems. Rogers and Shoemaker (1971) analyzed diffusion research and found that one educational innovation (modern math) reached 100% adoption in five years, while another innovation (kindergarten) took 50 years. Of the 12 innovations studied by Mansfield (1961, as cited in Lowe 1995) from the iron, steel, railroad, brewing, and coal industries, nine of them took over 20 years to completely diffuse into their particular societies.

Attributes of an Innovation

Every innovation has unique characteristics that are perceived differently by every individual. These include relative advantage, compatibility, trialability,

complexity, and observability, which will be discussed in detail. Rogers *(1995)* states, "past research indicates that the attributes of an innovation are *the most* important characteristics of innovations in explaining the rate of adoption" (p. 16).

Rogers (1995) suggests the presence or absence of some of these attributes can predict whether it will be adopted and its rate of diffusion through the system. Karahanna et al., (1999) support this claim. Their research of information technology adoption found that potential adopters based their attitude on the innovation's characteristics. These attributes are not the only variables for determining the rate of innovation adoption, but they constitute an important component to adoption.

Of all the diffusion research, relatively little effort has been spent on the analysis of the innovation and how its properties affect its rate of adoption (Rogers, 1995). Rogers and Shoemaker (1971) found that much of the diffusion research literature is devoted to the studying of "people" differences based on innovativeness (i.e. the adopter categories) but little effort has been given to analyzing the "innovation" differences (i.e. the attributes of an innovation). The research done in this area has led to a standard classification scheme of the attributes of an innovation.

Another area important to adoption is an individual's intention to adopt. This is related to a person's attitude in which beliefs will predispose action (Rogers, 1995). An individual's behavioral intention to adopt an innovation (such as distance education) can be influenced by increased awareness of the innovation, the active seeking of information about the innovation, persuasion by

mass media messaging, an individual offering an opinion, or a group of peers who can offer social reinforcement (Rogers, 1995).

In addition to the attributes of an innovation, a person who can influence an individual's intention to adopt an innovation is the gatekeeper. A gatekeeper is someone appointed by an organization to oversee the allocation of resources, such as a chairperson or dean in higher education. They can either increase or decrease the rate of innovation diffusion.

Figure 2 illustrates the model for the study that suggests the attributes of an innovation, in addition to the gatekeeper, will influence an interior design faculty member's intention to adopt the innovation of distance education. Each model component will be defined and discussed in detail.

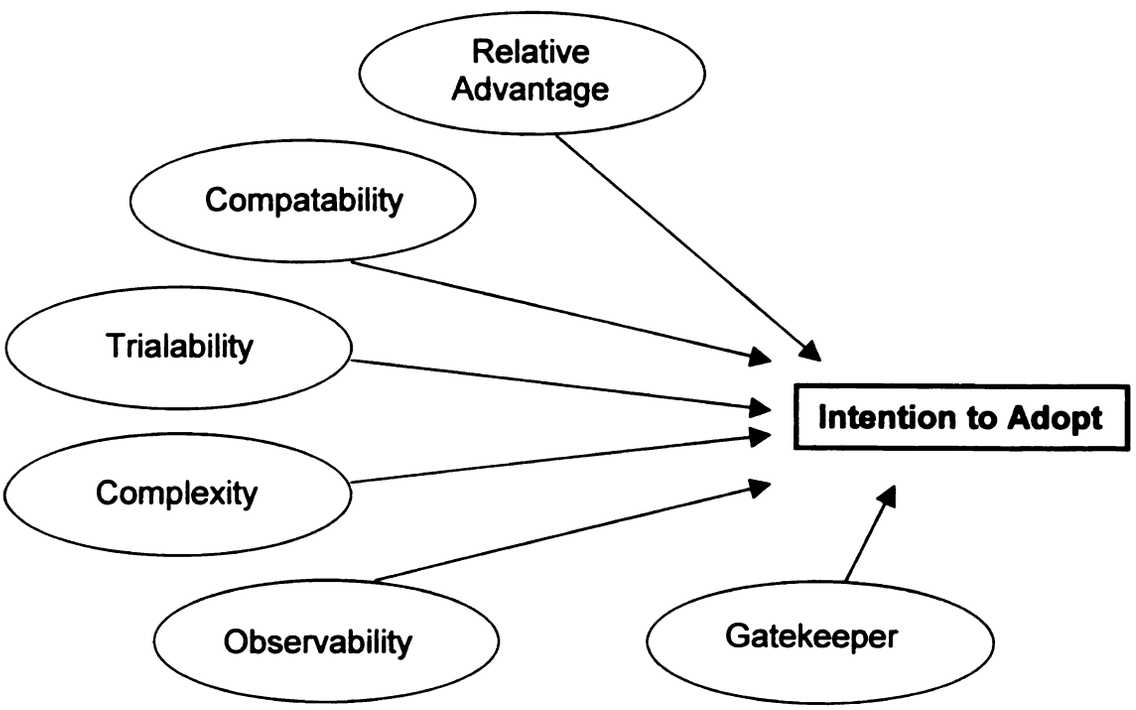


Figure 2: Variables Influencing the Intention to Adopt

Relative Advantage.

The first attribute related to an individual's intention to adopt an innovation is relative advantage. Relative advantage is the degree to which an innovation is perceived as better than the innovation that it may replace and is based on the perceptions of the individual.

Often expressed in economic profitability, the relative advantage of a new idea may be stressed by a crisis, either speeding up or slowing down the rate of adoption. For example, Sutherland (1959, as cited in Rogers & Shoemaker, 1971) concluded the labor shortage in World War II quickened the adoption of a cotton spinning innovation in England. Plouffe et al. (2001) found that consumers participating in a card-based payment system in Canada identified relative advantage as the most important characteristic leading to adoption. Likewise, Axin (1988) found relative advantage to be the single most significant indicator of firm export performance. Relative advantage may be seen as decreasing one's discomfort with the innovation, thus saving time and effort, lowering risk, and providing immediate rewards. The greater the recognized advantages of the new innovation, the quicker the innovation will be adopted. Relative advantage is positively related to the adoption of the innovation.

In academic settings, the acceptance of distance education as an innovation lies with the faculty. Many faculty members are realizing the benefits of teaching and learning at a distance. One benefit is the flexibility of scheduling for the instructor (Taylor and White, 1991; Landstrom, 1995). Though the fear of job loss is real (Carnevale & Young, 1999; Guernsey & Young, 1998),

respondents to the NEA survey (Abacus, 2000) believe the number of faculty jobs will not decrease, the quality of the instruction will not decline, and students will remain as candid in the distance classroom as they are in the traditional classroom. This study found that faculty members teaching a web-based course rated their web-based course significantly higher than their traditional courses (of the same subject matter) on these five items: (1) Providing access of information to students; (2) Assisting the students in mastering the subject matter; (3) Giving the students a high quality of course material; (4) Dealing with the variety of student learning styles; and (5) Assessing the course's educational effectiveness (Abacus, 2000). In research by Baird and Monson (1992), many educators who had taught distance courses found the experience better than their on-campus experience, both in course organization and student interaction.

Additional benefits include the accuracy and consistency of distance education instruction. All students viewing the lecture are guaranteed to receive the exact same course material, regardless of the instructional model implemented (Charp, 2000). All students get the same view of the professor and material, unlike the front row advantage in conventional classroom situations (Romiszowski, 1988).

On the other hand, faculty members may not be aware of the relative advantages of distance education, especially in the areas of time and workload. A distance education course that is delivered via the Internet takes more time to develop than a traditional course, often twice as much (Mason, 1999; Sherron & Boettcher, 1997; Gaud, 1999; Abe, 1988). Faculty members also agree that

teaching a distance learning course takes more time than teaching a traditional course (Abacus, 2000; Rickard, 1999; Mason, 1999). Over half (53%) of the respondents in the NEA survey (Abacus, 2000) spend more hours per week preparing and delivering their distance education course than they do for a comparable course taught in a traditional manner.

The individual assessment of students is another challenge faculty face regarding their time. Faculty members teaching a distance education course estimated they spent approximately 15 minutes per student, per week (Gaud, 1999). One hundred percent of the participants in Landstrom's (1995) study (n=20) found that the time spent grading assignments and exams in distance education courses was extensive. Faculty members also find it difficult to spend time learning new instruction tools (Lawn, 1998). Individual faculty member's interest in professional development of technology skills is low and often viewed as so labor intensive to learn that it wastes their time (Parker, 1997).

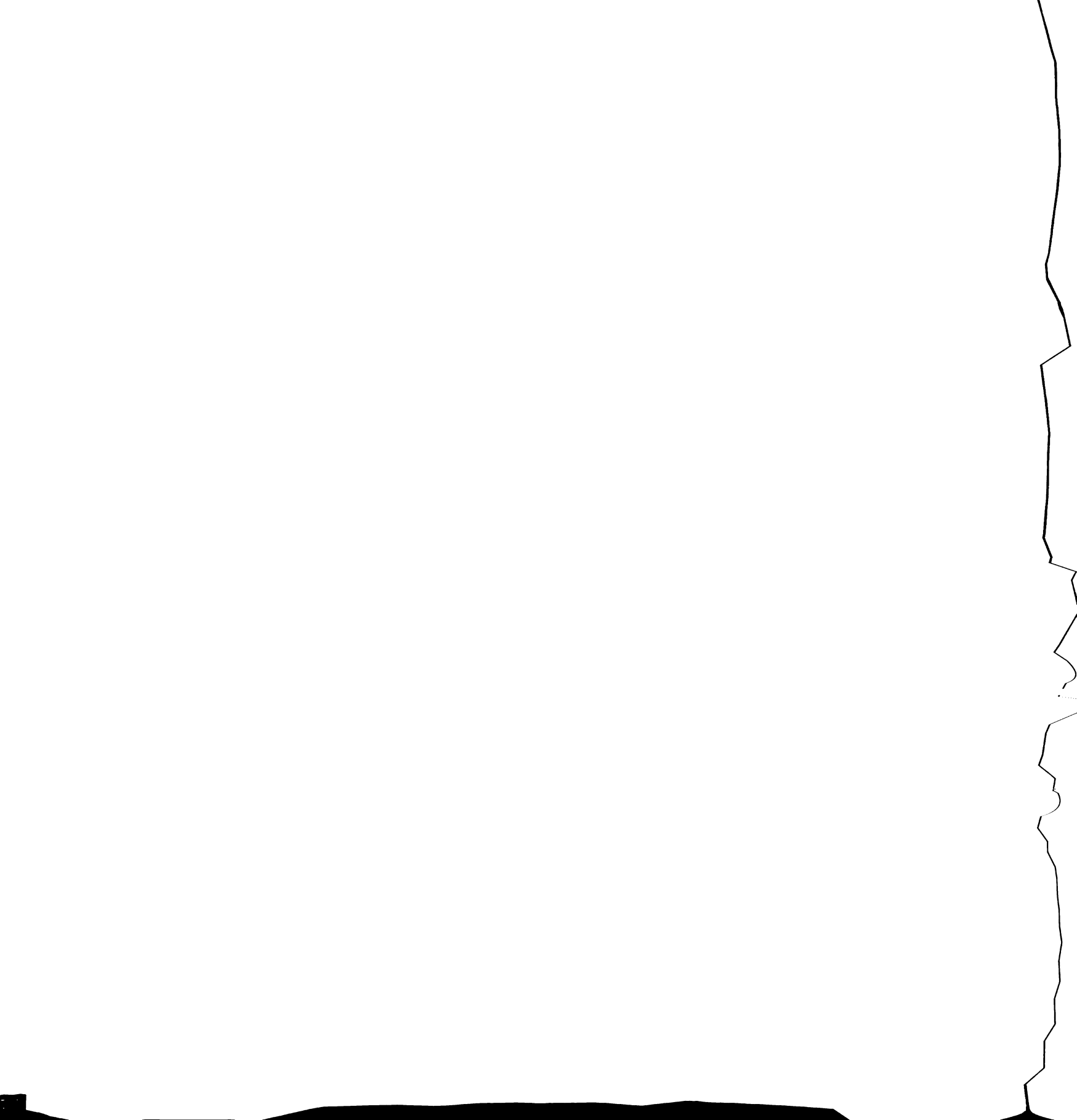
In addition to the time it takes to develop and teach a course, faculty have concerns regarding the weight and recognition of distance education on their workload. Workload is "the distribution of faculty effort and the outcomes of that effort over time" ("principles and guidelines", 1998, p. 5). Workload policies vary between and within institutions. Studies on faculty workload typically focus on average course loads, contact hours, and credit loads (Layzell, 1996). . It is believed that the distance education instructor will have a larger workload if multiple locations are involved in the instructional model (Willis, 1998). Workload policies for traditional campus courses are available. Policies for distance

education teaching workloads are either not included in university workload statements, or are unclear and ambiguous.

Compatability.

The second attribute of an innovation is compatability. Compatability, which is also positively correlated to the intention to adopt, involves the perception of consistency between the existing values, past experiences, and needs of the potential adopter. Innovations that are consistent with these values and norms will be adopted rapidly. Compatability makes the innovation more meaningful to the adopter because it ensures security and reduces risk. The question "Is distance education compatible with existing academic values and traditions?" must be answered by individual faculty members prior to adoption.

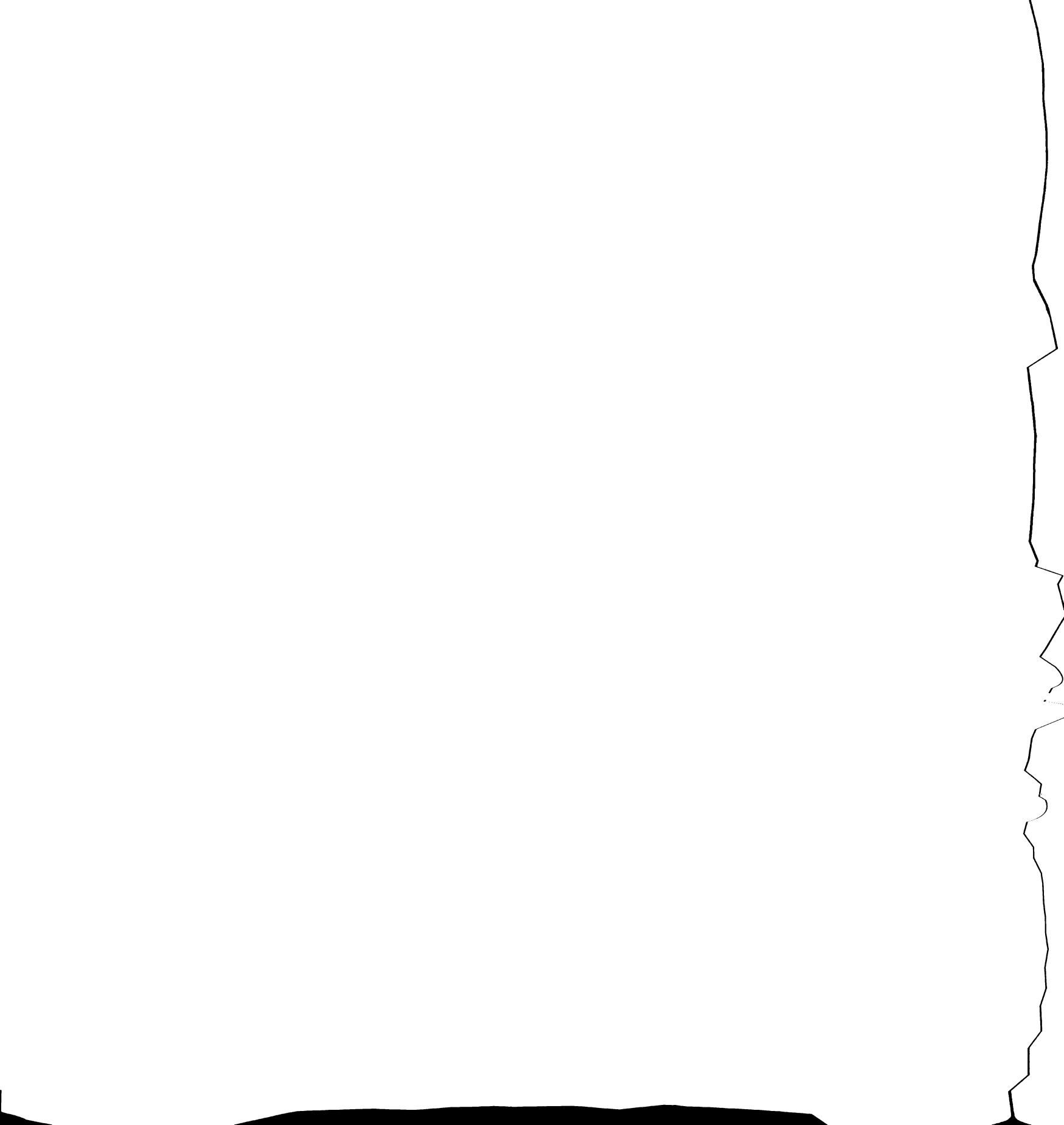
In addition to technology, another force pushing the move to distance education is the constantly changing demographics of the student body. Changes in the student population and the rapidly expanding technology provide ideal opportunities for colleges and universities to pursue the creation of distance education courses and programs. Distance education may be perceived as compatible with traditional education because it can address problems of scale, rarity, and cognitive learning styles. Students with unusual learning needs (i.e. English as a second language), students desiring courses in atypical subjects (i.e. Japanese), and students who have a more dominant visual learning style (Dede, 1989; Massy & Zemsky, 1995) can more easily be accommodated in distance education courses. Technology allows complex content to be conveyed



more effectively due to the integration of multiple representations of material such a computer animations with audio and video (Dede, 1989). The format and technology used in many distance education courses offer the faculty an opportunity to customize their courses to facilitate student learning styles, goals, and abilities while providing instruction on an "any time, any place" basis (Massy & Zemsky, 1995).

According to theory, distance education must be consistent with the existing values of faculty before it will be adopted. In dual mode institutions where distance education and traditional classroom classes are taught, faculty may suspect that distance education courses are not as rigorous as regular courses (Landstrom, 1995; Anderson, 1997-98). Mani (1988) found the curriculum content and evaluation methods were the same for many distance and traditional courses. Dillon (1989) found that 83% of faculty teaching university telecourses in the Oklahoma Telecourse Program believed they were of acceptable academic quality, with an equal or greater level of difficulty when compared to traditional on-campus courses.

Compatability may be affected by innovation negativism. Innovation negativism is the degree to which a previous innovation's failure conditions the receiver of the message to reject future innovations (Rogers & Shoemaker, 1971). This occurs when a previous innovation was not adopted or was discerned negatively. An example of this would be the failed attempts of technology, beginning when Thomas Edison first predicted in 1922 the motion picture was to revolutionize the process of learning and that it would surpass the

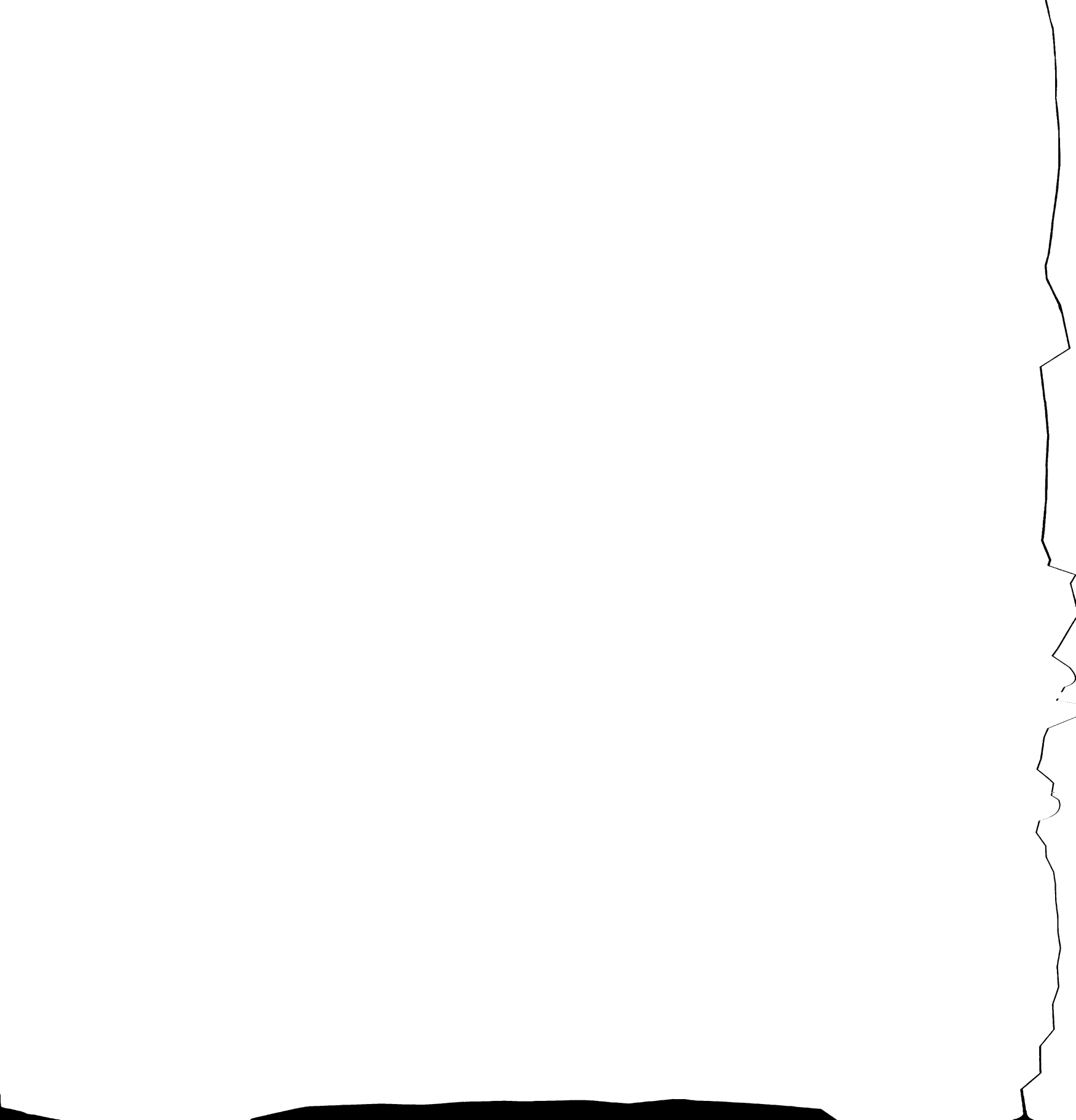


use of classroom textbooks (Bollentin, 1998). Since its advent in the early 1950s, television has not made as much of an impact on education as predicted. Television and the VCR that emerged in the 1980s were predicted to close movie theaters. Yet movie theaters still exist and are flourishing (Gandolfo, 1998).

Faculty work expectation may be incompatible with distance education methodologies since the professor's job description is so rapidly changing. Today's faculty member must be adept at facilitating students' learning by focusing on the process of quality instruction (Beaudoin, 1990). Michele Tolela Myers (2000), President of Sarah Lawrence College, wrote the "emergence of computers challenges us to know what our business is. We must respond that we are in the business of ideas, not information, of forming minds, not filling them" (p. A25).

As the "sage on the stage," the instructor is recognized as an information provider who lectures to a room full of students. With distance education, the instructor seeks to create an environment in which students discover the knowledge for themselves. This places the instructor in the role of navigator, coach, mentor, or the "guide at your side" (Denning, 1999). This forces the faculty member to go beyond his traditional role of lecturer and grader.

Yet faculty members see themselves as creators of the curriculum and content delivery experts, rather than mere managers of information. Faculty members who prefer "privacy in teaching and 'hands-on' involvement hesitate to use the new technologies" (Rose, 1982, p.14). The emergence of a "cyberprof" causes anxiety in many faculty members who fear that students will be



processed in a factory-like model where the faculty grades and makes telephone calls (Catchpole, 1992). Denning (1999) notes it is only a "matter of time until these technologies mature and become capable of automating important parts of what we now call coaching, facilitating and guiding" (p. 4).

Involvement in distance education may also lessen the much valued autonomy and independence of faculty. Faculty members value their autonomy (Gandolfo, 1998) and are "not easily persuaded to change time-honored pedagogies from which they themselves learned successfully" (p. 35). Teaching is seen as a solo activity in which the learning situation is driven by the force of the instructor's personality (Rose, 1982). Faculty teaching distance education courses may find they no longer have sole responsibility for creating instructional materials, organizing and supervising activities, and evaluating student performance. More likely, a team of instructors and specialists share various roles in the development of a distance course (Bers, 1999). This team approach may undermine the faculty members' control of the curriculum and their independence (Olcott & Wright, 1995), resulting in the fear that distance education will be truly distant (Moore, 1989).

Trialability.

Trialability is the third attribute of an innovation. Trialability is the degree to which an individual may experiment with the innovation on a limited basis. New ideas that are tried incrementally, on the installment plan, and as "pilot tests" are more likely to be adopted as they reduce anxiety and uncertainty.

Distance education pilot projects provide faculty with evaluation data for improving instruction and for determining the feasibility of implementing the course on a permanent basis. Spotts and Bowman (1995) propose faculty members and administrators need time and experience with an innovation (such as distance education) to incorporate these new ways of learning into behavioral patterns. Trialability is positively correlated with the intention to adopt.

Evidence suggests that faculty attitudes toward teaching with technology improve as they become more familiar with it and the process of teaching at a distance (Dillon & Walsh, 1992). To help faculty ease into distance education endeavors, many universities offer faculty development programs. Faculty development can be defined as the practice of improving faculty performance and opportunity for the faculty member to produce better work ("American", 2001; Gillespie, 1998). By providing faculty the opportunity to explore new technological applications and investigate alternative teaching methods, faculty can develop insights into designing their own courses.

Yet in many institutions, the opportunity for development and training is lacking (Murphy & Terry, 1998). A NEA survey found that there was a positive relationship between a high degree of technical support and whether a faculty member has positive feelings toward distance education (Abacus, 2000). Information specialists have been hired at many universities because faculty need more than basic computer training. They need advanced information and skills to keep one step ahead of the students and the competition. But if these information specialists are too busy to teach the faculty, the faculty members feel

lost and on their own (McCollum, 1998), decreasing the perception of *distance* education compatability.

Complexity.

The next attribute of an innovation is complexity, which is an innovation's degree of difficulty in usage and understanding. There is a continuum between simplicity and complexity on which all innovations can be placed. Some innovations are clear in their meaning while others are not. New ideas that are simple to understand are adopted more rapidly than ideas that require an individual to seek out new skills and understanding (Rogers, 1983). For example, Graham (1956, as cited in Rogers & Shoemaker, 1971) looked at the vastly different diffusion rates of television and the card game known as canasta. He found canasta to be more difficult to learn and an active, rather than passive, activity. The learning of canasta occurred through detailed personal explanation by other card players. On the other hand, television is a relatively simple idea that only required the ability to turn a knob. In the case of distance education, technical systems must work efficiently and be easy to understand in order for faculty to focus on the instruction. Complexity is negatively correlated with the intention to adopt an innovation.

As higher education turns more to distance education, faculty members will be expected to have some degree of comfort with technology. While the written word and the use of textbooks are entrenched in traditional education, the use of instructional technology is being used to achieve instructional objectives at

a distance (Spotts & Bowman, 1995). Technology is a direct agent of *change* because it affects the way faculty members do their work and interact with their colleagues. In its broadest definition, technology is the application of science to a practical problem (Dalton, 1989).

E. Michael Staman (1990), Associate Vice President for Information Services at West Chester University, addressed the lack of technological progress in higher education, "the use of technology in pedagogic environments is not commonplace, and what momentum exists is developing at an excruciatingly slow rate" (p. 35). Murphy and Terry (1998) surveyed faculty members teaching in the college of agriculture at a land grant university as to their competency with distance education technology. Over 44% were not familiar with teaching methodologies used in teaching distance courses and were generally negative concerning their competence in producing appropriate instructional materials for these types of courses. In addition, of 306 full-time and part-time faculty members at Western Michigan University, only nine percent indicated knowledge of the instructional technologies utilized in distance education with six percent indicating experience with them (Spotts & Bowman, 1995).

The complexity of an innovation such as technology can also be a motivating factor. Research at Iowa State University (Stinehart, 1988) showed that technology, along with curriculum control, is a co-determinant in the faculty members' willingness to continue their initial distance education endeavors. Assisting faculty to integrate technology into higher education instruction is the

single most important information technology challenge ("the continuing challenge," 1999). Most campuses have information technology development programs and campus support centers where technology support personnel can be available during traditional and non-traditional hours. Faculty members rate technical support as significantly more important to the success of their course than the type of student or the type of educational institution (Abacus, 2000). Despite the negative connotation given to the labor-intensive technology needed in distance education courses, faculty respondents to the NEA survey gave higher ratings to library and laboratory facilities, and to the level of technical support provided by the institution than expected (Abacus, 2000).

Observability.

The next attribute of an innovation is observability, which is the degree to which the results of the innovation itself are not only visible and communicable to others, but the idea of the innovation is also visible (Rogers, 1983). Rogers (1995) illustrates the use of cellular phones as an innovation that is highly observable. If it is easy to observe the results, the innovation is more likely to be adopted. If an innovation is not easily seen or even described, adoption is hindered. For example, Rogers and Shoemaker (1971) report that pre-emergent weed killers sprayed on farmland before the weeds even appear were very slowly adopted. Why? There were no dead weeds that the farmers could show to their neighbors. Therefore, some innovations do not lend themselves to visible demonstrations. This is similar to distance education because a faculty member

cannot "see" student learning, but only the outcomes of that learning process. Observability is positively correlated to the intention to adopt.

Since observability focuses on the tangible results from distance education, these alternative technologies can provide a degree of motivation that is not present in traditional classroom instruction. One distance education instructor at the University of Windsor, interviewed by Landstrom (1995), felt that preparing a distance course forced him to view the course through the eyes of a student. He felt students who might otherwise be intimidated by the amount of unfamiliar material were better served in a distance education course because the material had to be accessible without an instructor present for explanation. Self-paced learning is enabled with distance education technology, due to a continuous assessment of student progress and learning. The instructional process is then transformed into a more outcome-oriented enterprise (Massy & Zemsky, 1995). Student advantages cited by faculty members involved in the Oklahoma Telecourse Program included the ability for students to see concrete examples of abstract concepts, the opportunity for the students to review programs more than one time, the ability to have a variety of viewpoints, and the ability to see the top names in the field of study (Dillon, 1989). Recent research has demonstrated that students educated in cyberspace learn as well as, or better than, traditional learners (Navarro & Shoemaker, 2000; "what's the difference", 1999; Russell, 1999; Smith, 1983, as cited in Whittington, 1987).

Student to student and faculty to student interaction can be a benefit of distance education. In the recent NEA survey, faculty members rated their web-

based courses on the same level with traditional courses when addressing the goal of developing student interactivity (Abacus, 2000). In addition, many students experience a higher intensity of participation than in the passive state of traditional lecture formats (Farrington, 1999). Beaudoin (1990) states that students who commute to campus one or two evenings a week, sitting anonymously in a classroom with 50 other students will have little interaction with the instructor, despite the close physical proximity. Off-campus students participating in distance education courses are more likely to develop a productive one-on-one relationship with the instructor due to periodic contact and detailed feedback. Faculty members involved in distance education endeavors feel their students are disciplined, highly motivated (Landstrom, 1995), and actively involved in the education process, rather than being passive recipients of information (Bellman, 1992).

The results and benefits of distance education may not be as visible or tangible as the examples mentioned previously. Concerns about the recognition of distance education in the faculty reward system can be considered a negative aspect of observability. Because the promotion and tenure system is an integral component of the traditional academic culture, there is a need to recognize and reward distance education efforts in the same manner as traditional teaching (Sherron & Boettcher, 1997). Yet distance education is rarely mentioned as an activity for which faculty members should receive promotion and tenure "credit" (Wolcott, 1997). In interviews conducted with 32 faculty members, Wolcott (1997) found that several faculty members (no number given) thought distance

teaching should be weighted more heavily than traditional classroom teaching in the promotion and tenure process due to the additional time it takes to create and teach a distance class. Gunawardena (1992) summarizes the biggest frustration of distance education faculty as "the lack of recognition for the amount of time and effort that goes into planning and teaching a distance class" (p. 70). Observable behaviors are limited by observing the people with whom one associates (Bandura, 1977). If distance education is not visibly recognized, the adoption process will be slow.

Gatekeeper

A gatekeeper is an individual who is empowered by the leadership of an institution to distribute resources and make decisions. The gatekeeper is often a person in authority who controls the access to resources. He is usually from a small group of individuals who have been empowered by their institution to make decisions. The concept of the gatekeeper as a role in organizations began with the social psychological research of Kurt Lewin in the mid-1940s. David Manning White then applied Lewin's theory to the field of communication (Divelbiss, 1981). Since that time, the term has been so widely used that it is now considered common jargon in a wide variety of contexts.

A necessary function of the gatekeeper is the dissemination of scarce resources. The gatekeeper has to select from a mass of detailed information a few items that are worthy enough to pursue, given the conditions of limited resources such as budget, available labor, and time (Divelbiss, 1981). If a

gatekeeper moves information or resources through an organization to *the right* person in a timely manner, he or she is viewed positively. On the other hand, if a gatekeeper retains information or resources in a negative way, he or she is considered a bottleneck in an organization's communication network (Rosner, 2001). For example, medical physicians must ration medical care to individual patients. By enabling some to receive care, other medically needy persons may not be granted access and therefore, will suffer the consequences of that denial (Reitemeier, 1991). Also in the field of medicine, Bodenheimer, Lo, and Casalino (1999) conducted a survey of chronically ill persons younger than age 65 and found that 22% were unable to see a specialist due to the primary care physician's role as gatekeeper.

The gatekeeper in higher education is often an individual in an administrative position. He serves the various needs of the institution, college, or department as a whole, as well as individuals in the faculty body. A department's program coordinator is important in determining the future direction of the program and its teaching innovation (Clark, 1993). The program coordinator must be an impartial decision maker who is objectively rationale because he schedules and approves teaching assignments, allocates financial resources, and determines which academic activities will receive support and which activities will be rewarded in the promotion and tenure system. In addition, these administrators can determine the extent of faculty training or re-tooling in the area of distance education (Olcott & Wright, 1995). After all, major innovations are often introduced as part of a top-down process (Lowe, 1995). On the other

hand, he or she is also the advocate and sponsor of the faculty's *interests* (Erickson & Shultz, 1982). Therefore, the gate swings in both directions. The gatekeeper experiences conflicting expectations due to his double function as both advocate and judge.

The role of the gatekeeper in the adoption process is to make key decisions about which innovations to diffuse, how to diffuse them, and to whom (Rogers, 1995). As centralized authority figures, university administrators make the decision for a faculty member to teach a distance course. Dalton (1989) states that this "edict-from-on-high approach typically generates fear and anger" in the faculty (p. 20). Faculty dislike the idea of administration planning and developing a technology-based instructional program without consulting with them, as witnessed in the failure of the State University of Nebraska project in the early 1970s (Millard & Bass, 1991). This project failed because the faculty members were all but ignored, thus limiting the involvement and subsequent support of the academic community. Seven percent of faculty participating in a study by Clark (1993) expressed their doubts about distance education based solely on a distrust of university administrators. The result is that faculty members feel administrators are telling them how to teach and how to do their job, when the effort may be simply to assist or advise them (Beaudoin, 1990). As Staman (1990) states "integrating technology into the curriculum is not an administrative process. It is a faculty process which requires a great deal of administrative support" (p. 36).

Faculty members recognize the important role of the administrator and wish to see this group commit to distance education before the faculty agree to participate. Administrative support was critical (p <.001) to 168 faculty members implementing technology in their teaching at a Midwest state university (Gueldenzoph, Guidera, Whipple, Mertler, & Dutton, 1999). Faculty members may be reluctant to expend their time and energy on an endeavor that will be discarded in a short time. They may remember the experimental distance education projects started in the 1980s and 1990s that were not continued after external funding ceased (Laaser, 1988; Eggen, 2000).

Summary

Distance education is a momentous reconfiguration in higher education instruction and has triggered interest and motivation on one hand, and conflict and opposition on the other. Motivated by individual faculty self-interest and organizational concern, faculty members from all disciplines are struggling with of how to appropriately utilize technology and distance education methodologies in the education process.

The five attributes of an innovation from Rogers' (1995) diffusion of innovation can be combined with the role of the gatekeeper to assess the attitudes of interior design faculty members toward distance education. Social learning theory and behavioral modeling provide the framework for an experimental treatment. The experimental treatment consists of a brief audio and video presentation on CD-ROM that demonstrates how an interior design

course can be taught with distance education methodologies. This treatment is intended to influence a faculty member's intention to adopt distance education.

CHAPTER FOUR

Method

This chapter presents the full study design, methodology, instrumentation, data collection procedures, statistical analysis design, hypotheses, and research questions involved in investigating interior design faculty member's perceptions of distance education. An experimental treatment for a Solomon four-group experimental design was developed, and administered to the sample by the researcher. The sample included higher education interior design educators teaching in the U.S.

Sample

The sample included faculty members from the Interior Design Educators Council (IDEC) organization. Founded in 1963, IDEC is devoted to the promotion of education and research in interior design. IDEC concentrates on strengthening the avenues of communication between interior design educators and interior design practicing professionals ("IDEC website", 2001). At the start of this study in September 2001, 514 members residing in the U.S. were included in this population. Participation in this study was voluntary. The protocol for self-selection is described in the following procedures.

Instrument

This study utilized an experimental design format that will be discussed in detail. A survey instrument served as both pretest and posttest evaluation. Faculty members were invited to add written comments. Requested demographic variables included age, membership in professional design organizations, years of teaching experience, gender, ethnicity, and the type of institution at which they taught.

The survey instrument focused on the attributes of an innovation as described in Rogers (1995) and Moore and Benbasat (1991). These attributes and the number of measurement items are: relative advantage (3); compatibility (3); trialability (3); complexity (4) and observability (7). Due to its established link in the learning and adoption process, perception of the gatekeeper (4 items) was also measured. Finally, an additional construct, intention to adopt (4 items), was included in the instrument to "capture the respondent's sense of urgency to formally adopt the innovation" (Plouffe et al., 2001, p. 69). Individual measurement items are provided in Appendix A. Comments on distance education were also solicited from participants.

All items were presented on a seven-point Likert-type rating scale ranging from *strongly disagree* (1) to *strongly agree* (7). The items related to the attributes and intention to adopt were developed and extensively tested by Moore and Benbaset (1991) and modified by Plouffe et al. (2001). The reliabilities for each attribute (Moore & Benbaset, 1991) and for the intention to adopt (Plouffe et al., 2001) are listed in Table 1.

Table 1: Reliability of Variables from Original Instrument	
Relative Advantage	0.92
Compatibility	0.83
Complexity	0.80
Trialability	0.71
Observability	0.73
Intention to Adopt	0.95

Based on the literature, measurement items were created by the researcher to assess the perception of the gatekeeper. The items and the definition of the gatekeeper were presented to 22 faculty members in design-related disciplines for content analysis. After the initial analysis phase, one gatekeeper item, which had both the dean and the program coordinator listed in the same statement, was divided into two separate items. The second phase of analysis was conducted with 15 graduate students in the field of education. All items achieved inter-rater reliability with 63-85% of respondents (see Table 2).

Table 2: Content Analysis of Gatekeeper Measurement Items			
	Phase 1	Phase 2	Measurement Item
1	95.2%	75.0%	I am worried there may be a lack of support for distance education by my dean.
2		84.6%	I am worried there may be a lack of encouragement from my program coordinator.
3	77.8%	63.6%	I worry that my program coordinator's commitment to distance education initiatives will wane as time goes by.
4	53.3%	84.6%	I am concerned about the lack of release time/compensation awarded by my program chairperson to adequately develop a distance education course.

Experimental Treatment

The treatment consists of an automated instructional presentation on CD-ROM (created by the researcher) to demonstrate the process and technology used in the instruction of a distance education interior design course. An existing interior design course at Michigan State University, entitled Computer-Aided Design and Structural Systems, utilizes a high degree of web-based technology and was used as an example of how an interior design course could be conducted at a distance (Bender, Vredevoogd, & Witt, 2002). The content of the treatment begins with a listing of the advantages and disadvantages of teaching a traditional design studio. The focus of the treatment is a process for using distance education methodologies in teaching a design studio course. This includes a four-step student process for completing the weekly design assignment, converting the assignment to image format, and uploading it to the course website. Then there is a five-step faculty process that is used for compiling all student assignments into one presentation file, creating an audio critique file, and uploading both files to the course website. Finally, there is a two-step student process where the student downloads and reviews the presentation and critique files to make changes to his design solution. The treatment concludes with a short list of student and faculty advantages for using distance education as the instructional model for teaching interior design studio courses. See Appendix B for slide illustrations. The development of this instructional presentation represents one application of behavioral modeling.

Experimental Design

The Solomon four-group design (SFGD) is a true experimental design. To qualify as a true design, random assignment of subjects to each of the four groups must be involved (Gay, 1996). The SFGD combines the pretest-posttest control group design and the posttest only control group design (see Table 3). Four groups are formed: two groups are premeasured (one control and one experimental) and two groups are not premeasured (one control and one experimental).

Table 3: Solomon Four-Group Experimental Design

GROUP	PRETEST	TREATMENT	POSTTEST
G1	Pre-Tested	Treatment	Post-Tested
G2	Pre-Tested	No Treatment	Post-Tested
G3		Treatment	Post-Tested
G4		No Treatment	Post-Tested

The SFGD has been used with success in fields such as drug abuse resistance education (Dukes, Ullman, & Stein, 1995), effects of newly relocated nursing home residents (Haight, Michel, & Hendrix, 1998), assertion training (Aschen, 1997), band students and the integration of students with disabilities (Johnson & Darrow, 1997), and hope and humor (Westburg, 1999). The SFGD eliminates nearly all sources of internal and external invalidity. Threats to internal and external validity that are minimized by the SFGD are: history, maturation, testing, instrumentation, regression, selection, mortality, selection interactions, pretest-X interaction, and multiple-X interference (Gay, 1996). Gay (1996) also states that this design increases generalizability. As summarized by Michel and Haight (1996), the process of pre-and post-measurement reduces between-

subject variation, "increasing the power of the study to detect true *intervention* effects" (p. 367). If a posttest only design is used, the risk of a pretest effect is eliminated but the amount of change is unknown (Eckhardt & Ermann, 1977). By combining the two designs together into a four-group design, interaction effects can be revealed and controlled. These may include effects of selection, maturation, instrumentation, regression, sampling, and treatment (Eckhardt & Ermann, 1977) that could limit the generalizability of the study (Walton Braver & Braver, 1988). Though considered a strong design, SFGD has been underutilized for reasons such as its complexity, little research in pretest sensitization effects, the need for a larger sample size, and the lack of certainty concerning the stages of analysis (Walton Braver & Braver, 1988).

Procedure

This procedure was reviewed and approved by Michigan State University's University Committee on Research Involving Human or Animal Subjects (UCRIHS). Interior design faculty members who do not use distance education methods were the target sample for this study. Initial correspondence was sent to 514 IDEC members residing in the United States to explain the study and to request their participation (see Appendix C). The mailing list was provided to the researcher from IDEC in August 2001. The procedure and timeline for the execution of this experimental design is shown in Table 4. A self-addressed, stamped postcard was included on which the potential participant indicated his willingness to participate in the study (see Appendix C). As participation

postcards were returned, email addresses and other information were input into a spreadsheet to prepare for division into the four groups. Participating respondents were randomly assigned to one of the two experimental groups or the two control groups by using a table of random numbers.

Table 4: Timeline for Experimental Design Procedure	
9/08/01	Request participation from all IDEC members via postcard
10/20/01	Randomly distribute participants into four groups
10/22/01	Mail pretest to Group 1 and Group 2
11/12/01	Email reminder to Group 1 and Group 2
11/14/01	Mail treatment and posttest to Group 1 and Group 3 Mail posttest only to Group 2 and Group 4
12/12/01	Email reminder to all groups; postcards to unknown emails
1/22/02	Email second reminder to all groups
2/01/02	Begin data analysis

Directions for completing the questionnaire, the treatment presentation on CD-ROM, instructions for watching the treatment presentation, a self-addressed stamped return envelope, and a hard copy of the presentation were all provided to the participants. Responses were kept confidential. The questionnaires were coded for tracking purposes only, in order for group identification and the electronic mailing of reminders. Each participant kept the CD-ROM presentation.

Hypotheses and Research Questions

H_1: Interior design faculty members who are administered the experimental treatment will exhibit higher overall posttest scores on all seven variables than faculty members who are not administered the experimental treatment.

H_2: Interior design faculty members who are administered the pretest and the experimental treatment will exhibit higher posttest scores on all seven variables than faculty members who are not administered the pretest or the experimental treatment.

H_3: Interior design faculty members who are not administered the pretest but are administered the experimental treatment will exhibit higher posttest scores on all seven variables than faculty members who are not administered the pretest or the experimental treatment.

H_{4a}: Relative advantage will be a significant predictor of an interior design faculty member's intention to adopt distance education.

H_{4b}: Compatability will be a significant predictor of an interior design faculty member's intention to adopt distance education.

H_{4c}: Trialability will be a significant predictor of an interior design faculty member's intention to adopt distance education.

H_{4d}: Complexity will be a significant predictor of an interior design faculty member's intention to adopt distance education.

H_{4e}: Observability will be a significant predictor of an interior design faculty member's intention to adopt distance education.

H_{4f}: Gatekeeper will be a significant predictor of an interior design faculty member's intention to adopt distance education.

Two research questions are created to determine whether interior design educators' attitudes of the study variables are consistent with the results from

past diffusion research. The first research question states that regardless of exposure to the experimental treatment, relative advantage, compatability, trialability, and observability will have a positive relationship with the intention to adopt distance education. The second research question states that regardless of exposure to the experimental treatment, complexity and gatekeeper will have a negative relationship with the intention to adopt distance education.

CHAPTER FIVE

Results

Sample and Procedure

Participation for this study was solicited from the 514 members of IDEC teaching in the U.S. One-hundred fourteen faculty members self-selected to participate in this study for a response rate of 22.2%. At various stages of the study, 47 faculty members discontinued participation. Sixty-seven participants returned usable surveys for a final response rate of 13.0%.

Surveys were logged as they were returned between September 8, 2001 and February 1, 2002 (see Table 5). Each returned survey was examined for accuracy and completeness. Respondents with missing data were excluded from analyses involving those missing data.

Table 5: Participants by Experimental Group

Group	Original N	Completed Study
Group 1 (O_1, X, O_2)	29	10
Group 2 (O_1, O_2)	28	14
Group 3 (X, O_2)	29	19
Group 4 (O_2)	28	24
Total	**114**	**67**

Sample Demographics

Demographic data requested of participants included age, membership in professional design organizations, years of teaching experience, gender, ethnicity, and type of institution where they taught (see Table 6). The majority of participants were between 51 and 60 years of age (37.3%), female (68.2%), Caucasian (93.9%), hold a master's degree (55.2%), and teach in a four-year

institution (76.1%). The average participant has over 13 years of combined part-time (2.7 years) and full-time (10.6 years) teaching experience and is a member of one or more professional design organizations. The 24 participants who completed the pretest but failed to complete the study have a similar demographic profile. Two participants in group one and seven participants in group two completed no part of the study.

Table 6: Participant Demographic Data		
Demographic	Frequency	Percentage
Type of Institution		
2-year	12	17.9
4-year	51	76.1
Neither	3	4.5
Missing data	1	
Highest Degree Acquired		
Bachelor's	10	14.9
Master's	37	55.2
Doctoral	16	23.9
Other	3	4.5
Age		
Under 40	13	19.4
41-50	22	32.8
51-60	25	37.3
61 or Older	6	9.0
Gender		
Male	19	28.8
Female	45	68.2
Missing data	1	
Ethnicity		
Caucasian	62	93.9
Hispanic	2	3.0
Asian American	1	1.5
Other	1	1.5
Missing data	1	
Professional Organization Membership		
IDEC	67	100
AIA	6	9.0
ASID	26	38.8
IIDA	24	36.4
Other	15	22.4

Instrument Reliability

Reliability tests were performed on instrument constructs to represent as much measurement accuracy as possible. Cronbach alpha was used as a statistical method for determining internal consistency and item-by-item reliability on posttest data (n=67). The reliability coefficient for each variable is presented in Appendix A.

Data Analysis and Hypothesis Testing

Inferential statistics were used to analyze the data. An alpha level (level of significance) of .05 was used throughout data analyses. Statements phrased in the negative were recoded for analysis. The data for each subscale were first analyzed using descriptive procedures. With the exception of gatekeeper, that had a mean of 2.65 using posttest data, the overall means for all other variables ranged from 3.49 to 4.33 (see Appendix D). With a neutral point of four in the seven-point Likert scale, responses to these variables had no strong direction. Interior design faculty members neither strongly agreed nor strongly disagreed with the various aspects of distance education.

The first stage in the analysis of the SFGD is to examine pretest sensitization. Simply taking the pretest may change a person's attitude (Solomon, 1949). Therefore, it is desirable to detect and control premeasurement effects that could threaten the validity of the experiment (Haight et al., 1998). The existence of pretest sensitization can be determined by conducting a 2 x 2 between-groups analysis of variance (ANOVA) of all posttest results. Shavelson (1996) notes that the use of the ANOVA will determine

"whether any combination of the treatment groups is significantly different from any other combination" (p. 378). The two independent variables are the control/experiment variable (i.e. treatment occasion) and the pretest/posttest variable (i.e. test occasion). It is acknowledged that using individual ANOVAs for each variable increases the likelihood of Type II error. Results of this initial ANOVA on posttest scores produced *F*-scores that were low (relative advantage 0.291; compatability 1.186; trialability 0.251; complexity 0.135; observability 2.063; gatekeeper 1.383; intention to adopt 0.315). Probabilities were consistently greater than .05 for each of the seven variables. There was no significance at this stage. Therefore, a premeasurement effect does not exist and the analysis can continue.

The second stage of SFGD analysis proposed by Walton Braver and Braver (1988) is the examination of the main effect of the intervention in the previous ANOVA to determine whether there is a treatment effect (H_1). See Table 7 for treatment effect results. Relative advantage (p = .026) was significantly higher after treatment than prior to treatment. Interior design educators could see the benefit using distance education to improve the quality of instruction, enabling them to teach students more effectively. No other variables reached a satisfactory level of significance. Therefore, the hypothesis that subjects administered the experimental treatment would exhibit higher overall posttest scores on all seven variables was not supported.

Table 7: Treatment Effect Results Using Posttest Data					
	Pretest	**No Pretest**	**MS**	**F**	**Sig**
Relative Advantage			10.506	5.174	.026*
Treatment	4.4000	3.7193			
No Treatment	3.1429	3.3056			
Compatability			4.408	1.828	.181
Treatment	4.3667	4.3667			
No Treatment	3.3333	3.3194			
Trialability			.039	.018	.894
Treatment	3.6000	3.8947			
No Treatment	3.6429	3.7500			
Complexity			1.568	1.439	.235
Treatment	3.5250	3.9342			
No Treatment	4.2262	3.8785			
Observability			.182	.186	.668
Treatment	3.9286	4.5564			
No Treatment	4.0510	4.2143			
Gatekeeper			.093	.049	.826
Treatment	3.7250	4.7588			
No Treatment	4.3393	4.3021			
Intention to Adopt			4.239	2.534	.116
Treatment	5.000	4.3158			
No Treatment	4.0357	4.2188			

ABBREVIATIONS: MS, Mean Square, F, Fisher's *F* ratio; Sig, Significance
NOTE: $*p < .05$

If the treatment effect test shows no significance, the analysis continues to the third stage of SFGD analysis (H_2). At this stage, the researcher has the choice of three tests to perform on the premeasured groups: a two group analysis of covariance (ANCOVA) on the posttest scores, covarying the pretest scores; a gain score analysis in the form of a *t*-test between pre- and post-test scores; or a repeated measures 2 x 2 ANOVA with treatment and time as the two factors (Michel & Haight, 1996). The gain score analysis was chosen in an attempt to determine pre-post score difference for group one (pretest, treatment, posttest) and group two (pretest, no treatment, posttest). The intention to adopt variable achieved significance ($p < .05$). No other variables reached a

satisfactory level of significance. Therefore, the hypothesis that subjects administered the pretest and the experimental treatment would exhibit higher posttest scores on all seven variables was not supported.

Since the previous three stages of analysis yielded no significant results, the testing continues to the next stage (H_3). In the fourth stage of analysis, a *t*-test was performed on group three (treatment and posttest) and group four (posttest only). Similar to the analysis in stage three, this test is not very powerful because it omits half of the available data (i.e. groups 1 and 2). No variables reached significance at this stage of analysis. Therefore, the hypothesis that subjects not administered the pretest but administered the treatment would exhibit higher posttest scores on all seven variables was not supported.

A multiple regression analysis was used to compare the six independent variables (relative advantage, compatability, trialability, complexity, observability, and gatekeeper) against the dependent variable (the intention to adopt). Multiple regression analysis on posttest data had an adjusted R^2 value of .662 (see Table 8). Significance was achieved for compatability ($p < .000$) and trialability ($p < .001$). Interior design educators would pursue distance education endeavors if distance education fit their current teaching style and they had the opportunity to try and experiment with it. No other variables achieved a satisfactory level of significance. Therefore, hypothesis 4b that compatability would be a significant predictor of intention to adopt was supported. Hypothesis 4c that trialability would be a significant predictor of intention to adopt was also supported.

Hypotheses 4a, 4d, 4e, and 4f that relative advantage, complexity, observability, and gatekeeper would be significant predictors of intention to adopt were not supported.

Table 8: Multiple Regression on Intention to Adopt Using Posttest Data			
Variable	Beta	T score	Significance
Relative Advantage	.096	.770	.443
Compatability	.612	10.906	.000*
Trialability	.201	3.416	.001*
Complexity	-.097	-1.065	.290
Observability	.035	.421	.675
Gatekeeper	-.016	-.240	.811

NOTE: * $p < .001$

Research Question Analysis

There were two major research questions in this study. Both questions were created to determine whether the opinions of interior design faculty toward distance education were consistent with the findings of other diffusion of innovations research. Findings from the diffusion of innovations theory are based primarily on agricultural research (Rogers, 1995).

Looking at the Beta scores from Table 7, it is apparent that results from this study are in agreement with past diffusion research results. Relative advantage, compatability, trialability, and observability all have positive Beta scores. Complexity and gatekeeper both have negative Beta scores. Therefore, the two research questions that interior design educators' attitudes of the study variables would be consistent with past diffusion research were supported.

CHAPTER SIX

Discussion of Results

The purpose of this chapter is to present a restatement of the problem and an interpretation of the research findings. The conclusions regarding the research questions and hypotheses are summarily discussed. Participant comments relative to each variable are included where appropriate.

The purpose of this study is to assess the attitudes of individual interior design faculty members toward the development and instruction of distance education courses. It uses the attributes of an innovation as the conceptual framework for data collection and analysis and an experimental treatment to present the process of teaching interior design with distance education methodologies. This study investigates whether the attitudes of interior design educators change as a result of behavioral modeling (how interior design can be taught as a distance course). The study also looks at the consistency of interior design educator's attitudes toward an innovation with the theoretical findings of previous diffusion of innovations theory applications. This study is conducted with interior design educators who self-selected to participate. A Solomon four-group design and an experimental treatment comprise the methodology.

Summary of Results from Experimental Design

With the lack of research on educational innovations (Rogers & Shoemaker, 1971) and no evidence of research that directly addresses distance

education and faculty who teach in an area of the arts (such as interior design), it was imperative to select a strong and methodologically appropriate blueprint for data collection and analysis. The Solomon four-group design was selected because it has the precision of pretesting, as well as the potential for identifying an interaction between the pretest and the treatment. A post-test only design would be free of pretest sensitization but the interpretation of results would be limited. The SFGD gives explicit consideration to issues of reliability, validity, and generalizability (Gay, 1996).

The first hypothesis states that interior design faculty members administered the experimental treatment will exhibit higher overall posttest scores on all seven variables than subjects not administered the experimental treatment. The hypothesis is not supported by the data. The only variable to achieve significance for a treatment effect is relative advantage ($p<.05$). Faculty members who watched the presentation demonstrated stronger agreement that distance education would improve teaching quality and effectiveness and provide them more control over the teaching experience than faculty members who did not watch the presentation.

The greater the perceived advantages of distance education, the quicker it will be adopted (Rogers, 1995). Relative advantage has been found to be the most important characteristic leading to adoption (Axin, 1988; Ploufe et al., 2001) and the findings of this study support that claim. Overall, this study indicates interior design educators see a stronger relative advantage of distance education after watching a demonstration of how a design studio course could be taught

using distance education methodologies. The treatment addresses various advantages of teaching at a distance, such as the reduction of faculty workload by not having to repeat information to individual students, the use of available technology tools to speed the feedback process, and the continuance of quality education while serving an increased number of students. It should be noted, however, that while attained scores do not reflect support for the first hypothesis, educators watching the presentation (groups one and three) did score higher on the posttest measures for relative advantage, compatability, trialability, and intention to adopt than educators not watching the presentation (groups two and four). See Tables 10 to 16 in Appendix E for the listing of mean scores for each variable by group.

The second hypothesis states that interior design faculty members administered the pretest and the experimental treatment would score higher on all seven variables than faculty members not administered the pretest or the experimental treatment. The hypothesis is not supported. However, one variable, the intention to adopt, is significant (p=.04). Interior design educators who were administered the pretest and viewed the presentation on CD-ROM show an increase in their intention to adopt distance education as compared to faculty members who did not view the presentation.

As stated previously, the intention to adopt variable is included to get a sense of the faculty member's urgency to become involved in distance education. As behavioral intention is the direct determinant of an individual's behavior, the significance of this variable suggests interior design faculty members may pursue

distance education endeavors in the near future. Two measurement items have high mean scores, indicating faculty's recognition of the need for distance education (M=5.24) and their personal interest in using distance education (M=5.19).

The third hypothesis states that interior design faculty members who were not administered the pretest and were administered the experimental treatment would score higher on all seven variables than faculty members administered neither the pretest nor the experimental treatment. The hypothesis is not supported. Participants in group three who watched the presentation on CD-ROM stated higher mean scores for all variables (except complexity) than did participants in group four who did not watch the presentation. However, the difference between these mean scores was not large enough to be significant. It should be noted that the second and third hypotheses are largely dependent upon relative support of the data for the first hypothesis. Therefore, these hypotheses lack a certain degree of interpretive integrity on their own merit.

Hypotheses 4a – 4e state that the six independent variables (relative advantage, compatability, trialability, complexity, observability, and gatekeeper) would be significant predictors of the dependent variable, intention to adopt distance education. Hypotheses 4b (compatability) and 4c (trialability) were supported ($p < .001$). No other hypotheses were supported. These results indicate that an interior design educator who believes distance education methods could be applied to the education of interior design and has the

opportunity to test this instructional model is very likely to adopt the practices of distance education.

Summary of Results from Research Questions

The intention to adopt variable is included in this study to assess the participant's sense of urgency to formally adopt distance education. This variable bridges the gap between attitude and behavior so important in understanding the diffusion of innovations. From the multiple regression results between the intention to adopt and the remaining study variables (see Table 7), it is clear that interior design educators are in agreement with all aspects of an innovation's attributes, as described by previous diffusion of innovations research results. It should be noted that the Beta scores for relative advantage, complexity, observability, and gatekeeper are all close to zero, indicating a weak relationship. Discussion of individual variables will provide insight into faculty attitudes toward distance education.

Relative Advantage

The advantages of using distance education should theoretically decrease a faculty member's discomfort with the innovation. Participants in this study indicated a positive relationship between relative advantage and their intention to adopt distance education ($\beta = .036$). They believe the use of distance education will impact the quality and effectiveness of their teaching. One participant provides the comment, "I am currently doing a web-enhanced course and have

found it to be a positive experience - with challenges. I'm looking forward to doing a totally web course."

Compatability

Interior design educators perceive distance education as fitting their teaching style. Participants in this study indicate a positive relationship between compatability and their intention to adopt distance education (β = .612). Compatability is the consistency between existing values, past experiences, and needs of the potential adopter. The diffusion of innovations states that compatability should be positively correlated to an individual's intention to adopt.

Based on the high number of comments received in this study, interior design educators are concerned about the way distance education could be used to teach interior design. Gandolfo (1998) states that faculty who become involved in distance education may exhibit expressions of grief due to the loss of what is familiar, such as traditional teaching methods. One participant expresses his willingness to explore distance education for courses such as the history of architecture, design, and furniture. But he does not " see it replacing the majority of I.D. courses and art courses. Interior design is about people and their places/spaces; it is a creative and functional problem solving [process] at the same time; students and faculty need to 'feed' off each other." Another interior design educator does not believe studio courses are suitable for distance education delivery because the "person-to-person creativity enhancement would

be missing and the quality of the graphics are not adequate for an appropriate studio experience."

Trialability

Participants in this study indicate a positive relationship between trialability and their intention to adopt distance education ($\beta = .201$). Trialability is the degree to which an individual may experiment with the innovation on a limited basis. If interior design educators were trained in distance education methodologies and allowed to test them on a limited basis, distance education may be adopted more quickly. By providing the opportunity to explore new technological applications, investigate alternative teaching methods, and view or participate in a sample distance course, faculty could develop insights into designing their own courses. The experimental treatment utilized in this study did not provide the opportunity for participants to try teaching with distance education methodologies. One participant says he is "in the process of trying it now." Another interior design educator comments, "I'm willing to try."

Complexity

Participants in this study indicate a negative relationship between complexity and their intention to adopt distance education ($\beta = -.097$). Complexity is the degree to which an innovation is perceived as difficult to use or understand. Rogers (1983) states that ideas that are difficult to understand are

adopted slowly. According to the diffusion of innovations, the attribute of complexity should be negatively correlated with adoption intention.

The process of distance education often involves technology that may be unclear or difficult to use. One participant in the current study comments, "My major concern is getting and understanding and dealing with the glitches of technology." Research at Iowa State University has shown that technology is one of the determinants for faculty willingness to continue their initial distance education endeavors. The use of the computer enhanced the distance experience for the NEA faculty participating in distance education (Abacus, 2000). This suggests faculty who are adequately trained in technology would be most satisfied teaching a web-based distance education course.

Observability

Observability is defined as the degree to which the results of the innovation itself are not only visible and communicable to others, but the idea of the innovation is also visible (Rogers, 1995). Participants in this study indicate a positive relationship between observability and their intention to adopt distance education ($\beta = .035$). One participant writes, "I do see a very strong need for it" while another comments that she is interested but needs "to see more positive examples."

The experimental treatment created and administered in this study was an attempt at increasing the visibility of distance education in interior design. Faculty members had the opportunity to see the usefulness and application of

distance education in interior design, but not necessarily its consequences or impact.

Gatekeeper

Literature explains the dual role of the gatekeeper as both the advocate for the faculty body and the judge who administers limited resources. The gatekeeper, which in higher education can be a program coordinator or dean, is perceived negatively if he retains resources or prohibits the flow of information, creating a bottleneck in the department's or college's communication network (Rosner, 2001). Participants in this study indicate a negative relationship between the gatekeeper and their intention to adopt distance education (β = -.016).

Over half of both traditional faculty members (52%) and distance education faculty members (51%) participating in the NEA survey believe administrators to be the most forceful proponents of distance education (Abacus, 2000). Many comments arose in this study related to the role of program coordinators and deans in supporting faculty involvement in distance education. One participant states, "I would be willing to teach studio via distance education. However, I have no support from my department, colleagues, and chair. I really would be willing to get involved in distance education, but I have no support to accomplish this from my environment."

CHAPTER SEVEN

Conclusion

The purpose of this chapter is to provide a conclusion to the topic of interior design and distance education. The limitations of the study are addressed. Insight is given for increasing the adoption rate of distance education among interior design educators. Recommendations for future research are provided, along with concluding statements.

Limitations of the Study

The findings in this research should be interpreted in light of several study limitations. Issues of sample size and the design of the study limit the generalizability of the study's findings to other populations. Future replication of this investigation should attempt to address these limitations in order to acquire more generalizable results.

Sample Size

Even though the entire U.S. population of IDEC was solicited for participation in this study, individuals made the decision to participate. A self-selected sample risks bias. Because the demographic profile of the population of IDEC members is unknown (R. Brown, personal communication, February 25, 2002), it is assumed that this sample is representative of the population. For the experimental design, self-selected participants were randomly distributed into

one of the four groups, ensuring equal distribution of the accessible population into each group. In addition, all interior design educators are not necessarily members of IDEC and their opinions may differ from those presented in this investigation.

The study began during the fall semester, which is a busy time for educators in academe. A related limitation was the unexpected terrorist attacks in New York, Pennsylvania, and Washington D.C. on September 11, 2001. These events delayed delivery of the initial request for participation. Some participants received their letter four to six weeks after initial mailing. Therefore, the initial participation stage of this study extended longer than expected. These conditions may have negatively affected faculty members' willingness to participate in general. Another unfortunate issue related to the terrorist attacks was the anthrax threats that occurred from November 2001 to February 2002 (Parker, 2001). Individuals who agreed to participate early in the semester may have forgotten their commitment and disposed of the follow-up mailings for fear of opening mail from an unfamiliar source.

The validity of the statistical conclusions and the statistical power of the study would undoubtedly be stronger with a larger sample size. Use of the SFGD requires a large sample size, especially since stages three and four utilize data from only two of the four groups. Johnson and Leone, (1964, as cited in Haight et al, 1998) believe a group size of 45 in each group provides 90% power. This study was unable to achieve this sample size per group.

Attitude and Behavior

Bandura (1977) expresses concern that mere exposure to modeled activities may not result in observational learning. All aspects of modeled behavior may not be observable. If observed, the behavior may not be retained for any length of time. The 15-minute treatment used in this research combines instruction with exploration, which is part of the behavioral modeling approach (Simon & Werner, 1996). Harrison (1992) conducted an experimental design concerning cultural assimilation by employees in a U.S. military agency and found no significant relationship between the length of training and resultant behavior. In Harrison's (1992) research, the first group received behavioral modeling training; the second group watched videos; and the third group received no training. Participants reacted favorably to receiving any training, regardless of the training approach and format utilized, as opposed to receiving no training at all. Harrison (1992) concluded that watching videotapes alone was all that was needed for some learning to occur. The groups receiving the experimental treatment in this study had no opportunity for practice and feedback on the material presented. Due to design limitations, it was not possible for the researcher to travel across the U.S. to provide training sessions on the use of distance education methodologies in interior design. The integration of a training component in the experimental treatment may have increased the treatment effect.

Study Design

Moore and Benbaset's (1991) scale development process for the attributes of an innovation resulted in the formation of both a long list and short list of measurement items. This study utilized the short list of items in order that the questionnaire not appear long and intimidating to participants. Using the long list of measurement items should increase the reliability of each variable. Therefore, it is recommended that further research be conducted with this longer list of measurement items.

The exposure to identical testing conditions was not possible as experimental and control subjects were not tested simultaneously. A time lapse of almost four weeks occurred between administering the pretest to groups one and two and administering the posttest to groups three and four. Therefore, it is assumed all participants were exposed to similar environmental conditions but at varying times. Aschen (1997) experienced a similar situation in her analysis of patients in an assertive training therapy study. It is presumed that a tighter time window would have maintained the faculty's interest in and awareness of the study, resulting in a higher number of completed posttests.

Recommendations for Future Research

Distance education is truly an innovative approach to teaching interior design. Its impact on higher education as a whole and faculty members in particular remains unclear. Research is needed in various areas related to faculty attitudes toward distance education. First, investigating variations in

training methods to affect faculty attitudes toward distance education would be beneficial. Behavioral modeling involves three stages of applied learning: (1) presentation of the role behavior; (2) imitation of the modeled behavior; and (3) positive social reinforcement (Nunns & Bluen, 1992). Research on persuasive techniques that utilize one, two, or all three stages of behavioral modeling could provide insight into effective attitude change strategies.

Second, longitudinal research should be done on the retention rate of attitude change and an individual's intention to adopt distance education. By contacting the study participants with a positive attitude toward the intention to adopt distance education at a later date, one could see whether they had adopted it. Another related study could be conducted with interior design faculty members who currently utilize distance education methodologies in their teaching. Comparisons between their perceptions of an innovation's attributes and the perceptions of the current study participants would make a distinction between pre-adoption and post-adoption beliefs, as evidenced in research by Karahanna et al. (1999) and Plouffe et al. (2001).

Third, further investigation is needed on related factors that could impact a faculty member's pursuit of distance education (Karahanna et al., 1999; Mathieson, 1991). Exploration of whether the initial adoption decision would be voluntary or forced upon the individual is another area that was neglected in this study and deserves further research. Assessing the attitudes of interior design faculty toward distance education and including variables emphasized in the

theory of planned behavior (Ajzen, 1985), should be more fully explored with this educational innovation.

Fourth, research is paramount in recognizing distance education in the traditional faculty reward system. Faculty members in the fine arts have typically been evaluated on the basis of tangible and creative activities (Lawn, 1998). As design education moves into the digital world, new tools and materials need to be developed for instruction at a distance. Yet faculty members are reluctant to recognize the development of high quality, academic software in the same light as contributions to refereed scholarly journals (Staman, 1990). When distance education is aligned with service or outreach at research-based universities, it carries even less prestige than teaching (Wolcott, 1997). If distance teaching and traditional teaching are viewed as having equal status in the faculty reward system, faculty in the arts will be more inclined to integrate distance education methodologies.

Fifth, intellectual property and copyright ownership is becoming an important issue in distance education (Smith, Eddy, Richards, & Dixon, 2000; Abacus, 2000; Guernsey & Young, 1998). One participant in this study believes "copyright/ownership issues with the University for course materials" are an issue for developing interior design distance courses. The U.S. Copyright Office is considering the impact of the Internet on copyright infringement because copyright law, which was created for print media, may be discouraging innovation in education (Fisher, 2000). For this reason, Smith et al. (2000) feel that federal antitrust regulations, copyright laws, and intellectual property litigation will be

areas of concern as higher education moves toward online distance education. University policy related to online course ownership may impact a faculty member's participation in distance education.

Finally, Moore and Benbaset (1991) strongly encourage using their instrument to assess the opinions of various populations, with a diversity of innovations. This study addressed interior design faculty members only. The ability to generalize past this population to all arts and humanities content areas is limited and may be misleading. Any lack of significance can be due to the homogeneity of the population exposed to the innovation. In other settings, different patterns of predictors are likely to emerge.

Summary

In conclusion, this study attempted to illuminate the attitudes of interior design faculty on distance education. Though none of the hypotheses were supported, the results provide insight as to which attributes of an innovation have the most impact on the attitudes of interior design educators. The two research questions addressed the unique population of interior design educators, who may or may not react to an innovation as hypothesized in the diffusion of innovations.

Major findings included: (1) subjects who were administered the pretest received higher posttest means on relative advantage, compatability, trialability, complexity, and the intention to adopt regardless of whether they were in the treatment group; (2) subjects who received the treatment intervention yielded significantly higher posttest means on the variables relative advantage and the

intention to adopt than those not exposed to the treatment intervention; and (3) compatability and trialability are significant predictors of the intention to adopt distance education.

Whether using an asynchronous or synchronous delivery method, distance education courses are increasing in number every year (Eggen, 2000; Everhart, 2000) with no apparent end in sight. As new electronic technologies become available, traditional education methods are converging with those illustrated by distance education. Rather than having distance education merely supplement on-campus instruction, it is suggested that a paradigm shift will occur where the two instructional models become one. This will be triggered by advancing technology, declining funds, globalization, the demography of the students, and an increase in the individual's responsibility to pay for education (Moran & Myringer, 1999; InnoVisions Canada, 1998; Otchet, 1998). Interior design educators should be prepared to seek answers to their questions and determine where they stand on the issue of distance education.

APPENDICES

Appendix A

Table 9: Construct Items and Reliabilities

*NOTE: *phrase recoded in analysis*

Relative Advantage (r = .82)
Using distance education would improve the quality of my interaction with students.
Distance education would enable me to teach students more effectively.
Using distance education would give me greater control over my teaching endeavors.
Compatability (r = .92)
Using distance education would be compatible with all the ways I like to teach.
Using distance education would fit with my style as an educator.
I think that using distance education would fit well with the way I educate students.
Trialability (r = .70)
I've had a great deal of opportunity to try distance education.
I am able to experiment with distance education methodologies as necessary.
Before deciding whether to use distance education for instruction, I would be able to properly try it out.
Complexity (r = .72)
Learning to teach at a distance would be easy for me. *
The process of distance education is clear and understandable to me.*
I would find it easy to get distance education to do what I want it to do.*
I would find distance education easy to use.*
Observability (r = .69)
Distance education is not very visible in my institution.*
I have seen what others are doing with distance education.
I have not seen many others using distance education in my department or college.*
I have had plenty of opportunity to see distance education being used.
I believe I could communicate to others the consequences of using distance education.
The impact of using distance education is apparent to me.
I would have no difficulty telling others about my experience with distance education.

Table 9 (cont'd)
Gatekeeper (r = .80)
I am worried there may be a lack of encouragement for distance education by my program coordinator.*
I worry that the administration's commitment to distance education initiatives will wane as time goes by.*
I am worried there may be a lack of support for distance education by my dean.*
I am concerned about the lack of release time/compensation awarded by my program coordinator to adequately develop a distance education course.*
Intention to Adopt (r = .95)
I would be interested in using distance education.
I will arrange to teach a distance education course as soon as possible.
I will recommend that my colleagues use distance education for instruction.
I don't see much need to use distance education.*

Appendix B

Slides from Experimental Treatment

Figure 3: Distance Education Technologies & the Design Studio

Figure 4: Teaching in a Design Studio 1

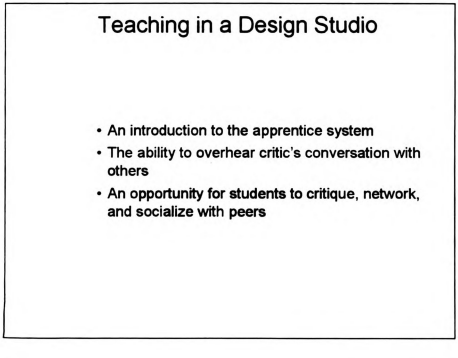


Figure 5: Teaching in a Design Studio 2

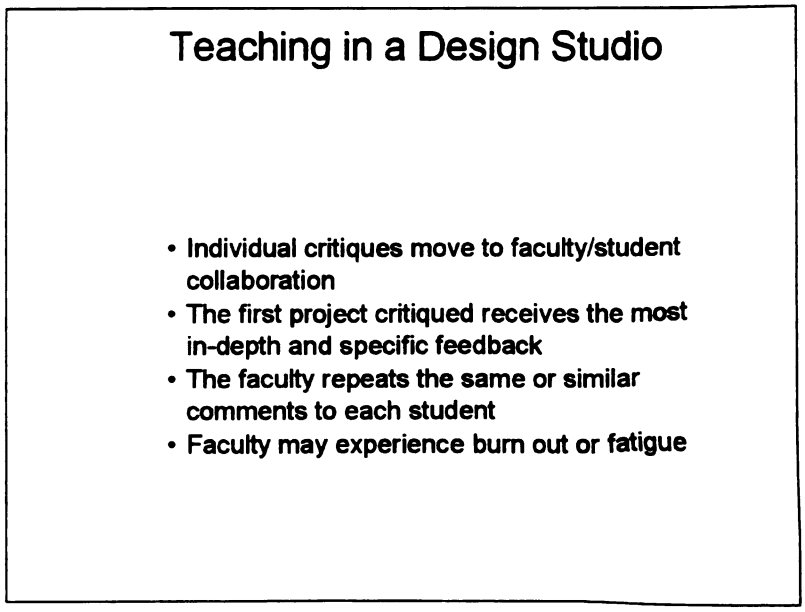


Figure 6: The Traditional Design Studio

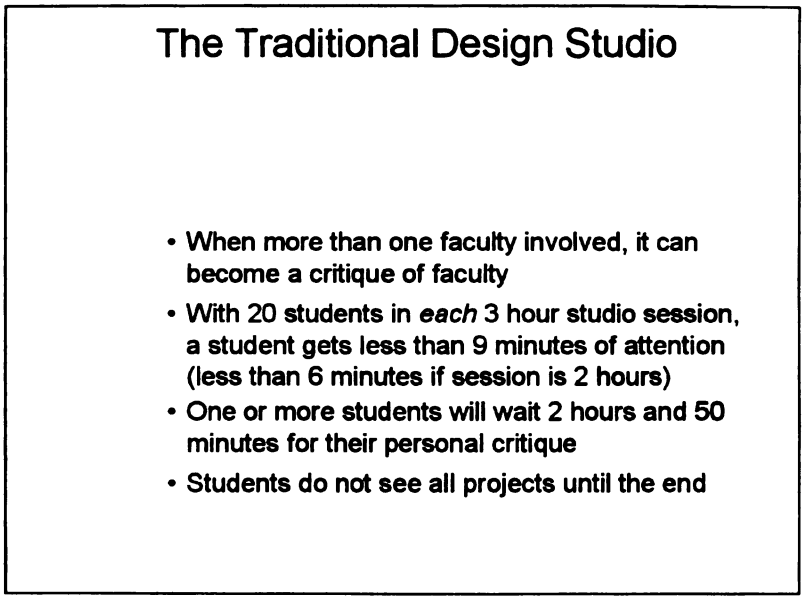
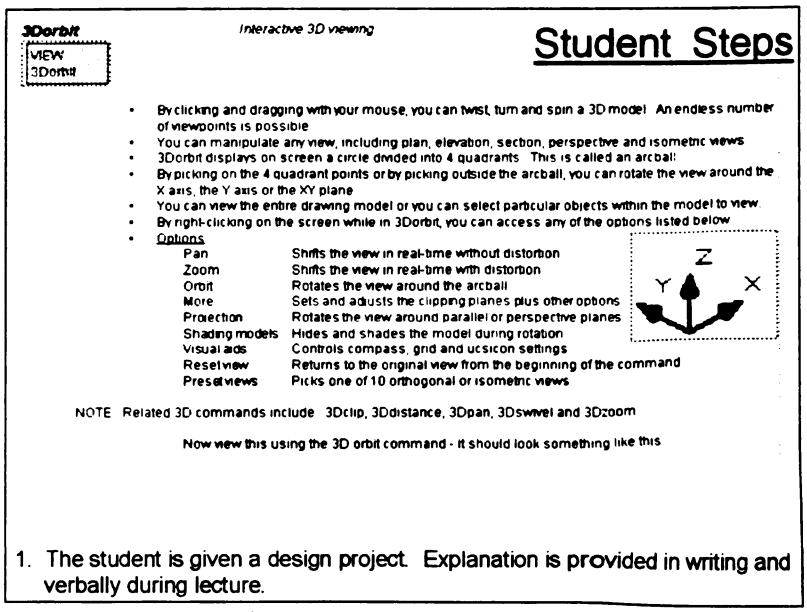
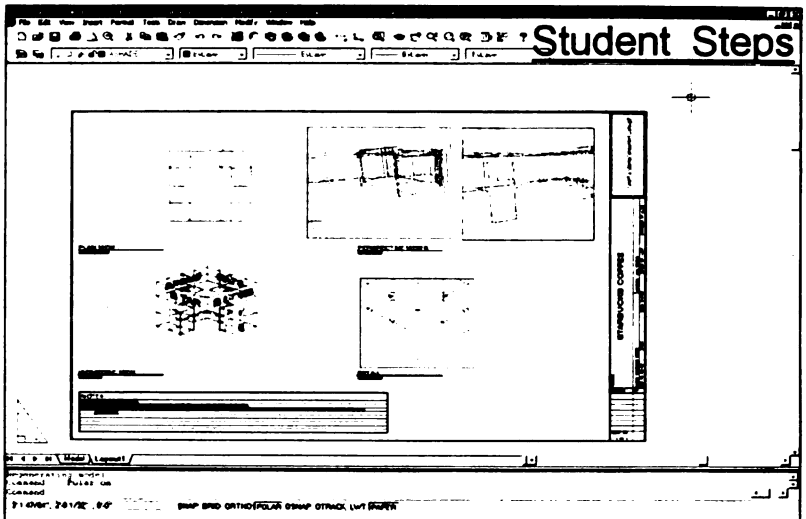


Figure 7: Student Step 1



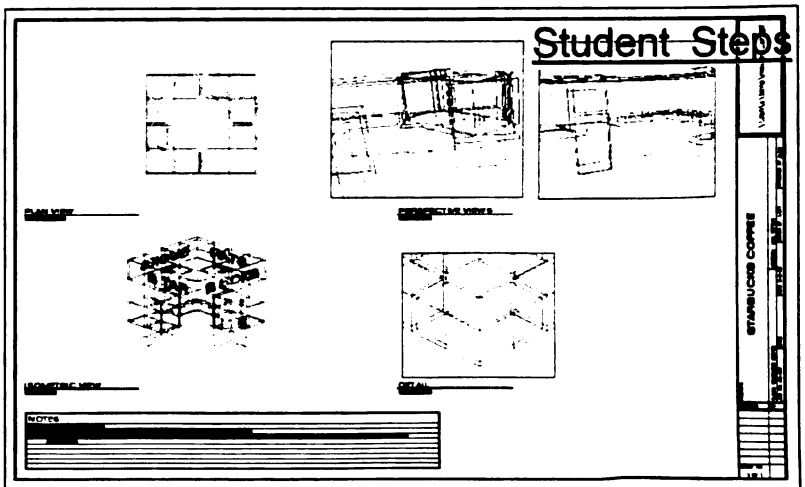
1. The student is given a design project. Explanation is provided in writing and verbally during lecture.

Figure 8: Student Step 2



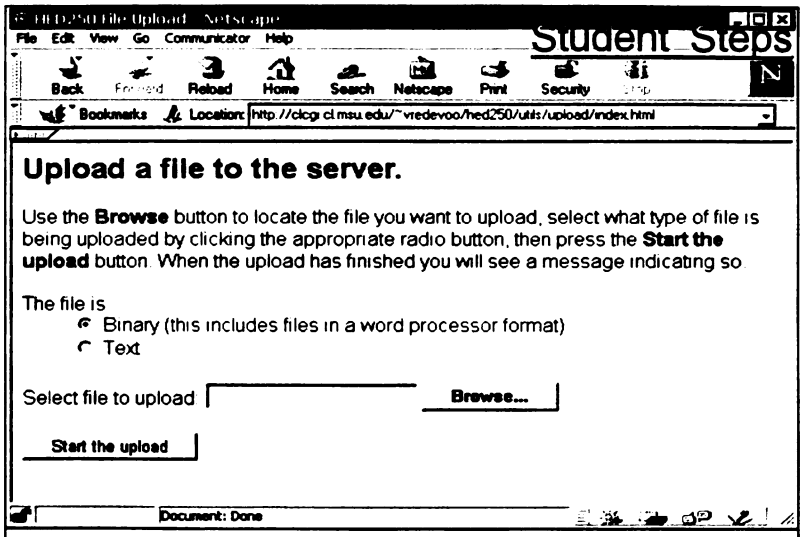
2. The student completes the weekly task and "captures" the drawing or image at the end of the task from the computer screen using the Print Screen key.

Figure 9: Student Step 3



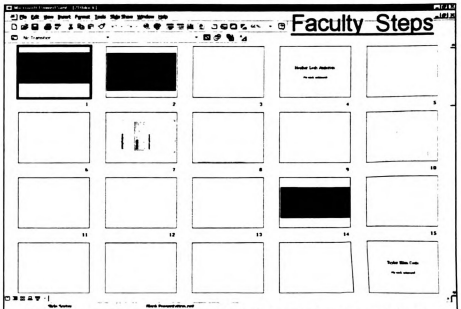
3. The student pastes the image onto a blank PowerPoint slide and modifies the image by cropping it to remove the menu bars of the software and resizing it to fit the screen. The student then exports the PowerPoint slide as a JPEG image.

Figure 10: Student Step 4



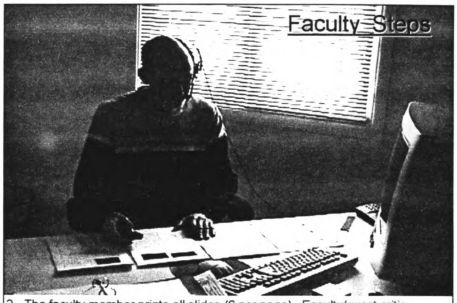
4. The student transfers the image to the course site using email or Internet tools.

Figure 11: Student Step 5



1. The faculty member or Teaching Assistant downloads all student files from the course site. Each image is imported into one PowerPoint presentation.

Figure 12: Faculty Step 1



2. The faculty member prints all slides (6 per page). Faculty/guest critic reviews all submissions, identifies problems common to all students, and creates a thoughtful critique of student work.

Figure 13: Faculty Step 2

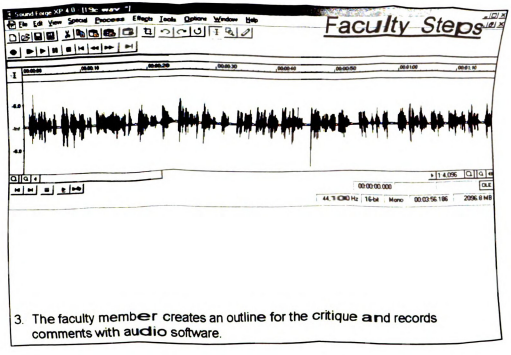


Figure 14: Faculty Step 3

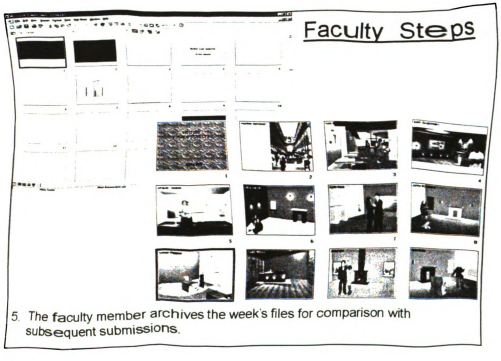
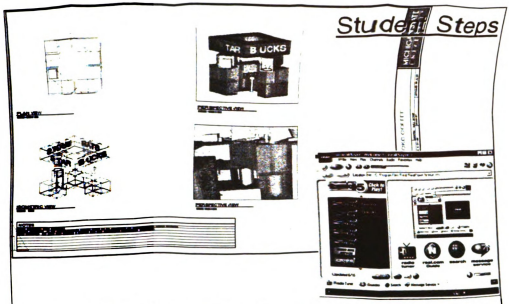
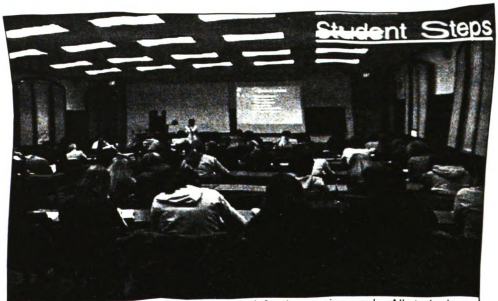


Figure 15: Student Step Download



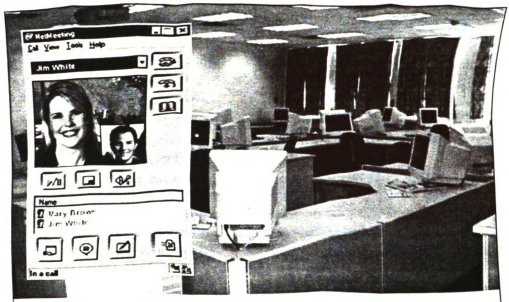
The student downloads the appropriate files and listens to the critique to make corrections to his project.

Figure 16: Student Step Preview



Students are expected to preview the task for the coming week. All students come to class to communicate concerns, get personal attention, and ask questions of the faculty and teaching assistants.

Figure 17: Student Assistance



Students have several options for getting assistance: email, open lab times, and Microsoft Netmeeting.

Figure 18: Student Advantages 1

Design Studio: Current Modifications

Student Advantages:

- Each student can view all projects submitted
- Students can review the critique at any time from any computer during the week
- All students receive the same information, feedback, and direction
- Students can easily see where their project "fits" in relation to others
- Students maintain their original work (i.e. not lost, damaged, etc.)

Figure 19: Student Advantages 2

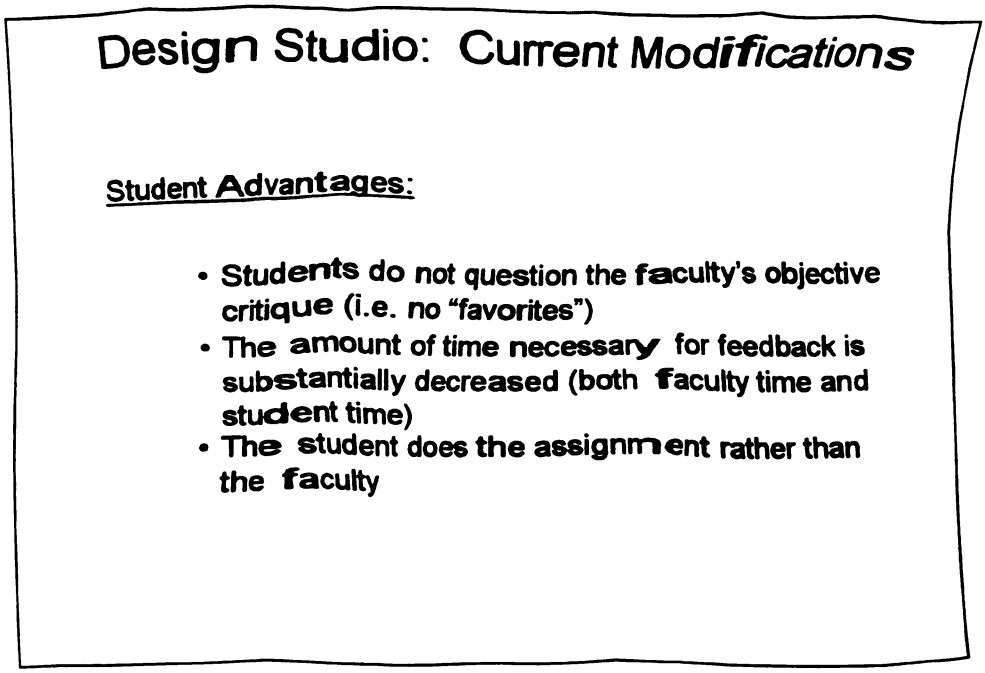


Figure 20: Faculty Advantages

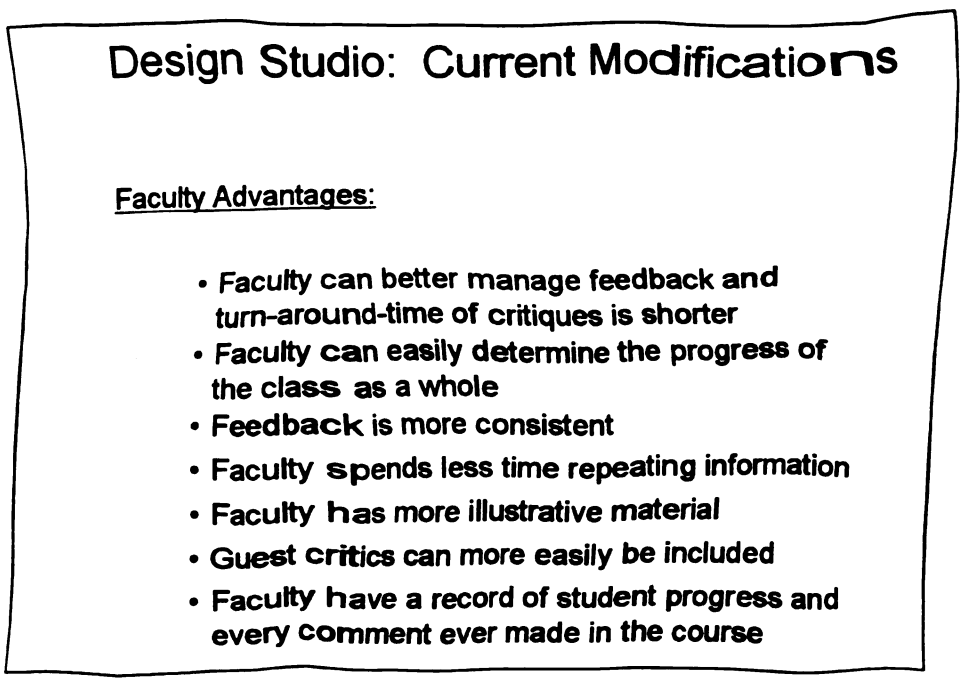


Figure 21: Disadvantages

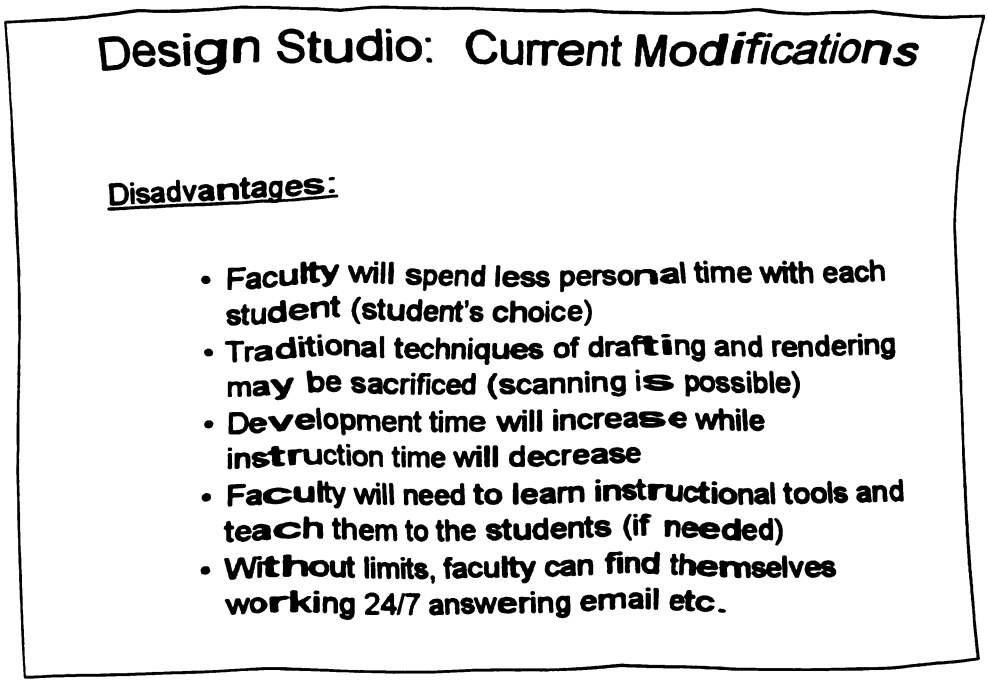


Figure 22: Design Studio Strategy

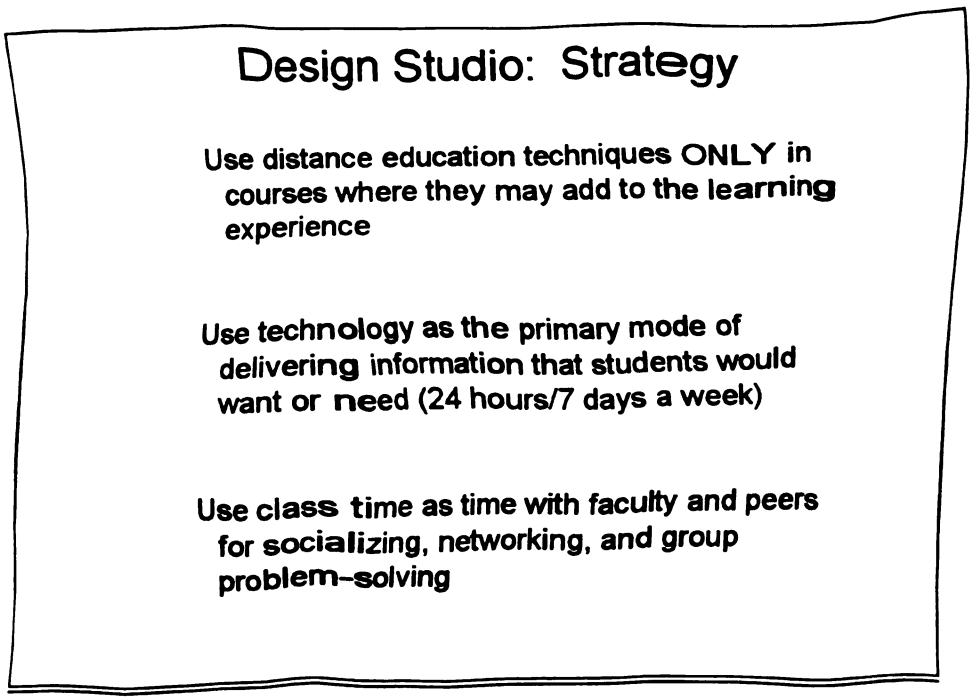
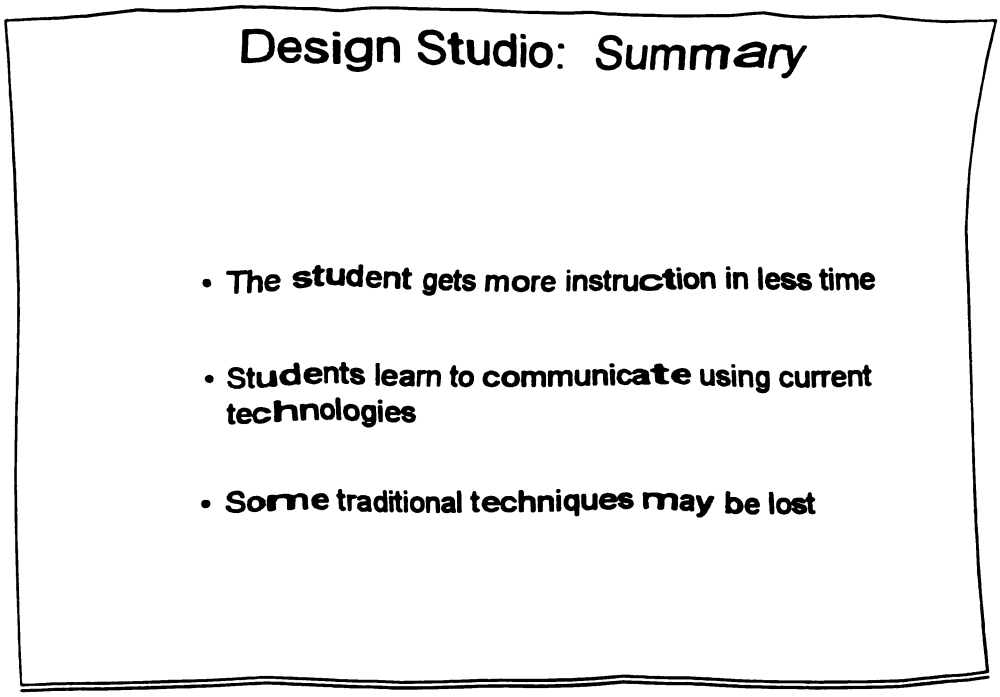


Figure 23: Design Studio Summary



Appendix C

Letter of Participation and Reply Postcard

September 1, 2001

Dear Educator:

Has your university begun discussing terms like "distance education" and "virtual university"? Are you feeling pressured to teach "at a distance"? Some even say it may not be long before the use of distance education methodologies is no longer an option for interior design faculty.

> Your perceptions regarding distance education are critical to program planning for interior design education.

You are asked to participate a study to determine how interior design faculty perceive distance education and how increased awareness of distance education could influence faculty attitudes. Participation is voluntary. Subjects may choose not to participate at any time and have the right to discontinue participation in this study without penalty or loss to which the subject is otherwise entitled.

I need your participation to make this study happen!

You would be involved in either one or two parts of the study, depending on group assignment. Everyone will get a questionnaire that will take approximately 7-10 minutes to complete. You may also be asked to watch an instructional movie (on CD-ROM), which will take another 15-20 minutes to view. The movie will demonstrate how distance education methodologies can be applied to an interior design course. The CD-ROM is yours to keep. Even if you are not asked to watch the movie, I will mail it to you for your own personal use at the conclusion of the study. If you agree to participate, the study will begin in October.

If you participate, results will be kept confidential. Your privacy will be protected to the maximum extent allowable by law. The number in the upper right corner of each questionnaire will be used for follow-up purposes only. Only the researcher will know your identity and reports of research findings will not associate names with individual responses.

Enclosed is a self-addressed, stamped postcard for you to indicate your willingness to participate in this study. Your participation is necessary to assess the impact of distance education on interior design education. Regardless of your willingness to participate, please drop this postcard in the mail by September 20th.

If you have any questions or concerns related to your participation, please contact Diane Bender at (517) XXX-XXXX. If you have any questions related to your rights as a participant, please contact David E. Wright, MSU UCRIHS Chair, at (517) XXX-XXXX.

Thank you for your help,

Diane M. Bender, Doctoral Candidate

Linda Good, Professor

Your participation is important to the success of this study!

Please check the item that indicates your willingness to participate:

- ☐ I have never developed or instructed a distance education course and am willing to participate in this study.
- ☐ I have developed or instructed a distance education course and am willing to participate in this study.
- ☐ I have never developed or instructed a distance education course but am not willing to participate in this study.
- ☐ I have developed or instructed a distance education course but am not willing to participate in this study.

My email address is: _____

My preferred communication method is:

- ☐ Email
- ☐ U.S. Postal Service
- ☐ Facsimile
  (If selected, please provide a fax number: _____)

Regardless of your willingness to participate,
please drop this postcard in the mail by September 20th!

Appendix D

Table 10: Variable Means and Standard Deviations *Using Posttest Data*

Variable	Mean	*SD*
Relative Advantage	3.5522	*1.4536*
Compatability	3.4925	1.5617
Trialability	3.7463	1.4461
Complexity	4.2313	1.0246
Observability	4.2345	0.9909
Gatekeeper	2.6468	1.3906
Intention to Adopt	4.3246	1.2990

Appendix E

Means and Standard Deviation Values of Individual Scales

Table 11: Mean Scores of Groups for Relative Advantage

	N	Pretest M	Pretest SD	Posttest M	Posttest SD
1	10	4.0000	0.9813	4.4000	1.0159
2	14	2.9286	1.1560	3.1429	1.1301
3	19	--------	--------	3.7193	1.7960
4	24	--------	--------	3.3056	1.3828

Table 12: Mean Scores of Groups for Compatability

	N	Pretest M	Pretest SD	Posttest M	Posttest SD
1	10	3.9000	1.2771	4.3667	1.2712
2	14	2.9762	1.4290	3.3333	1.5359
3	19	--------	--------	3.3684	1.6737
4	24	--------	--------	3.3194	1.5650

Table 13: Mean Scores of Groups for Trialability

	N	Pretest M	Pretest SD	Posttest M	Posttest SD
1	10	3.4667	1.4333	3.6000	1.3407
2	14	3.2619	1.5088	3.6429	1.4991
3	19	--------	--------	3.8947	1.5318
4	24	--------	--------	3.7500	1.4687

Table 14: Mean Scores of Groups for Complexity

	N	Pretest M	Pretest SD	Posttest M	Posttest SD
1	10	4.2233	1.2385	3.5250	1.1987
2	14	4.3860	1.2596	4.2262	0.8155
3	19	--------	--------	3.9342	1.2579
4	24	--------	--------	3.8785	0.8992

Table 15: Mean Scores of Groups for Observability					
	N	Pretest M	Pretest SD	Posttest M	Posttest SD
1	10	4.1571	1.0333	3.9286	0.8116
2	14	4.0204	1.2338	4.0510	1.1546
3	19	--------	--------	4.5564	1.0123
4	24	--------	--------	4.2143	0.9258

Table 16: Mean Scores of Groups for Gatekeeper					
	N	Pretest M	Pretest SD	Posttest M	Posttest SD
1	10	3.7250	1.4741	3.7250	1.5787
2	14	4.4107	0.9836	4.3393	1.2504
3	19	--------	--------	4.7588	1.3330
4	24	--------	--------	4.3021	1.4103

Table 17: Mean Scores of Groups for Intention to Adopt					
	N	Pretest M	Pretest SD	Posttest M	Posttest SD
1	10	4.7500	1.0737	5.0000	1.1426
2	14	3.8214	1.2876	4.0357	1.1596
3	19	--------	--------	4.3158	1.3146
4	24	--------	--------	4.2188	1.3994

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