THE FACTORS THAT MAY INFLUENCE A FACULTY MEMBER'S DECISION TO ADOPT ELECTRONIC TECHNOLOGIES IN INSTRUCTION

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Abstract

The adoption and diffusion of electronic technologies into the higher education are complex processes. This study was formulated to see which factors might influence faculty members' motivation and inclination to adopt new electronic technologies in their delivery of instruction. The following research questions were addressed in this study: a) What social variables are involved in the decision to adopt electronic technologies used in the delivery of instruction? b) What organizational variables are involved in the decision to adopt electronic technologies used in the delivery of instruction? c) What personal motivational variables are involved in the decision to adopt electronic technologies used in the delivery of instruction? d) What is the relationship between the social factor with size of the university, size of the department, rank, tenure status, level of experience, and adopter behavior categories? e) What is the relationship between the organizational factor by size of the university, size of the department, rank, tenure status, level of experience, and adopter behavior categories? f) What is the relationship between the personal motivational factor by size of the university, size of the department, rank, tenure status, level of experience, and adopter behavior categories? g) What is the relationship between the social factor and the types and frequency of technology used? h) What is the relationship between the organizational factor and the types and frequency of technology used? i) What is the relationship between the personal motivational factor and the types and frequency of technology used? j) What is the relationship between self-selected adopter categories and the types and frequency of technology used? k) What comparison can be made between *a priori* adopter categories and self-selected adopter categories? The sample

consisted of accounting faculty who taught an introductory accounting class at 12 of the 16 public 4-year institutions of higher education that are in North Carolina, who have accredited Schools or Colleges of Business. The results of this study reinforce the need for administrators and faculty to be made aware of the many social, organizational, and personal motivational factors that can assist and affect a faculty member's decision to use and adopt electronic technologies. Social variables that include friends, mentors, peer support, and students were found to significant in their influence related to a faculty members' decision to adopt electronic technologies in the classroom. Organizational variables of physical resource support and mandate from the university were reported by faculty to also be statistically significant in their influence. All three personal motivational variables emerged as important in the decision to adopt instructional technologies. With the recognition of these social, organizational, and personal motivational factors environments could be developed that enhance and establish the appropriate settings and goals for incorporating instructional technologies into higher educational settings.

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TABLE OF CONTENTS

LIST OF TABLES PAGE

Chapter 1

The adoption and diffusion of electronic technologies has been a slow process on most university campuses. Without question, the integration of new computer technology has come with many challenges not just for physical resource allocation, but for the human resource as well. Prior research (Fulk, 1993; Rogers, 1995; Spotts & Bowman, 1995) has indicated that the innovation diffusion process may be due in part to several reasons, including level of education, resource allocation, peer pressure, and peer support. Yet another reason may be one's own personal motivation to adopt newer innovations.

Rogers (1983) defined a range of behaviors related to the diffusion of innovations and applied his results to a bell-shaped curve. The behavioral characteristics he defined fell along a continuum that ranged from an innovator (at the highly innovative end) to a laggard (at the low innovation end). Rogers further explained diffusion as a process by which an innovation is communicated through certain channels over time and among members of a social system. Thus, diffusion of an innovation within Rogers' theory is both an individual and a social activity.

Additionally, Rogers found that the diffusion of innovations was not only affected by certain behavioral traits, but also by other variables such as the perceived attributes of the innovation and the type of decision involved in the adoption process. Other variables such as size of the organization and socioeconomic status were also considered to be theoretical reasons why individuals choose to be involved in the innovation diffusion process.

In academia, as in other areas, electronic technology has offered ways to improve the general efficiency and effectiveness of the workplace, job functions, and communication among constituencies (Doherty & Pope, 1986). With new electronic technologies, faculty now have available new avenues of communications to support effective and timely classroom dialogues

with their students, peers, and administrators (Sproull & Kiesler, 1991). Some examples of these technologies and tools may include CD-ROMs, the Internet, videodiscs, microcomputer-based classrooms and laboratories, local and wide area networks, email, and interactive videos.

Rogers' (1983) theory of innovation diffusion is useful in helping both university administrators and faculty understand a range of behaviors and social and organizational variables related to innovation adoption. His foundational research provides an appropriate model for this empirical study that seeks to further identify a larger set of variables that might influence the innovation diffusion and adoption process. In addition to the variables emphasized in Rogers' theory, this research will investigate the potential influence of personal motivation variables, or factors that might predispose an individual to welcome and respond to newer technological innovations. Herzberg (1959), as well as other researchers (Blackburn & Lawrence, 1995; Braskamp & Ory, 1994) found that motivation to try newer innovations or methods comes from within the employee, suggesting that intrinsic motivational forces may be just as influential as extrinsic forces.

Statement of the Problem

Technology has advanced remarkably in recent years, providing faculty in higher education with many new opportunities to apply electronic technological innovations in the classroom. While we see many new technological applications being used in a variety of ways, faculty members tend to vary in their willingness to adopt newer methods and innovations and to usefully apply these innovations in their teaching and classroom methods of instruction (Spotts & Bowman, 1995).

Researchers have explored a host of variables that may influence faculty choices regarding newer innovations and technologies. For example, several studies have investigated

the influence of social variables (Glaser, Abelson & Garrison, 1983; Rogers, 1983; Zaltman, Duncan & Holbek, 1973), such as peer support or peer pressure, shared departmental values, and mentors. Other researchers have focused more on organizational variables as motivators to adopt newer methods or innovations (Darley & Beninger, 1981; Davis, 1991, Kelman, 1983). An organizational factor may include variables such as a mandate from the university, an institutional reward system, physical resources, and others.

Rogers (1983) further explored individuals' inclinations to adopt newer innovations. By categorizing individuals according to a combination of actions related to change and adoptive behaviors, he developed the classifications of innovators, early adopters, early majority adopters, late majority adopters, or laggards. In short, these individuals' predisposition and the timing of their response to the adoption of newer methods and innovations might be predicted (Cottrell, 1997; Hamilton, 1992).

While some support has been shown for social and organizational variables, other variables may also be influential. If we can assume that most faculty advance through their careers in passages or stages (Lawrence & Blackburn, 1988; Maehr & Braskamp, 1993), then we can expect some personal motivational variables to be more influential at some stages than at others. As Herzberg (1959) pointed out, higher aspirations generally prevail only after lesser needs and concerns have been fulfilled. Further, if teaching is a dynamic process (Boyer, 1990), then we might expect faculty members to also be influenced by personal motivational factors, as evidenced by an interest in enhancing student learning, improvement in teaching, and in the usage of instructional technologies.

Toward that end, this research will explore: a) the influence of social, organizational, and personal motivational factor variables on higher education faculty members' adoption of

electronic technologies in the classroom; b) the classification of higher education faculty into adopter behavior categories; and c) other demographic variables such as size of the department and student enrollment in the institution with the social, organizational, and personal motivational factor. While this research builds on Rogers' theory of the diffusion of innovations, this study seeks to expand the range of potential variables by including personal motivational variables, and by testing his identified adopter behavior categories.

Statement of the Purpose

This study addressed a set of different variables and factors that affect the innovation adoption decision by faculty regarding their use of electronic technologies in the classroom. The social factor as well as the organizational and personal motivational factor was formed from the combined means of their statistically significant variables. The results identified social, organizational, and personal motivational variables that were statistically significant, adopter behavior categories, and the types of electronic technologies used in the delivery of instruction and the frequency of use of each type. These identified statistically significant variables can serve as a guide to faculty and administrators in their future efforts to facilitate the diffusion process.

Research Questions

The following research questions were addressed in this study.

Research Question 1: What social factor variables are involved in the decision to adopt electronic technologies used in the delivery of instruction? Social factors expected to influence this process include: peer support, peer pressure, mentors, and shared values in the faculty member's department, friends, and students.

Research Question 2: What organizational factor variables are involved in the decision to adopt electronic technologies used in the delivery of instruction? Organizational factors expected to influence this process include: mandates from the university, institutional reward systems, formal recognition on a department, college, or university level, and physical resources such as equipment, hardware and software.

Research Question 3: What personal motivational factor variables are involved in the decision to adopt electronic technologies used in the delivery of instruction? Motivational factors include: personal interest in instructional technology, personal interest in improvement in teaching, and personal interest in enhancing student learning.

Research Question 4: What is the relationship between the social factor with size of the university, size of the department, rank, tenure status, level of experience, and adopter behavior categories?

Research Question 5: What is the relationship between organizational factor by size of the university, size of the department, rank, tenure status, level of experience, and adopter behavior categories?

Research Question 6: What is the relationship between the personal motivational factor by size of the university, size of the department, rank, tenure status, level of experience, and adopter behavior categories?

Research Question 7: What is the relationship between the social factor and the types and frequency of technology used?

Research Question 8: What is the relationship between the organizational factor and the types and frequency of technology used?

Research Question 9: What is the relationship between the personal motivational factor and the types and frequency of technology used?

Research Question 10: What is the relationship between self-selected adopter categories and the types and frequency of technology used?

Research Question 11: What comparison can be made between *a priori* adopter categories and self-selected adopter categories?

Significance of the Study

This study focused on a multi-faceted set of variables that may influence the innovation diffusion decision process by faculty members in colleges and universities. Its significance lies in its ability to provide additional information as to which types of variables and factors are influential in that process and to what types of behaviors are associated with innovation adoption.

Since Rogers' (1983) book on innovation, research has tended to focus on the theoretical reasons why people choose an innovation more so than the broader personality-based issues surrounding innovation adoption. Thus it seems important for research to address issues of personal interest and self-motivation.

Limitations

The study did present some limitations, several of which are related to the sample. The study targeted a subset of higher education faculty, a subset where the adoption of technological innovations appears to be important and useful. Only accounting faculty who taught introductory level accounting classes were selected to participate. Through this restriction, both faculty who taught in different majors and accounting faculty who taught other courses were eliminated.

Other findings may have resulted if different disciplines had been chosen or faculty who taught upper-level classes in the accounting department had been included.

Given the differences in disciplines and approaches to teaching different topics, I chose to control for those differences by focusing on the one discipline of accounting. The accounting profession has been on the vanguard of accepting and using technological innovations and is generally wedded to information technology.

Third, the study was restricted to public 4-year colleges and universities in North Carolina with accredited colleges or schools of business. Non-accredited institutions may have different academic goals or mission statements that do not include instructional technology.

Another limitation related to the sample was the sample size. Since the study was restricted to those tenured or tenure-track full-time accounting faculty who taught introductory accounting classes in the concept institutions whose business schools or colleges are AACSB accredited, only 80 possible participants were available for study. Therefore, the study was limited to a small sample size of the above-mentioned criteria.

An additional limitation was the use of a questionnaire to gather data. The questionnaire method is often used in the "soft" research of opinions and attitudes, even though personal interviews can sometimes detect nuances in replies that are absent in mailed questionnaires.

Definitions

Diffusion: The process by which an innovation is spread over time through communication channels among members of a social system.

Electronic Technology: This refers to the techniques, tools, and methodologies utilized to enhance teaching and learning through a computerized system. Examples of electronic

technology that might be used in the delivery of instruction include email, web pages, and multimedia lectures.

Social Factor: This factor includes such variables as peer support, peer pressure, mentors, shared values among members of a department, friends, and students.

Organizational Factor: Factor included within this category are institutional reward systems, mandates from the university, and formal recognition on a department, college, or university level.

Adopter Behavior Categories: Rogers identified a list of five adopter behavior categories that included innovators, early adopters, early majority, late majority, and laggards.

Personal Motivational Factor: Personal motivational factor includes personal interest in instructional technology, personal interest in improvement in teaching, and personal interest in enhancing student learning

Organization of the Study

This dissertation is divided into five chapters. Chapter 1 includes an introduction, statement of the problem, definitions, limitations of the study, and organization of the dissertation. Theory development and related literature are presented in Chapter 2. This study's research methodology is described in Chapter 3. In Chapter 4, the survey results and this study's findings are summarized. Results, conclusions, and recommendations for future practice and research are discussed in Chapter 5.

Chapter 2

The study was designed to understand what factors and/or variables affect the adoption and use of certain electronic technologies for the delivery of instruction by faculty at higher education institutions. These experiences are examined as they relate primarily to the diffusion of innovation theory, as defined by Everett Rogers (1983).

This review begins by addressing the different components of Rogers' (1983) definition of the diffusion process that consists of the following main processes: innovation, communications channels, time, and social system. Also examined in this first section are the social and organizational factors, the diffusion process, the consequences of innovation adoption, and the adopter categories that also play an important role in the adoption decision process. The second section examines the literature on faculty motivation, which also addresses faculty roles and responsibilities. Finally, research that focuses on the benefits faculty may gain from the use of instructional technology is reviewed.

Organizations that are involved in knowledge intensive tasks, such as educational institutions, depend greatly on the ability of individuals to use effective methods to communicate information. Electronic technologies and communication systems such as email and the Internet have had a profound effect on how information and communications can be made more accessible among professors and between professors and students (Fulk & Steinfield, 1990). New technologies and electronic capabilities also have affected the traditional roles and responsibilities of faculty members.

Electronic technology may be as simple as using a computer for word processing or as advanced as using a desktop video to deliver instruction to distant learners. In today's educational environment computers are able to assist professors by illustrating concepts, by storing massive

amounts of data, by disseminating information over the Internet, and by providing a forum for communication and discussion over long distances. Just a few decades ago, technology was a chalkboard, an overhead projector, and the printed page. In fact, today, some professors still use these methods of technology. Innovative technologies are seen by some individuals solely as additional tools to accomplish educational goals; their choice to use these technologies is not an outcome, but rather a way to supplement, enhance, and extend the learning experience (Green, 1997).

Fears about using technology in the classroom and doubts about technology's potential are not unfounded. Faculty express the fear of change, the fear of appearing incompetent, and the fear of the necessary time commitment it may take to produce meaningful output (Albright & Graf, 1992). But institutions or planners of instructional technologies should view these fears as valuable input for developing strategies that might motivate faculty in their decision whether or not to adopt newer technologies. "The history of modern education is littered with the trash of technology left behind by unrealistic purchases, naive users and vendors working on a quota system" (Albright & Graf, 1992, p.2).

The use of various instructional technologies drives a need for research into the factors that influence both the diffusion and implementation of instructional technologies (Cooper & Zund, 1990). Many institutions are in the early stages of instructional technology adoption, and it is important for them to understand what behaviors affect the adoption and use of certain electronic technologies.

Diffusion of Innovation Theory

Historically, a number of theories have been used to investigate when and how innovations arise, become accepted, and are used effectively in organizations. Perhaps the most

appropriate of these theories for the adoption of technology in higher education is the Diffusion of Innovations (DoI) theory (Rogers, 1995). This theory is used to describe the patterns of adoption, to explain the mechanism, to assist in predicting whether and how a new innovation will be successful in its use, and to ascertain its consequences.

Definition

Social theorist Everett Rogers (1983) has dominated the field of diffusion theory for many years. It was after the compilation of 2,925 empirical and 975 non-empirical studies that Rogers identified four key elements in the diffusion process. He characterized diffusion as "the process by which an (a) innovation is (b) communicated through certain channels over (c) time among the members of a (d) social system" (p.10).

Innovation. As the first component in Rogers' theory, innovation is described "as an idea, practice, or object that is perceived as new by an individual" (1995, p.10). Therefore, an innovation may not be new; it just may be new to the individual. In his meta-analysis of the diffusion of innovations Rogers (1983) reported on 12 studies from 1960 to 1978 in terms of innovation attributes and found 5 attributes that were significantly related to the rate of innovation adoption.

The first of these attributes was relative advantage. Rogers (1983) found relative advantage typically a good predictor of the rate of innovation adoption, and he included within this category the components of costs, investment returns, efficiency, and yield. He also determined that individuals who identify themselves as risk takers are more likely to earn the windfall profits from the introduction of a new idea into a social system. Thus, individuals who adopt technology that may lead to future profits and that covers the costs of development have relative advantage or yield. Innovations, according to Glaser, Abelson, and Garrison (1983), that

offer sufficient incentive to "offset the considerable effort that change may require" or to minimize concerns about undesirable side effects or risks may also be thought of as producing a satisfactory yield or relative advantage (p. 30-31).

Zaltman, et al. (1973) included costs, efficiency, and return on investment in his list of variables related to prediction of use. Costs included social and financial factors; efficiency included overall timesaving and avoidance of bottlenecks; and return on investment implied both tangible and intangible benefits. Glaser, et al. (1983) reported more ready adoptions when potential users perceive a relative advantage, especially when espoused by well-respected opinion leaders.

Compatibility is the second innovation attribute that Rogers (1983) identified. One element of compatibility is the degree to which an innovation can meet a need as identified by a potential adopter. If the innovation can be seen as advantageous by the potential adopter or as compatible with an individual's needs it is more likely to be adopted. However, within the compatibility attribute is also the factor of consistency. Consistency may have an unpredictable effect. It can speed up an adoption, slow down an adoption, or cause new methods to be inappropriately applied. It is because of this variation in effect that compatibility may only be a moderate predicator of innovation adoption.

Complexibility of an innovation is the third attribute and, according to Rogers (1995), is negatively correlated with adoption processes. If individuals find an innovation too difficult to understand or to use, they are less likely to adopt a new innovation. Zaltman, Duncan, and Holbek (1973) concurred with Rogers and found that the complexity of a concept or of an implementation can be a deterrent to the adoption of innovations. Pelz & Andrews (1985)

concurred with Rogers stating, "technically simple innovations are installed with a more discrete succession of stages than are complex innovations" (p. 288).

On the other hand, Crandall (1997) cited several large educational studies by the Rand Corporation and others suggesting that the larger the scope and personal “demandingness” of a change, the greater the chance for success (p. 224). The authors explained the apparent conflict with other findings by indicating that educational studies represent implementation after an adoption decision has been made rather than prior to the decision. "Apparent complexity," they stated, "may initially deter a potential adopter who has to master the innovation alone" (Crandall, 1977, p. 224).

Davis, Bagozzi, and Warshaw (1989) also studied the issue of complexity when they introduced the Technology Acceptance Model (TAM), which was compared to and based on Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA). Although Davis developed TAM from TRA, the two theories differ in one key respect: While TRA is a very general theory that can be used to predict behaviors in a variety of settings, TAM is a very specific theory intended strictly to explain or predict user acceptance of computer technology. TAM supports Roger's third issue of complexity in finding that the perceived usefulness and ease of use of an application are factors that influence an individual's attitude toward using the software.

Fourth in Roger's list of innovation attributes is trialability. Trialability is the opposite of complexibility in that it allows the individual time to experiment with and understand the innovation through a phased-in approach. Studies addressing the importance of users being able to see a demonstration of an innovation or having the opportunity to try it out with minimal risks was seen as positively correlated with the adoption rate of an innovation (Rogers, 1995).

"Situations in which the user need not 'play for keeps' provide more opportunity for innovation" (Zaltman, et al. 1973, p. 7).

The last innovation attribute, observability, indicates that innovations are more likely to be adopted if they can produce visible results. This attribute, as seen in Roger's model, is a strong predicator of adoption rate and is positively correlated as well (Cottrell, 1997). Roessner (as cited in Glaser, et al. 1983) also sees observability of results of an innovation as important under its readiness for use.

Communications Channel. The second component in Roger's (1983) definition of diffusion is a communications channel that provides a method for the transmission of information about a new innovation from one individual to another. There are basically two types of communications channels--mass media channels and interpersonal channels. The difference between the two is in how the information is transmitted. Through mass media, information knowledge is transmitted through such sources as radio, television, newspapers, the Internet, or other methods that people might use to reach a large audience.

Interpersonal communication channels use a process that is created by the sharing of information between two individuals to create or reach a mutual understanding (Rogers, 1995). The process that takes place can include individuals who have similar values in certain attributes, such as educational level or social status, where they are considered to be homophilous in their belief system. Rogers found that two individuals who are homophilous are more likely to have greater effects on the transmission of knowledge, on attitude formation, and on behavior change related to a new innovation because they share similar values related to work and home environments.

According to Rogers, heterophilous individuals are more likely to create problems in the diffusion of innovations than homophilous individuals. Their communication style may cause cognitive dissonance because they are exposing others to knowledge or information with which the other person feels uncomfortable. "Differences in technical competence, social status, beliefs, and language lead to mistaken meanings, thereby causing messages to be distorted or to go unheeded" (Rogers, 1995, p. 287).

Time. Time is the third component in Roger's definition of diffusion, and he includes time in three different measurements. First is the innovation-decision process by which an individual gains new knowledge and either adopts it or rejects it; second, the innovativeness of an adoption which is characterized by when the adoption decision occurs; and third, the number of adoptees of the innovation. The first of these elements related to the innovation-decision process is further expanded in the social system component.

Social System. The social system component of Roger's (1983) definition of diffusion is represented by a group of individuals whose behaviors and shared values facilitate the communication of new ideas and of adoption of innovations to accomplish a common goal. Rogers further identified three ways that innovation-decisions are made within a social system: (1) Optional innovation-decisions are made by individuals without the influence of other members of their group; (2) collective innovation-decisions are made by a consensus of the group; and (3) authority innovation-decisions are made by individuals with a great deal of technical expertise or who possess power within the unit. Within each of these decisions are the implication of peer support or peer pressure and the determinant of whether or not the organizational structure is a formal or informal one.

Rogers found that there are definable differences between formal and informal structures within and among the units. Formal structures are defined as patterned social relationships that may consist of hierarchical positions and behaviors that appear on a consistent basis. Informal structured systems are identified by the existence of casual relationships that are determined by who interacts with whom and in what situation or circumstance. According to Rogers, even when strangers first meet they quickly tend to form a behavior and communications pattern that can be used to predict when and how they would adopt an innovation.

Members of a social unit, therefore, assume different roles within the system. Individuals can have a positive or negative influence over innovation adoption decisions, and the most innovative member of a unit can be perceived as being a deviant from the system norm. This straying from the norm allows for some individual members to possess a great deal of influence related to technology diffusion and adoption while others are more likely to be limited in their influential powers (Rogers, 1983).

Individuals with a great deal of influence and power are identified by Rogers as opinion leaders and change agents. They function to diagnose a problem or develop a need for change; to create intent to change on the part of the organization; to translate this intent into action; and to stabilize the adoption, thus following the adoption process from agenda-setting to routinizing. The acceleration point in Rogers' model in the adoption of innovation was found to be the point at which opinion leaders adopted an innovation (Tarde, as cited in Rogers, 1995). Knowing the characteristics of the opinion leader becomes important in understanding how the diffusion of innovation takes place and at what rate it progresses.

Opinion leaders, when compared with their followers, are identified as having characteristics of higher social status, prestige, and more cosmopolitan. These individuals,

although in a position of power, still serve as the center of a communications network that allows them to stay interconnected with the people who can either assist them in stalling or moving an innovation. Opinion leaders, like other members of the social system, can lose their influence or power if they stray too far from the norms of their unit. Opinion leaders generally reduce the stress of innovation adoption by decreasing uncertainties about an innovation. Followers see opinion leaders as peers who have adopted new innovations and generally feel comfortable with the change because they see someone like themselves adopting the innovation (Rogers, 1983).

Rogers (1995) also found that individuals outside of an organization may exert influence in a social system over innovation adoption decisions and these individuals were identified as change agents. From a practical perspective, organizations could employ more targeted implementation efforts at each phase of the adoption process if someone such as a change agent understood what criteria were influential or important within each phase of the innovation adoption decision. By emphasizing only relevant criteria at each phase, the change agents can greatly enhance both the efficiency and effectiveness of the organization. This process of observing important criteria is becoming increasingly significant as organizational investments in technology continue to rise.

Havelock and Zlotolow (1995) also researched change agents and their role within an organization. They identified seven critical stages that a change agent would be involved in within a process of adoption or change: (a) Stage 0 - Concern: Someone inside or outside of the organization feels there is something wrong with the current environment. It is the change agent that makes a decision to do something and initiates the following stages; (b) Stage 1 - Relate: A relationship is established between the change agent and the organization; (c) Stage 2 - Examine: Needs and problems are identified; (d) Stage 3 - Acquire: The necessary resources are obtained

that will help effect the change; (e) Stage 4 - Try: Choose a solution among the alternatives; (f) Stage 5 - Extend: Discuss, demonstrate and, in general, make others aware of the innovation. An attempt is made by the change agent to gain acceptance of the innovation; and (g) Stage 6 - Renew: Develop a capability within the organization to maintain the innovation's use.

Darley and Beninger (1981) determined that perceptions of an innovation, and subsequent decisions to adopt, depend largely on social systems and social networks. Advice and friendship networks have been repeatedly found to influence diffusion of products and practices (Rogers, 1983). Hutchinson and Huberman (1993), in their review of knowledge dissemination and utilization in math and science education, found that the "best single predicator of knowledge use and gain is intensity of contact(s) between disseminators and receivers" (p.75). Clearly, the adoption of an innovation and its continued use relies upon the early adopters who have the knowledge of its use and will use that knowledge to spread the innovation throughout the institution.

A number of theorists have shown that social links have played a role in the adoption and use of technology. Davis (1991), in an early study of the role of social networks in diffusion of innovation, found that the roles of friendship, advisor, or formal structures might coincide or influence the adoption of innovations. Davis further observed that "information alone does not produce adoption, but social contact made adoption more likely" (p.7). He concluded that friendship ties (cohesion) probably provided the structural mechanism that facilitates early innovation adoption and diffusion.

Burnkrant and Cousineau (1975) also identified two types of social influence: (a) informational influence, which occurs when individuals accept information as evidence of reality, and (b) normative influence, which occurs when individuals conform to the expectations

of others. Social influence is hypothesized to operate through three processes: internalization, identification, and compliance (Kelman, 1983). Internalization results from accepting information from expert sources and integrating this information into one's cognitive system. Identification results from feeling some bond with a likable source and persists for as long as the likable source is still salient. Finally, compliance is produced by a powerful source having control over the message recipient in the form of rewards and punishments. Internalization is a form of informational influence while identification and compliance are forms of normative influence. The social normative component of Burnkrant and Cousineau's model captures the collective effect of these influences on behavioral intention.

Each of these aforementioned theories and models closely parallels Roger's theory, at least to the extent that diffusion is a social process that spreads through interpersonal networks (Rogers, 1995). The interpersonal nature of diffusion places the change agent and the opinion leaders in pivotal roles, thus the larger the interpersonal network and the more influence a person has the more rapid the diffusion of the innovation (Havelock & Zlotolow, 1995).

Effecting a technological change, such as the use of electronic technologies in the classroom, basically requires that an innovation be perceived as better than the existing condition. If so perceived, the innovation will be more readily adopted. Not surprisingly, according to Glaser (1983) and Rogers (1983), the easier an innovation is to understand and to use, the better its chances of adoption.

Organizational Factor

Evidence would suggest that social factor variables, however, are not the only influences related to the adoption decision. Organizational factor variables also play an important role. Roger's (1983) defined organizations by both their internal and external characteristics of

organizational structure. Internal characteristics according to Rogers consisted of centralization, formalization, interconnectedness, size, and leadership. An external characteristic according to Rogers that affected organizational innovativeness was system openness that allowed for free information exchange among the members of the organization as well as individuals external to the system. These internal as well as external organizational variables he found could affect receptivity to, and use of technology (Rogers, 1983).

Summarizing his findings from hundreds of studies in the 1960s and 1970s on organizational innovativeness due to internal organizational characteristics, Rogers (1983) concluded that there were low negative correlations between centralization (power and control in a system are concentrated in the hands of relatively few individuals), and formalization (rules and policies) to initiation of the innovation. However, if a decision to adopt a newer innovation was made, centralization and formalization he found might encourage implementation and adoption.

Studies of organizations and innovation adoption have operationalized size in such terms as the number of employees and the size of the population served. Findings, therefore, differ partly due to definitions. Rogers (1995) saw size as a probable surrogate measure of other dimensions leading to innovation, among them total resources, technical expertise of employees, and organizational structure (p. 379). He further suggested, as most researchers have consistently found that larger organizations are more innovative. Brace (1996), Craig (1995), and Kelly (1996), like Rogers found larger organizations more readily adopt newer innovations and that physical resource support was necessary for the successful diffusion and subsequent adoption of an innovation.

The Diffusion Process. An organization, according to Rogers (1995), makes the decision to adopt an innovation through a five-stage process. Opinion leaders, change agents, innovators, and potential adopters help define each stage, where they can play either major or minor roles in innovation diffusion. He identified the five stages that organizations go through in the diffusion process as: (a) agenda-setting, (b) matching, (c) redefining/restructuring, (d) clarifying, and (e) routinizing (1995).

Agenda-setting begins when an organization identifies a problem or a perceived need and goes in search of an innovation that might help to resolve this need. This portion of the five-stage cycle is continuous in nature and is a method for prioritizing the problems or needs in a hierarchical fashion. This stage not only identifies the problems but also searches for potential sources of innovations that might assist with solving the problem. However, problems or needs are not the only actions within an organization that begin the innovation decision process. Sometimes, simply knowledge or curiosity of the existence of an innovation launches the process. In academia, mandates from the university show that leaders have identified problems and searched for solutions. This process of identifying problems and solutions according to Rogers is continuously underway in every organization (Rogers, 1983).

Matching takes place when a problem and an innovation can be coordinated within an organization. Thus an evaluation process takes place to determine if the innovation fits with the needs of the organization. This stage further recognizes what the adoption would really mean for the organization. During this time a change agent may be hired to assist with the adoption and innovation process. This individual may assist with or be responsible for the stages of the innovation adoption from the definition of an adoption plan to the implementation stage (Rogers, 1983).

Rogers referred to the combination of the first two stages of agenda-setting and matching as initiation. This period is further explained by Rogers as "information gathering, conceptualizing, and planning for the adoption of an innovation, leading up to the decision to adopt" (p. 394). One strategy that organizations can use to boost the adoption rate during these periods is to offer the innovation on a trial basis. Innovations adopted on a trial basis are generally adopted more rapidly (Rogers, 1995). After the initial stage is completed, the next stages of implementation are defined.

Redefining/restructuring includes both changes to the innovation and to the organization. The innovation is reinvented, often resulting in a proliferation of adding and discarding through a process of redefining (Van de Ven & Poole, 1990). The researcher needs to be aware that the innovation will not evolve in the same way for all users (Eveland et al., as cited in Rogers, 1995). Innovations change as they are adapted to the particular needs of users; Rogers defined this adaptation as reinvention. Throughout this stage, uncertainties about new innovations can also arise. Technology is a case in point. Research on the adoption of computer innovations in organizations has shown that individuals with little or no technical knowledge are likely to act as barriers in the adoption process, thus delaying implementation (Rogers, 1995). Rogers in his study of the diffusion of an education innovation in schools throughout Ontario found that an infrastructure designed to meet the communications needs of an innovation can circumvent this barrier. For organizations in the adoption process it is important for organizations to lower or eliminate those barriers through training or education, or by finding ways to make the technology easier to use.

Clarifying occurs when more people decide to use the innovation. It is a normal process during this period for individuals to discuss with colleagues the innovation and its uses. Through

this process individuals are more likely to gain an understanding of the innovation's usefulness. The primary goal during this stage is to acquire enough information and have decisions made so that the adoption of the innovation can move to a point of sustainability known as critical mass. It is also within this period that the innovation becomes embedded into the organization's structure (Rogers, 1995).

Routinizing is the last stage in the organization's adoption process. During this period the innovation becomes absorbed into the organization and is no longer seen as something new. Support for the innovation is shown through continuous monetary support, management activities that may include informational meetings, and the establishment of links between the innovation and the organization. It is also during this time that adopters may pull out of the implementation process thus causing the adoption not to succeed. Opinion leaders and change agents also continue to have responsibilities at this stage to provide information and support to adopters. This support maintains an important communication link between the adopters and the innovation (Rogers, 1983).

Consequences of Innovation Adoption. The changes that can occur within an organization due to the adoption or rejection of an innovation are according to Rogers (1995) hard to identify. Each consequence will be different, and thus hard to predict. Change agents often presume that the outcome or consequences of all innovations will be a positive one. Rogers found that consequences of innovations were difficult to study because the innovation adoption and implementation decision occurred over an extended period of time and individuals were usually not fully aware of the consequences of their decision.

Another problem in measuring consequences is that these consequences are often intertwined with other decisions and effects. Ideally, Rogers (1995) stated, "we should only

measure the consequences that are exclusively the outcome of the innovation, the changes that would not have occurred if the innovation had not been introduced" (p.412).

Adopter Categories

Rogers (1983) reported that due to certain innovation factors people adopt innovations at different rates. By grouping people according to how quickly they adopt an idea, Rogers came up with five different adoption categories: innovators, early adopters, early majority, late majority, and laggards. Each category of adopters has specific characteristics.

Rogers labeled the first 2.5 % of adopters as innovators. Innovators are seen as venturesome, as obsessed with trying new ideas, as seekers of information, as able to understand complex issues, as well-traveled, and as able to cope with uncertainties (Cottrell, 1997). These individuals are the first to bring the innovation to the rest of the group and are generally networked with other innovators. They are also typically distanced from the majority of the system members, therefore making their communication style and influence ineffective in bringing others to an adoption decision (Schwarzbach, 1999).

The next category that consists of 13.5% of adoptees are the early adopters. Rogers (1995) indicated that early adopters of innovations tend not to be different in age, but they do have more years of education and higher social status. They also have upward social mobility, are in larger organizations, have greater empathy, are less dogmatic, and have a greater ability to deal with abstractions. Early adopters also have greater rationality and intelligence, greater ability to cope with uncertainty and risk, higher aspirations, and more contact with a larger number of people. They are well respected, are opinion leaders who are looked to for advice from their peers, and are considered to be role models who tend to decrease the uncertainties of new ideas by researching and evaluating them closely (Cottrell, 1997).

Early adopters also possess different characteristics from late adopters in that they tend to be more empathetic, can more easily project themselves into the roles of individuals they wish to influence, and are believed to be more open-minded and less dogmatic. Individuals identified as early adopters tend to have more contact with change agents and possess a high degree of opinion leadership (Rogers, 1995).

Recent studies support Rogers' (1983) research in the adopter categories. One such study looked specifically at early adopters and the use of electronic communication networks (ECN) for teachers (Hamilton, 1992). Thirty-five individuals, including university professors, graduate students, and student teachers, were chosen from a list of frequent ECN users to answer questions related to problem solving and the use of electronic systems. The researchers found results similar to Rogers. These early adopters of the networked communication system displayed the characteristics Rogers found to be indicative of early adopters, such as a high degree of innovation, a favorable attitude toward risk and change, and an ease in personal communication. The participants were also found to have a higher record of social participation.

Edwards (1998) conducted another study of early adopter characteristics with seven classroom teachers as subjects. The researcher looked at the diffusion process and studied the patterns of problem solving and perceptions of the teachers who were attempting to implement telecommunications technology in their classrooms. The participants encountered difficulties in acquiring reliable network service and project partners, but they used ingenuity to solve the problems. Edwards concluded that the behavior of the participants in the areas of both problem solving and implementation were in general agreement with previously discovered characteristics of early adopters of technology as identified by Rogers. He further found that the

early adopters in the study perceived telecommunications as an exciting tool for learning, which led them to be more effective in innovation adoption and diffusion.

Rogers (1995) found that the next category, early majority adopters, are deliberate, interact frequently with their peers, and are willing to try new innovations but are not willing to be the leaders. This group provides the link between the early and late adopters in the social system interpersonal network. According to Roger's model, this group of adopters accounts for one third of the members of a system. The innovation-decision period of early majority adopters is relatively longer than that of the early adopters, as they are seldom the leaders in the adoption of an innovation.

The late majority of adopters were found by Rogers (1995) to be skeptical, cautious, and uncomfortable with uncertainty. Further, peer pressure or economic necessity was necessary to convince them to use new innovations, and they accounted for about one third of the innovation acceptance population. These individuals wait until the majority of the others in their social system adopt an innovation before they do. It is also these individuals that are characterized by a need for greater support. If they become disenchanted with an innovation these are the individuals who will quickly discontinue their support.

At the other end of the bell-shaped curve were the laggards, who accounted for 16 % of the population of adoptees. Laggards are individuals who are traditional in their scope, are suspicious of innovations and change in their current system, can rationalize the delay in adoption of new methods, and refer to their past experiences for guidance. They are the last individuals to adopt an innovation and will generally do so, but not without resistance. Their innovation adoption process is based on limited social resources, and the innovation must be guaranteed not to fail (Rogers, 1995).

Davis (1991), like Rogers (1995), also contended that if this adoption rate is correct, evidence of social contagion or a snowball effect should appear in any population containing substantially more than 2.5 % of early adopters, although the overall pattern of social interaction within the institution may influence the speed of diffusion. For instance, early adopters who view electronic technologies as a general communication tool may be especially likely to disseminate the use of these technologies to people with whom they regularly communicate (e.g., their friends at work). Rice, Grant, Schmitz, and Torobin (1990) examined the adoption of an internal electronic messaging system in a small government office and found that two-way communication links led to similar adoption behavior. These findings suggested that having friends who are using email should increase the likelihood of adoption. Under this model, the early adopters are the individuals who are spreading their practices through their social links, further supporting Rogers' theory.

Other research (Fulk, 1993) showed that people who use electronic technologies do so because of socially constructed values in their work groups, examples of which include interpersonal relationships, decision processes, and common goals. Those shared intradepartmental values drive the use and adoption of electronic technologies. Social identification, fostered by relations with others in the same department, could contribute to diffusion of new electronic technologies. Under Fulk's model, early adopters act as standard-bearers who bring the technology to their department, initiate construction of congruent values, and spread the use of the technology within that particular department.

Faculty Motivation

In addition to those departmental shared values, according to Clark, Corcoran, and Lewis (1986) faculty members aim for different professional achievements and goals as they progress

through their career stages. Blackburn & Lawrence (1995) characterized adulthood in terms of life stages and emphasized that the passage through the stages is not linear but dynamic and cyclical. Similarly, faculty stages outlined by Braskamp and Ory (1994) point to career patterns that reflect adaptations to successes and failures, as well as shifts in personal interests. Motivation of university faculty varies with different personal goals, with professorial ranks, and with the type of institution in which they are employed. Faculty at large research-oriented universities generally have different career goals and values than faculty at teaching-oriented universities. Assistant or associate professors have more short-term priorities such as publishing or tenure pressures, whereas full professors' work encompasses consulting, entrepreneurial endeavors, advising, and possible increased involvement in administration (Braskamp & Ory, 1994). Faculty motivation can also be influenced by the institutional culture--its values, norms, and reward structure.

According to Herzberg (1959) two types of factors are necessary to increase employee satisfaction and motivation in the workplace. His dual-factor theory pertains to two different types of employee needs; those are hygiene factors and motivator factors. Hygiene factors are those basic work factors--job security, working conditions, quality of supervision, interpersonal relations, status, and adequacy of pay and benefits--that if lacking, can cause dissatisfaction. While the presence of these factors does not in itself produce satisfaction, they are essential, since without them an employee can become dissatisfied, a condition that could lessen motivation.

However, when hygiene factors are provided in the work place there is the potential for motivation. Herzberg (1959) suggested that the motivational generators, such as self-fulfillment, self-actualization, and a work environment that is creative and challenging, are part of the factors

that influence an employee's performance and motivation. The factors of responsibility and the recognition and growth that are secured from the work environment are also considered to be motivational factors. True motivation, according to Herzberg, comes from within the employee, thus suggesting that intrinsic motivational factors may be just as important as extrinsic factors.

Faculty Roles and Responsibilities

Charles W. Eliot, when he assumed the presidency of Harvard College in 1869, declared, "the prime business of American professors . . . must be regular and assiduous class teaching" (Boyer, 1990, p.4). The establishment of land grand colleges later in the century included a new goal of providing service to society, and the turn of the century saw the influence of German research universities and the notion of scholarly research.

Generally, the complete trilogy of teaching, research, and service is required of all full-time university faculty in relationship to tenure and promotion issues. The quantitative definition of teaching typically includes course load; that is, the number of credit hours assigned to a faculty member. This includes undergraduate and graduate classes as well as advising and field supervision (Froh, Gray, & Lambert, 1993). But what are not addressed in this definition are other duties faculty members perform, such as course development, course preparation, student assessment, tutoring, or one-on-one mentoring work.

Traditionally, in many higher educational institutions a faculty member's teaching workload has been determined by using the semester credit-hour approach. This approach has been based upon the assumption that the primary responsibility of a faculty member is classroom teaching. Historically, this approach worked well when most instruction occurred in three credit hour courses delivered primarily by the lecture method and on university campuses. The problem, however, is that changes have occurred both in the instructional methods used and the

locations of where these topics might be taught. Some classes for instance are taught in off-campus locations or through distance learning technologies. For faculty, the issues of offering their course materials electronically bring forth concerns regarding faculty evaluations, evidence of productivity, along with the design of an appropriate reward system for their work.

The qualitative definition of teaching describes personal characteristics that a faculty member is expected to exhibit in relation to teaching activities. Boyer (1990) stated "teaching should be a dynamic endeavor that involves all of the analogies, metaphors, and images that can build bridges between the teacher's understanding and the student's learning" (p. 23).

Sometimes productivity is measured in numerical terms, such as the number of students or courses taught. For some faculty, the measure of productivity may be an award received by an undergraduate or graduate student. Each of these actions may be associated with different values, depending upon the academic disciplines of the faculty member and the employing institution.

Research, which is generally required of all university faculty is generally defined by its product, not its purpose (Diamond & Adam, 1993). The general purpose of research may include the advancement of knowledge, the creation of new knowledge, the integration of knowledge, or the application of new knowledge (Froh et al., 1993). Some of the products that faculty may produce include books, refereed journal articles, conference papers, and the reviews of books or essays. Works of art, published proceedings of scholarly work, or professional presentations are generally considered research by most institutions. Research accomplishments are also easy to count and to document.

Service is another major component of faculty work and can take place in various spheres. There is institutional service (e.g., university or departmental committee work), professional service (e.g., consulting, editing a journal), and community service (e.g., application

of academic expertise outside the institution). Another type of service is private service, where the faculty member volunteers to perform non-academic work for local, regional, national, or international organizations. Enumeration of service-related activities is fairly easy. Serving on committees and editing journals can also be easily documented and counted (Boyer, 1990).

Instructional Technology Benefits

Instructional technologies have offered benefits in all three dimensions--teaching, research, and service--to both student and faculty member. According to Ferguson and Morris (1993), personal satisfaction is the major benefit one should expect from successful use of instructional technologies. He further states that successful instructional technology adoption has allowed teachers who take pride in their work to improve their teaching, and in return to become the recipients of student gratitude (Ferguson & Morris, 1993).

Another potential benefit to faculty using computers for instructional purposes is the acquisition of skills that may be useful in other areas of their professional life. Many faculty have embraced computer-based word processing as a means of dealing with the administrative tasks in their professional lives, such as writing student recommendations or reference letters, preparing articles for publication, or compiling information describing their accomplishments (Keyes, 1989). But word processing packages, along with other tools such as on-line databases and the Internet, have stimulated some scholars to expand their use of computers beyond the realm of research and into their other professional activities of teaching and service (Frisbie, 1989).

With the availability of network connections, faculty members will have unprecedented autonomy in the production and dissemination of teaching and classroom materials. Electronic technologies will allow the faculty member to post assignments and other classroom materials electronically so that students will have ready and easy access to the materials.

Recognition within one's own institution is another benefit that may be derived from the use of instructional technologies. Deans, department chairs, and especially students know good and bad teaching reputations. Effective use of electronic instructional technologies in the classroom, according to Ferguson and Morris (1993), is one way to develop a reputation for good teaching. Such a reputation attracts hard-working students, and a faculty member's recruitment of such students is a substantial contribution to the faculty member's department, college, and university. According to Ringle (1996), the results of investments in the use of electronic technologies are improved quality and the ease of learning that would not be possible without these technologies.

Summary

It is evident from a review of the literature that there are a number of factors that influence the success of an innovation adoption. According to Everett Rogers and other researchers these factors include social, organizational, personal motivational, and adopter behavior characteristics.

The goals of a faculty member in higher education are associated to a greater or lesser degree with the elements of the traditional faculty performance trilogy of teaching, research, and service. While some faculty have incorporated technology in their classrooms, others have not. The adoption decision process provides a perspective for a study of which, if any factors influence faculty members' use of electronic instructional technologies in the delivery of instruction.

Chapter 3

This study investigated a sample of university faculty who have access to both knowledge and resources, and are employed in institutions where some peers are already expected to be embracing newer technological teaching methods. Given the multi-faceted benefits made possible by newer technological opportunities, as well as the expressed value placed on the technology adoption and diffusion process by universities, this study provided a description as to what kinds of factors are influencing faculty in their decisions to adopt newer technology methods. These factors can be classified into four groups and all are expected to influence faculty members' decisions to adopt newer electronic technological methods. The factors are shown in Table 1.

The purposes of this chapter were to (a) describe the research methodology of this study, (b) explain the sampling technique, (c) describe the procedure used in designing the data gathering instrument and the administration of the survey, and (d) provide an explanation of the statistical procedures used to analyze the data.

Research Design

Davis (2000) proposed, "quantitative research typically involves structured survey questioning of some type that is subsequently numerically and statistically analyzed" (p. 264). This research design also allows the researcher to collect and analyze data that generally consists of more than a few observations, which may not be the case with qualitative research. Additionally, Davis distinguished between active and passive data collection. He found that active data collection that consists of personal, telephone, mail, or computerized methods requires respondents to participate actively in the process of obtaining data, whereas passive data collection methods do not.

Table 1

Factors that influence faculty members' use of electronic technologies in the delivery of instruction

Factors	Description
Social	Peer support Peer pressure Mentors Shared values Friends Students
Organizational	Formal recognition on a department, college, university level Mandate from the university Reward system Physical resources
Personal Motivational	Personal interest in instructional technology Improvement in teaching Enhancing Student Learning
Adopter Behavior Characteristics	Innovators Early Adopters Early Majority Late Majority Laggards

This study was formulated to identify and examine which, if any, of the social, organizational, and personal motivational factors influence faculty in the use of electronic technologies in the classroom. More specifically, the primary objective of the study was to investigate through the use of a survey instrument those variables within each of the factors and the factor itself that were identified as significant in their influence. Therefore, this study was best suited to a quantitative research design and active collection method.

Data Collection

Fowler (1993) stated that the main way of collecting information is by asking people questions; their answers constitute the data to be analyzed. While there are different applications for conducting surveys the purpose appears to be the same. The main purpose of any survey is to provide statistics that are quantitative or numerical descriptions of some aspect of the study population (Fowler, 1993).

A survey questionnaire was disseminated by mail to 80 faculty members teaching an introductory accounting class at the universities specified in the Selection of the Sample. According to Boulware (1994), one of the most widely used instruments used in descriptive research is the survey questionnaire. Questions, according to Sudman and Bradburn (1982), must be unequivocal, be unbiased, address a single idea in any one question, and be reliable. A rationale was developed for each question on the survey instrument to assure that questions met the standards of a good questionnaire. The survey instrument included questions on the demographics of the sample population, the characteristics of adopter behaviors, the frequency of the types of technology used, and the factors that influenced the faculty members' decision to adopt electronic technologies in their delivery of instruction.

Each packet mailed to participants contained an individually addressed cover letter (Appendix A), a questionnaire (Appendix B), and a self-addressed, stamped envelope Names and addresses for faculty were found through the universities web site or in the Prentice Hall Accounting Faculty Directory.

Questionnaires were numbered for tracking purposes. This allowed the researcher to know who had responded and who had to be contacted in subsequent efforts to get questionnaires returned. The tracking number was used for response information was not used to report individualized information. This is a similar questionnaire procedure as described by Alreck and Settle (1985).

Kerlinger (1986) maintained that responses to mailed questionnaires are generally poor. Returns of less than 40% or 50% are common. He concluded that the return rate of questionnaires depends upon the length and the relative importance of the survey to the respondents. For these reasons, the researcher chose a topic of current relevance and gave considerable attention to the length of the survey.

To ensure a response rate no less than 40% – 50%, a follow-up telephone survey method was used for those participants who had not returned the questionnaire after two weeks. According to Frey and Oishi (1995) telephone surveys generally have a higher response rate than mailed questionnaires. They further elaborate, "although the sample may be systematically distributed, only those respondents personally motivated in the subject matter are likely to return the mailed questionnaire."

Selection of the Sample

The University of North Carolina Board of Governors is the policy-making body legally charged with the general determination, control, supervision, management, and governance of all

of its 16 university campuses. The researcher studied 12 of the 16 public 4-year institutions of higher education within North Carolina that have an accredited School or College of Business (Table 2). These institutions were chosen in order to obtain a homogenous sample. The characteristics of homogeneity related to this study consisted of the following: a) governed by the same state legislature, b) the same Board of Governors, c) the same accrediting agency, d) the same department, and e) the same course work. Additionally, since all institutions studied are accredited by the same accrediting agency, faculty members are assumed to possess similar academic and professional qualifications.

To control for extraneous factors in college majors where technology is required, the accounting major was selected because of its relationship to an industry that is somewhat guided by technology (Davidson & Etherington, 1995). As required by AACSB standards, introductory accounting courses are a core requisite for a business major. The introductory accounting course was selected because it helps to build a foundation for all subsequent business courses and all business majors.

It is assumed that an examination of faculty teaching the same course at a sample of higher education state institutions with accredited Schools or Colleges of Business would have a similarity of purpose, focus, and resource allocation which would lend itself to providing meaningful information. The faculty who teach accounting courses still have the choice as to whether or not they will embrace the use of technological methodologies in the their classrooms and in their communications with their colleagues and students.

Instrumentation

An instrument was developed for this study that investigated the factors that may influence a faculty member's decision to adopt electronic technologies in the delivery of

Table 2

Accredited Schools or Colleges of Business In North Carolina

Institutions
Appalachian State University
East Carolina University
Fayetteville State University
North Carolina Agricultural & Technical University
North Carolina Central University
North Carolina State University
University of North Carolina at Chapel Hill
University of North Carolina at Charlotte
University of North Carolina at Greensboro
University of North Carolina at Pembroke
University of North Carolina at Wilmington
Western Carolina University
Total 12

instruction. More specifically, the questionnaire was designed to elicit information from participants concerning how those decisions are influenced by social, organizational, and personal motivational factor variables. The items were based upon factors that were identified in Rogers' diffusion of innovation theory and other literature pertaining to self-motivational factors (Blackburn & Lawrence, 1995; Braskamp & Ory, 1994; Herzberg, 1959).

The instrument was divided into four sections. The first section of the questionnaire educed demographic and self-identified adopter behavior information from participants used in data analysis (e.g., rank, tenure status, level of experience). The remaining questions elicited data about the research hypotheses posed in the study.

The next section contained 18 items designed to determine the frequency of use of electronic technologies in the delivery of instruction. This section investigated a variety of electronic technologies, ranging from computer and projector use to on-line chat rooms. The instrument employed a Likert scale to elicit participants' responses related to questions describing the frequency and type of electronic technology used. A rating scale of 1 to 5 was employed to best describe the frequency and use of each technology. The participant assigned a rating of 1 if they had never used a technology and a 5 if they had used it almost all the time.

The third section consisted of 20 items, which solicited responses related to the participants' attitudes and predisposition toward a set of social and professional actions. A Likert scale ranging from 1 to 4 was also employed, where the participants assigned a rating of 1 if they strongly disagreed with the statement and a 4 if they strongly agreed.

The fourth section contained 13 social, organizational, and personal motivational factor variables such as peer support, friends, mandate from the university, and a personal interest in instructional technology. The purpose of this section was used to examine the influence of these

variables on a participant's decision to adopt electronic technologies in the delivery of instruction. Variables that participants identified as not important were assigned a ranking of 1, and variables that participants identified as very important were assigned a ranking of 4. The participant assigned a ranking of 5 if they felt that the statement was not applicable.

The Pilot Study

A pilot test of the questionnaire was conducted in two AACSB accredited colleges of business in the state of West Virginia and three AACSB accredited colleges of business in the state of South Carolina. These institutions were also selected because they were public 4-year institutions and contained departments of accounting.

Each of the 24 subjects in the pilot test was given the proposed cover letter and questionnaire. Completion instructions were included on the questionnaire. Participants were asked to note areas of difficulty on the questionnaire as they were completing it. No other written or verbal instruction was provided. The participants were asked to return the completed questionnaire within two weeks.

The pilot study was able to provide information concerning ambiguities within the questionnaire thus dealing with the issue of content validity. Content validity is a subjective measure of how appropriate the items seem to a set of reviewers who have some knowledge of the subject matter (Davis, 2000). Based upon the results of the pilot study, several sections of the questionnaire were reorganized and revised. These recommendations are identified in Table 3. This process of review resulted in the final questionnaire that was used in this study.

Procedures for the Analysis of Data

The returned surveys were examined for completeness. All surveys that had one or more parts incomplete were discarded. After collection of the questionnaires was completed,

Table 3

Pilot Study Faculty Surveyed and Recommendations

Faculty	Responses
West Virginia	Question 8, are these questions doing what they are intended to do? Are they intended to indicate consistency? If so, you may want to reframe the wording. Your definition of use of technology is limited, and the design for the respondents is not slick. You could have used some programs to design the questionnaire so that is becomes convenient to respond.
South Carolina	In Question 1 add the word university behind institution In Question 2 add the word full-time In Question 3 add the word Current to Rank and change Years in the Profession one line with Total Number added to it Add a category of Other to Question 4 In Question 6 add "only one" to the following labels and the word "that" before best. Add "Not Applicable" to Question 9. Reorder so that Strongly Agree appears first in Question 8 and "Almost all the time" appears first in Question 7. Reverse the order in Question 7 so that Laggards appear first. Question 8, make statement b as a source of contact not primary, and statement c take out created and used and change to "includes an online syllabus with hyperlinks to class resources. Align all of the responses. Question 8, add a neutral response. Add the statement "to share ideas" with Early Majority Adopters and to Early Adopters "could be a leader."

the data was coded and keyed into a database using the Statistical Analytical System (SAS) where several statistical techniques were used.

A number of demographic characteristics were addressed in Questions 1-5 of the questionnaire such as rank, tenure status, and level of technology experience. An ANOVA was used to investigate differences between means of the different categorical groups. This analysis was most suitable to test for differences in mean responses of the types of technology used by self-identified adopter categories and variables describing the effect of social, organizational, and personal motivational factors (Questions 6 & 7).

To analyze Question 8, *a priori* analysis was performed using participants' responses and predetermined adopter categories according to Rogers' definition of adopter behavior characteristics. The frequency of these responses was then calculated that formed the *a priori* adopter categories.

Social, organizational, and personal motivational factor variables are addressed in Question 9. Mean values, standard deviations, *t*-values, and *p*-values were used to identify statistically significant variables. These statistically significant variables were then used to create a grand mean that was used in the correlation analysis.

Summary

This chapter explained the methodology used to accomplish the objectives of the study. It included a discussion of the population, the research sample, the development of the questionnaire, the distribution procedures for the questionnaire, and the data analyses performed.

Chapter 4

The purpose of this chapter is to report the findings of the study. This study was conducted to identify and examine substantive relationships among the variables germane to the factors that may influence a faculty member's decision to adopt electronic technologies in the delivery of instruction. Information is presented in three sections. The first section presents the demographic results of a survey sent to faculty members who taught introductory accounting classes at 4-year universities in accredited colleges or schools of business within the state of North Carolina. The second section presents the results of the tests among the multi-faceted set of factors that may influence a faculty member's decision to adopt electronic technologies in the delivery of instruction. Additionally, the differing types of technologies and the frequency of use of each of these types are addressed in this section. The third section presents the results of the survey responses associated with each research question.

The significance level for each test was set at a= 0.05. This significance level was selected because of the exploratory nature of the study.

Survey Response

As noted in Chapter 3, surveys were mailed to 80 faculty members who taught introductory level accounting classes at 12 institutions of higher education in North Carolina that housed accredited colleges or schools of business. A total of 45 surveys were returned by the deadline of March 20, 2001, and 5 surveys were returned by the second deadline of April 3, 2001. Although 50 surveys were received by the second deadline, 6 respondents indicated they were non-participants in the use of electronic technologies in the delivery of instruction and, therefore, were not included in the sample. This resulted in a sample size of 44, with an overall response rate of 55%.

Characteristics of the Sample

Demographic information reported by the participants indicated that the average number of students enrolled at their institution was 14,579 and the average number of faculty members in their department was 13.14. Seven (7, 15.9%) of the 44 respondents held the rank of professor for an average of 13.39 years while twenty (20, 45.5 %) assistant and seventeen (17, 38.6%) associate professors averaged about 7 years of service in their current rank. The total number of years in the profession for all three ranks showed an average of 13.94 years. Additional demographic characteristics of the respondents such as rank, tenure status, level of experience, and adopter behavior self-identified categories are summarized in Table 4.

Twenty-eight (28, 63.6%) of the participants were tenured faculty. Non-tenured or tenure-track faculty accounted for sixteen (16, 36.4%) of the respondents.

Of the sample, twenty (20, 45.5%) of the respondents identified themselves as novices in their level of experience in the use of electronic technologies in the delivery of instruction. Twenty-one participants (21, 47.7%) ranked their level of experience as proficient while three (3, 6.8%) of the respondents ranked themselves as experts.

Self-identified adopter behavior categories were analyzed. Each of the categories was described using actions or behaviors that had been identified by Rogers (1983) in his explanation of adopter behavior characteristics and categories. Though he found that there were individuals that were identified as laggards, none of the respondents in this study self-identified themselves as Type 1 (laggards). Eight (8, 18.2%) of the respondents labeled themselves as Type 2 (late majority adopters), seventeen (17, 38.6%) of the respondents were Type 3 (early majority adopters) and fifteen (15, 34.1%) were Type 4 (early adopters). Four (4, 9.1%) of the respondents self-identified themselves as Type 5 (innovators).

Table 4

Characteristics of the Sample (N=44)

Characteristics	n	%
Rank		
Professor	7	15.9
Associate Professor	20	45.5
Assistant Professor	17	38.6
Tenure Status		
Tenured	28	63.6
Non-Tenured (tenure track)	16	36.4
Level of Experience		
Novice	20	45.5
Proficient	21	47.7
Expert	3	6.8
Adopters		
Type 1 – Laggards	0	0.0
Type 2 – Late Majority	8	18.2
Type 3 – Early Majority	17	38.6
Type 4 – Early Adopters	15	34.1
Type 5 – Innovators	4	9.1

Data Analyses

The summarized data in this section is presented in a tabular form. The observations that had a response of "Not Applicable" were eliminated prior to the computation. A table for each type of motivational factor--social, organizational, and personal--was generated. The table presents all of the variables pertaining to the factor and through a t-test procedure identified those mean responses that were significantly greater than 2.0, which indicates that these variables had a mean response of at least "Somewhat Important."

Shown in Table 5 are the mean scores, standard deviations, *t*-values and observed significance values (*p*-values) for all of the variables pertaining to social factor that influenced a faculty member's decision to adopt electronic technologies in the delivery of instruction. Prior to the computation, observations of "Not Applicable" were eliminated. The *p*-value of less than 0.05 suggests the rejection of the null hypothesis, which in this case tests that the mean value of the variable is less than or equal to 2.0. The same conclusion can be reached when the calculated value of the *t*-statistic is greater than the table value of *t*. The variable identified as "students" appeared to be the most important among all of the variables within the social factor (mean = 2.90) on the Likert scale of 1 to 4, with 2 being somewhat important and 3 being important.

Overall mean scores, standard deviations, *t*-values and *p*-values for all of the variables considered to be organizational factor were reported in Table 3. The variable, "physical resource support," yielded the mean of 3.64 emerging as the most important variable. "Mandate from the university" was next with a mean of 2.33, thus appearing to be somewhat important in the decision a faculty member makes to adopt electronic technologies. The variable "institutional reward system" showed a *t*-value of –0.50, indicating that the sample mean is less

Table 5

Significant Social Factor Variables Involved in the Decision to Adopt Electronic Technologies

(N=41)

Variable	M	SD	t	p
Peer support	2.55*	1.02	3.54	0.0010
Peer pressure	2.07	1.00	0.45	0.6526
Mentors	2.00	0.86	0.00	1.0000
Shared values in my department	2.82*	0.99	5.46	0.0001
Friends	2.41*	1.00	2.73	0.0093
Students	2.90*	0.86	6.72	0.0001

Note. Scale values were calculated using 1 = not important, 2 = somewhat important, 3 = important, 4 = very important. However, values of 5 = not applicable were eliminated prior to the computation.

* $p < .05$, mean is statistically greater than 2.0.

Table 6

Significant Organizational Factor Variables Involved in the Decision to Adopt Electronic Technologies (N=38)

Variable	M	SD	t	p
Mandate from the university	2.33*	0.92	2.24	0.0307
Institutional reward system	1.92	0.98	-0.50	0.6188
Formal recognition of a department, college, university level	2.07	1.08	0.43	0.6672
Physical resources (equipment, hardware, software)	3.64*	0.73	14.65	0.0001

Note. Scale values were calculated using 1 = not important, 2 = somewhat important, 3 = important, 4 = very important. However, values of 5 = not applicable were eliminated prior to the computation.

* $p < .05$, mean is statistically greater than 2.0.

than 2.0. Hence, it does not support the alternative hypothesis that the population mean is greater than 2.0.

Variables of personal motivational factor means, standard deviations, *t*-values and *p*-values were shown in Table 7, with all of the variable means appearing as significantly larger than 2.0. In fact, all of the variables within this factor had a mean above 3.0, indicating that they fell within the range of important to very important. "Personal interest in improvement in teaching" appeared to be the most important variable followed by "personal interest in student learning" and "personal interest in instructional technology."

Additionally examined were the types of electronic technologies used and the frequency of use of each type. Either Spearman's correlation analysis or ANOVA was used, as deemed appropriate for each research question. According to Davis (2000), Spearman's correlation analysis is widely used to establish the strength between ordinal variables such as never, seldom, and occasionally. Spearman's coefficient is the nonparametric equivalent to the Pearson coefficient that does not require that two variables have bivariate normal distribution.

To determine the relationship between size of the institution and size of the department with the social, organizational, and personal motivational factors, a Spearman correlation analysis was performed. The group mean of significant variables of each factor was used in performing this analysis. The correlation analysis result, which is shown in Table 8, did not determine a significant association of the above-mentioned factors with the number of students in the university and the number of faculty in the department ($\alpha = 0.05$). In fact, it appears that, as student enrollment increases, social factors and organizational factors are less influential on a faculty member's decision to adopt electronic technologies. The opposite relationship was

Table 7

Personal Motivational Factor Variables Involved in the Decision to Adopt Electronic Technologies (N=35)

Variable	M	SD	t	p
Personal interest in instructional technology	3.18*	0.93	7.99	0.0001
Personal interest in improvement in my teaching	3.65*	0.48	20.72	0.0001
Personal interest in enhancing student learning	3.58*	0.65	14.63	0.0001

Note. Scale values were calculated using 1 = not important, 2 = somewhat important, 3 = important, 4 = very important. However, values of 5 = not applicable were eliminated prior to the computation.

* $p < .05$, mean is statistically greater than 2.0.

Table 8

Results of Spearman's Correlation Analysis Between the Number of Students in the University, Number of Faculty in the Department and Social Factor, Organizational Factor, and Personal Motivational Factor

Variable 1	Variable 2	r_s	p
Social Factor	Number of students in the University	-.0753	.6400
Social Factor	Number of faculty in the department	.0721	.6543
Organizational Factor	Number of students in the University	-.1856	.2647
Organizational Factor	Number of faculty in the department	-.0792	.6363
Personal Motivational Factor	Number of students in the University	.0586	.7381
Personal Motivational Factor	Number of faculty in the department	.0134	.9390

Note. Statistically significant social factor variables include peer support, shared values in the department, friends, and students. Statistically significant organizational factor variables include mandate from the university and physical resources. Statistically significant personal motivational variables include personal interest in instructional technology, personal interest in improvement in my teaching, personal interest in enhancing student learning.

* $p < .05$.

observed between social and personal motivational factors and the number of faculty in the department.

The ANOVA results on the effects of social, organizational, and personal motivational factors are reported in Tables 9, 10, and 11. These tables show that the means of each of the categories of rank, tenure status, level of experience, and self-identified adopter behavior categories were not significantly different.

Reported in Table 12 are the means, standard deviations, *t*-values and *p*-values pertaining to the usage of electronic technologies. A Likert scale of 1 to 5 was employed, with 1 being never and 5 being almost all the time. Computations used in this table included all five values. The six variables whose means were statistically greater than 2.0 were represented with an asterisk. These variables included "used internet research and searches", "used email as a primary source of student contact outside the classroom", "used a computer and projector in the classroom", "created and used on-line syllabus with hyperlinks to class resources," "provided web based grades," and "exchanged student written work via the web."

The correlation analysis results shown in Table 13 addresses the relationship between significant social factor variables and the frequency and number of types of technologies used. No significant relationships were identified. Similar analyses were performed on both the organizational and personal motivational factor with the findings being presented in Table 14 and Table 15, respectively. As observed earlier with the social factor, the data did not provide any significant relationships for either the organizational or personal motivational factor. Table 16 depicts a one-way ANOVA that was applied to each variable pertaining to the use of electronic technology along with multiple comparisons of means for each of the self-identified adopter categories. A review of the table suggests that seven of the 17 variables were

Table 9

Results of ANOVA Procedure with Multiple Comparison of the Means for Demographic and Adopter Variables on the Effect of Social Factor (N=44)

Variable	n	%	M	F	df	p
Rank				0.93	2,38	0.4032
Full Professor	7	15.9	2.82			
Associate Professor	20	45.5	2.51			
Assistant Professor	17	38.6	2.83			
Tenure Status				0.06	1,39	0.8076
Tenured	28	63.6	2.72			
Non-Tenured (tenure track)	16	36.4	2.66			
Level of Experience				1.02	2,38	0.3707
Novice	20	45.5	2.57			
Proficient	21	47.7	2.84			
Expert	3	6.8	2.25			
Adopters				1.62	3,37	0.2005
Laggards	0	0.0	--			
Late Majority	8	18.2	2.53			
Early Majority	17	38.6	2.98			
Early Adopters	15	34.1	2.43			
Innovators	4	9.1	2.67			

Note. Comparison of means of social factor within rank, tenure status, level of experience, and adopters.
* $p < .05$.

Table 10

Results of ANOVA Procedure with Multiple Comparison of the Means for Demographic and Adopter Variables on the Effect of the Organizational Factor (N=44)

Variable	n	%	M	F	df	p
Rank				0.20	1,33	0.1503
Full Professor	7	15.9	2.79			
Associate Professor	20	45.5	2.94			
Assistant Professor	17	38.6	3.25			
Tenure Status				0.17	1,36	0.6806
Tenured	28	63.6	3.00			
Non-Tenured (tenure track)	16	36.4	3.08			
Level of Experience				3.17	2,35	0.0544
Novice	20	45.5	2.94			
Proficient	21	47.7	3.19			
Expert	3	6.8	2.25			
Adopters				1.26	3,34	0.3048
Laggards	0	0.0	--			
Late Majority	8	18.2	2.94			
Early Majority	17	38.6	3.22			
Early Adopters	15	34.1	2.91			
Innovators	4	9.1	2.67			

Note. Comparison of means of organizational factor within rank, tenure status, level of experience, and adopter.
* $p < .05$.

Table 11

Results of ANOVA Procedure with Multiple Comparison of the Means for Demographic and Adopter Variables on the Effect of Personal Motivational Factor (N=44)

Variable	n	%	M	F	df	p
Rank				0.84	2,32	0.4397
Full Professor	7	15.9	3.20			
Associate Professor	20	45.5	3.42			
Assistant Professor	17	38.6	3.59			
Tenure Status				0.41	1,33	0.5272
Tenured	28	63.6	3.40			
Non-Tenured (tenure track)	16	36.4	3.53			
Level of Experience				0.40	2,32	0.6713
Novice	20	45.5	3.43			
Proficient	21	47.7	3.45			
Expert	3	6.8	4.00			
Adopters				2.90	3,31	0.0508
Laggards	0	0.0	--			
Late Majority	8	18.2	3.21			
Early Majority	17	38.6	3.79			
Early Adopters	15	34.1	3.22			
Innovators	4	9.1	3.67			

Note. Comparison of means of personal motivational factor within rank, tenure status, level of experience, and adopters.

* $p < .05$.

Table 12

Means of Variables Pertaining to the Usage of Electronic Technology (N=44)

Variable	M	SD	t	p
Used computer and projector in the classroom	3.43*	1.35	7.02	0.0001
Used email as primary source of student contact outside the classroom	3.73*	1.06	10.76	0.0001
Created and used an on-line syllabus with hyperlinks to class resources	2.75*	1.62	3.08	0.0036
Used personally designed web-based lectures, notes, and tutorials	2.45	1.73	1.74	0.0888
Used personally designed web-based tests or quizzes	1.39	1.15	-2.24	0.0305
Used prepackaged commercial products web-based lecture notes and tutorials	1.09	1.41	-0.43	0.6713
Provided web-based grades	2.16*	1.61	0.65	0.5165
Used internet research and searches	3.80*	1.00	11.89	0.0001
Exchanged student written work via the web (e.g., email attachments, digital drop boxes)	2.61*	1.42	2.87	0.0063
Enabled and supported student group work in virtual environments	1.43	1.02	-2.81	0.0075
Enabled and supported collaboration among students via web-based programs	1.48	0.98	-3.24	0.0023

(table continues)

Table 12 (continued)

Variable	M	SD	t	p
Used totally audio web-based systems for instruction for review	1.98	0.15	-43.00	0.0001
Conducted asynchronous forums	1.79	0.73	-7.19	0.0001
Used on-line bulletin boards	1.56	0.95	-3.79	0.0003
Used on-line chat rooms	1.80	0.63	-8.35	0.0001
Conducted academic advising in virtual environments	1.61	0.75	-5.40	0.0001

Note. Scale values were calculated using 1= never, 2 = seldom, 3 = occasionally, 4 = often, 5 = almost all the time.

* $p < .05$, mean is statistically greater than 2.0.

Table 13

Results of Spearman's Correlation Analysis Between Frequency of Types of Technology Used and the Means of the Combined Significant Social Factor Variables

Variable	M	r_s	p
Used computer and projector in the classroom	3.43*	.1515	.3444
Used email as primary source of student contact outside the classroom	3.73*	.0992	.5370
Created and used on-line syllabus with hyperlinks to class resources	2.75*	-.2189	.1690
Used personally designed web-based lectures, notes, and tutorials	2.45	-.8448	.5983
Used personally designed web-based tests or quizzes	1.39	.0414	.7972
Used prepackaged commercial products, web-based lecture notes and tutorials	1.09	.2838	.0721
Provided web-based grades	2.16*	-.1441	.3686
Used internet research and searches	3.80*	.3014	.8455
Exchanged student written work via the web (e.g., email attachments, digital drop boxes)	2.61*	-.0381	.8130
Enabled and supported student group work in virtual environments	1.43	.0136	.9329

(table continues)

Table 13 (continued)

Variable	M	r_s	p
Enabled and supported collaboration among students via web-based programs	1.48	.0205	.8987
Used totally audio web-based systems for instruction or review	1.98	-.0202	.9001
Used totally video web-based systems for instruction or review	1.75	.0753	.6399
Conducted asynchronous forums	1.79	-.0493	.7594
Used on-line bulletin boards	1.56	.0648	.6871
Used on-line chat rooms	1.80	-.1051	.5132
Conducted academic advising in virtual environments	1.61	.0303	.8506

Note. Social factor variables include peer support, shared values in the department, friends, and students.

* $p < .05$.

Table 14

Results of Spearman's Correlation Analysis Between Frequency of Types of Technology Used and the Mean of the Combined Significant Organizational Factor Variables

Variable	M	r_s	p
Used computer and projector in the classroom	3.43*	-.0676	.6865
Used email as primary source of student contact outside the classroom	3.73*	-.0673	.6882
Created and used an on-line syllabus with hyperlinks to class resources	2.75*	-.2557	.1212
Used personally designed web-based lectures, notes, and tutorials	2.45	-.1390	.4052
Used personally designed web-based tests or quizzes	1.39	.0873	.6021
Used prepackaged commercial products web-based lecture notes and tutorials	1.09	.2165	.1916
Provided web-based grades	2.16*	-.3028	.0646
Used internet research and searches	3.80*	.1478	.3758
Exchanged student written work via the web (e.g., email attachments, digital drop boxes)	2.61*	.1011	.5460
Enabled and supported student group work in virtual environments	1.43	-.0211	.9000
Enabled and supported collaboration among students via web-based programs	1.48	-.2658	.1067
Used totally audio web-based systems for instruction or review	1.98	-.1706	.3057

(table continues)

Table 14 (continued)

Variable	M	r_s	p
Used totally video web-based systems for instruction or review	1.75	-.0128	.9391
Conducted asynchronous forums	1.79	-.0304	.8563
Used on-line bulletin boards	1.56	.1339	.4227
Used on-line chat rooms	1.80	-.1613	.3332
Conducted academic advising in virtual environments	1.61	-.0988	.5552

Note. Significant organizational factor variables include mandate from the university and physical resources.

* $p < .05$.

Table 15

Results of Spearman's Correlation Analysis Between Frequency of Types of Technology Used and the Means of the Combined Significant Personal Motivational Factor Variables

Variable	M	r_s	p
Used computer and projector in the classroom	3.43*	.2001	.2258
Used email as primary source of student contact outside the classroom	3.73*	.2414	.1624
Created and used an on-line syllabus with hyperlinks to class resources	2.75*	-.0269	.8777
Used personally designed web-based lectures, notes, and tutorials	2.45	-.1238	.4786
Used personally designed web-based tests or quizzes	1.39	-.3244	.0572
Used prepackaged commercial products web-based lecture notes and tutorials	1.09	.1091	.5328
Provided web-based grades	2.16*	-.1753	.3138
Used internet research and searches	3.80*	.2877	.0937
Exchanged student written work via the web (e.g., email attachments, digital drop boxes)	2.61*	.1444	.4080
Enabled and supported student group work in virtual environments	1.43	.1709	.3261
Enabled and supported collaboration among students via web-based programs	1.48	-.0329	.8551
Used totally audio web-based systems for instruction or review	1.98	-.2667	.1214

(table continues)

Table 15 (continued)

Variable	M	r_s	p
Used totally video web-based systems for instruction or review	1.75	-.2365	.1714
Conducted asynchronous forums	1.79	-.0834	.6339
Used on-line bulletin boards	1.56	.1644	.3453
Used on-line chat rooms	1.80	-.2480	.1508
Used totally video web-based systems for instruction or review	1.61	.0432	.8054

Note. Significant personal motivational variables include personal interest in instructional technology, personal interest in improvement in my teaching, personal interest in enhancing student learning.

* $p < .05$.

Table 16

Means and ANOVA Results of Variables Pertaining to the Usage of Electronic Technology by Self-Identified Adopter Category

Variable	F	p	Mean of Adopter Categories			
			Type 2	Type 3	Type 4	Type 5
Used computer and projector in the classroom	2.15	.1089	3.00	3.12	3.67	4.75
Used email as primary source of student contact outside the classroom	3.04	.0398*	3.00	3.53	4.06	4.50
Created and used an on-line syllabus with hyperlinks to class resources	5.79	.0022*	2.37	2.00	3.20	5.00
Used personally designed web-based lectures, notes, and tutorials	4.29	.0103*	2.12	1.94	2.53	5.00
Used personally designed web-based tests or quizzes	1.67	.1880	2.12	1.29	1.87	1.00
Used prepackaged commercial products web-based lecture notes and tutorials	1.25	.3031	1.37	2.00	1.80	3.00
Provided web-based grades	.60	.6167	1.62	2.53	2.07	2.00
Used internet research and searches	2.20	.1028	3.25	3.76	3.87	4.75

(table continues)

Table 16 (continued)

Variable	F	p	Mean of Adopter Categories			
Exchanged student written work via the web (e.g., email attachments, digital drop boxes)	3.69	.0196*	1.87	2.53	2.60	4.50
Enabled and supported student group work in virtual environments	1.72	.1776	1.75	1.53	1.26	2.50
Enabled and supported collaboration among students via web	2.22	.1010	1.75	1.47	1.20	2.50
Used totally audio web-based systems for instruction or review	1.56	.2145	1.12	1.00	1.00	1.00
Used totally video web-based systems for instruction or review	1.13	.3483	1.12	1.12	1.27	2.00
Conducted asynchronous forums	2.98	.0429*	1.50	1.00	1.07	2.00
Used on-line bulletin boards	8.57	.0002*	1.50	1.20	1.17	3.25
Used on-line chat rooms	4.36	.0095*	1.50	1.00	1.07	2.00
Conducted academic advising in virtual environments	.58	.6336	1.25	1.27	1.47	1.75

Note. Scale values were calculated using 1= never, 2 = seldom, 3 = occasionally, 4 = often, 5 = almost all the time. Type 1 = Laggard, no one self-identified, Type 2 = Late Majority, Type 3 = Early Majority, Type 4 = Early Adopter, and Type 5 = Innovator

* = Means are significantly different at the .05 level.

found to be statistically different at the .05 level, thus suggesting that there was dispersion among the mean values. Within this group, Type 1 did not appear, as there were no respondents that self-identified themselves as Laggards. Results for Type 2 through Type 5 were reported with innovators' means being the highest for all seven of the significantly identified variables. According to Rogers (1995), certain characteristics form adopter categories. Applying this concept, *a priori* analysis was performed using participants' responses to the use of electronic technology that appeared in Question 8 of the survey. The results are presented in Table 17. This is a cross-tabulation between all adopter categories based upon *a priori* analysis and self-identified adopter categories. Highlighted diagonal elements of this table indicate that those respondents who were classified in each adopter category based on *a priori* analysis also classified themselves in the same adopter category (i.e., self-identified category). The findings suggest that none of the respondents self-identified themselves as laggards. Out of 8 *a priori* late majority respondents, 50% self-identified themselves as late majority; out of 12 *a priori* early majority respondents, 16.7% self-identified themselves as early majority; out of 14 *a priori* early adopters, 42.8% self-identified in the same category; and out of 10 *a priori* innovators, 20% self-identified themselves as innovators. These results suggest that there were no consistencies observed between self-identified adopter categories and *a priori* categories.

Analysis of Research Questions

The overall purpose of this study was to examine a set of social, organizational, and personal motivational variables and the formed factors that may affect the innovation adoption decision by faculty regarding their use of electronic technologies in the delivery of instruction. Following are the research questions related to this study that examined these variables, factors, adopter behavior categories, and type and frequency of use of technology.

Table 17

Adopter Categories Comparison Determined by *A Priori* and Self-Identified

Self-Identified Adopter Categories	*A Priori* Adopter Categories				
	Laggard	Late Majority	Early Majority	Early Adopter	Innovators
Laggard	0	0	0	0	0
(Type 1)	**(0.0%*)**	(0.0%)	(0.0%)	(0.0%)	(0.0%)
Late Majority	3	2	4	1	2
(Type 2)	(30.0%)	**(50.0%*)**	(66.6%)	(14.4%)	(40.0%)
Early Majority	5	2	1	3	0
(Type 3)	(50.0%)	(50.0%)	**(16.7%*)**	(42.8%)	(0.0%)
Early Adopter	2	0	1	3	2
(Type 4)	(20.0%)	(0.0%)	(16.7%)	**(42.8%*)**	(40.0%)
Innovators	0	0	0	0	1
(Type 5)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	**(20.0%*)**
TOTAL	10	4	6	7	5
	(100.0%)	(100.0%)	(100.0%)	(100.0%)	(100.0%)

Note. * Matching classification between self-identified and *A Priori* categories

Research Question 1

The first research question examined which social factor variables are involved in the decision to adopt electronic technologies used in the delivery of instruction. Social factor variables that were expected to influence this process included: peer support, peer pressure, mentors, shared values in the faculty member's department, friends, and students. Four of the six variables--peer support, shared values, friends, and students--appeared as significant in relationship to a faculty member's decision to adopt electronic technologies in the classroom.

Research Question 2

The second research question examined which organizational factor variables are involved in the decision to adopt electronic technologies used in the delivery of instruction. Organizational factor variables expected to influence the innovation adoption process included: mandates from the university; institutional reward systems; formal recognition on a department, college, or university level; and physical resources such as hardware and software.

Research Question 3

The third research question examined which personal motivational factors variables are involved in the decision to adopt electronic technologies used in the delivery of instruction. Personal motivational factor variables included: personal interest in instructional technology, personal interest in improvement in my teaching, and personal interest in enhancing student learning. All three of the variables were identified as statistically significant in their influence on a faculty member’s decision to adopt electronic technologies for use in the classroom. In fact, these variables appeared as the most influential among all of the variables tested.

Research Question 4

The fourth research question examined the relationship between the social factor and number of students in the university, number of faculty in the department, rank, tenure status, level of experience, and adopter behavior characteristics. The results of Spearman's correlation analysis did not establish a strong relationship between the social factor and the number of students in the university or the number of faculty in the department. For the analyses related to rank, tenure status, level of experience, and adopter behavior categories, an ANOVA was conducted that found no statistically significant difference in the means of the categorical data. The mean response of full professors, associate professors, and assistant professors were homogenous on social factor variables. Correspondingly, rank, tenure status, level of experience, and self-identified adopter categories demonstrated similar results.

Research Question 5

The fifth research question examined the relationship between the organizational factor and the number of students, number of faculty in the department, rank, tenure status, and adopter behavior characteristics. Neither the number of students nor the size of the department indicated a positive correlation with the organizational factor. The summarized results of the ANOVA for the relationship of the organizational factor with rank, tenure, level of experience and adopter behavior categories also indicated that there was no significant difference in the means. Specifically, among rank, tenure status, level of experience and adopter categories, homogeneity was observed.

Research Question 6

The sixth research question examined the relationship between the personal motivational factor and number of students, number of faculty, rank, tenure status, and adopter behavior traits.

The correlation analysis showed no positive relationship between the factor and the demographic variables. ANOVA results for the relationship of the personal motivational factor to rank, tenure status, level of experience, and adopter behavior categories also showed no significant difference in the means of the categorical data.

Research Question 7

The seventh research question examined the relationship between the social factor and the types and frequency of technology used. No significant relationship was found.

Research Question 8

The eighth research question examined the relationship between the organizational factor and the types and frequency of technology used. The results of this analysis showed no significant relationships between the factor and the frequency of the different types of technology addressed in the survey.

Research Question 9

The ninth research question examined the relationship between the personal motivational factor and the types and frequency of technology used. No significant associations were shown between the personal motivational factor and any of the different types of technology used.

Research Question 10

The tenth research question examined the relationship between self-identified adopter categories and the types and frequency of use of technology. Seven out of the 17 variables tested pertaining to the use of electronic technologies by self-identified adopters were observed as significantly different at the $\alpha = 0.05$ level. These variables included: "used email as a primary source of student conduct outside the classroom," " created and used on-line syllabus with hyperlinks to class resources," "conducted asynchronous forums," "used on-line bulletin

boards," "used on-line chat rooms," and "exchanged student written work via the web." Of these variables, Type 5 adopters identified as innovators had the greatest average electronic technology usage in six of the seven electronic technologies used. Additionally, in each of these instances, innovators were followed by the early majority adopters in their frequency of electronic technology usage with the exception of two variables, which were conducting asynchronous forums and using on-line bulletin boards where late majority adopters followed innovators in their usage of electronic technologies.

Research Question 11

The eleventh research question examined a relationship existed between the *a priori* adopter categories and self-identified adopter categories that were based on a series of behaviors or actions related to adoption of newer innovations or change. The respondents' self-identified choices of a set of behaviors or actions, which were established in Question 6, validated the *a priori* adopter categories in Question 8. Respondents who were *a priori* late majority adopters counted for 50% of the respondents who self-identified themselves as late majority adopters. Correspondingly, 16.7% of the self-identified early majority adopters were found to be matches with their *a priori* counterparts, as were 42.8 % of the early adopters. Self-identified innovators matched with 20% of their *a priori* counterparts.

Summary

Respondents in this study indicated that several of the social, organizational, and personal motivational factors were important in their decision to adopt electronic technologies in the delivery of instruction. Among the social factor variables, peer support, shared values in the department, friends, and students appeared important in a faculty member's decision to adopt electronic technologies. Significant organizational factor variables included "mandate from the

university" and "physical resources." All three of the personal motivational factor variables which included "personal interest in instructional technology," "personal interest in improvement in my teaching," and "personal interest in enhancing student learning," appeared as important in its influence in a faculty member's decision to adopt electronic technologies for use in the classroom.

Overall, no significant relationships were found between the social, organizational, or personal motivational factors and the number of students enrolled at the university or the number of faculty in the department. Demographic variables such as rank, tenure status, level of experience and adopter categories also indicated that there were no significant relationships with any of the studied factors. Finally, the results did not show a strong correlation between self-identified adopters and *a priori* categories. These results and their implications for the future are discussed in the final chapter of the study.

Chapter 5

The purpose of this study was to provide an examination of the different variables and formed factors that may influence a faculty member's decision to adopt electronic technologies in the delivery of instruction. In 1983, Everett Rogers published his first edition of *Diffusion of Innovations*. In this seminal work, an innovation was conceived as an object with five perceived attributes that included relative advantage, compatibility, trialability, and observability, which helped to explain its rate of adoption. The decision by a user to adopt or reject the innovation was described as an event, represented as an independent variable and a point in a linear process. The process of adoption consisted of a series of actions and choices over time based on internal variables within a social system. Other researchers (Fulk, 1993; Spotts & Bowman, 1995) of innovation adoption also have supported Rogers' work by indicating that the innovation diffusion process may be influenced by social and organizational factors that include such variables as peer pressure, peer support, friends, and physical resource support.

Rogers (1983) also defined a range of behavioral characteristics that were related to the diffusion of innovations and applied his results to a bell-shaped curve. The behavioral characteristics ranged from an innovator (at the highly innovative end) to a laggard (at the low innovation end).

In addition to social and organizational factors, Herzberg (1959) and other researchers (Blackburn & Lawrence, 1995; Braskamp & Ory, 1994) found that individuals, or more particularly faculty, are motivated to participate in the adoption decision process when they determine whether or not the innovation will assist in providing a work environment that is creative and challenging, leading to a feeling of self-fulfillment and self-actualization. Additionally, according to Herzberg (1959), faculty are personally motivated when the use of the

innovation will enhances their teaching, contributes to their self-efficacy as teachers, and is compatible with their personal vision of learning.

The results of exploring which social, organizational, and personal motivational factor variables that were statistically significant will be further discussed in this chapter. Different types of technologies used and the frequency of their use as influenced by these above-mentioned factors along with the comparison between *a priori* and self-identified adopter categories is also addressed. The chapter concludes with a discussion of the study's implications and recommendations for future research.

Discussion of the Results

Rogers' diffusion of innovation theory (1995) provided an excellent framework for this study. Rogers linked the adoption of new innovations to social and organizational variables. This study used faculty members' responses to determine which of the factors appeared as the most influential among the social and organizational factor variables. In addition, this study elaborated on Roger's theory by including demographic and personal motivational factor variables. Finally, this study lends some evidence that multiple factors do weigh in a faculty member's decision to adopt newer innovations.

Demographic variables in this study were explored first. It was expected that the categories of rank, tenure status, and level of technology experience would have a positive relationship with the social, organizational, and personal motivational factors. Interestingly, the results of the study did not identify significant relationships between rank, tenure status, and level of technology experience with social, organizational, and personal motivational factors.

Other demographic variables such as the number of students enrolled at the institution and the size of the faculty member's department were addressed in relationship to each of the

social, organizational, and personal motivational factor variables. Studies of organizations and innovation adoption have often defined size in such terms as the number of employees and the number of the population served, and has found links between the size of an organization and innovation (Brace, 1996; Craig, 1995; Kelly, 1996). Interestingly, this study did not identify any significant relationships.

Using Rogers' theory of adopter categories, the researcher examined the relationship between self-identified adopter categories and the types of technology used and the frequency of that use. Without question, the findings suggest that innovators are the largest users of electronic technologies. In fact, they used 2 of the 17 technologies "almost all the time" and 6 of the 17 technologies at least "often." It is reasonable to assume that early adopters, or at least early majority adopters, would follow innovators in technology adoption. This was not the case in all of the technology categories. Interestingly, in 5 of the technology categories where innovators used the technology at least occasionally, late majority adopters had the next highest mean. No faculty members, as expected, self-identified themselves as laggards.

This study further elaborated on Rogers' adopter behavior categories through a comparison which determined if those individuals who self-identified themselves as one type of adopter would match their *a priori* counterparts. Unexpectedly, only 50% at the most of the self-identified adopters aligned with their *a priori* counterparts.

Social factor variables that were studied included peer support, peer pressure, mentors, shared values within the department, friends, and students. All of these variables were expected to have an influence on a faculty member's decision to adopt electronic technologies for use in the classroom. Of the social variables studied, "students" appeared as the most influential. The use of electronic technologies by university students appears to be on the rise as institutions

make available more hardware and software for both student and faculty use. With this increase in acquisition of technology comes the opportunity for students and faculty members to increase their lines of electronic communications.

Shared values within the department, peer support, and friends appeared next in their influence among the social factor variables. Faculty may have witnessed that it is through these social networks and communication channels that they can reach a common goal, providing cohesion, and producing a better outcome for themselves, their students, and their institution.

Organizational factor variables that were expected to have an influence on a faculty member's decision to adopt electronic technologies included "physical resource support," "mandate from the university," "institutional reward system," and "formal recognition on the department, college, or university level." As expected, the variable "physical resource support" was found to be the most influential of all the organizational factor variables. Availability of technologies is critical in the successful adoption of an innovation. Once faculty members have decided to incorporate technology into their teaching methods, it becomes essential to provide such necessary resources as hardware, software, and training to accomplish their goals. Most notable was the fact that faculty members apparently feel that it is more important to have physical resource support than to have recognition for their efforts in the area of instructional technology. The extrinsic force of "mandate from the university" was also shown to be statistically significant in its influence, thus suggesting that faculty members could be encouraged to use electronic technologies in the delivery of instruction if the proper technology support or policy enforcement was provided from the administration.

A primary difference between this research and Rogers' diffusion of innovation theory was the inclusion of personal motivational factor variables. The three variables--"personal

interest in instructional technology," "personal interest in improvement in my teaching," and "personal interest in enhancing student learning"-- were analyzed. Each of the variables appeared as statistically significant in their influence on a faculty member's decision to adopt electronic technologies for use in the classroom.

Relationship of the Findings to Prior Research

Social theorist Rogers (1983) has dominated the field of diffusion theory, and his theory has been used in numerous innovation adoption studies (e.g., Brace, 1996; Craig, 1995; Kelly, 1996). The findings of the present study support the results of previous research in some instances, but they contradict those findings in other respects.

Researchers (Polin, 1992; Seppanen, 1990; Spotts & Bowman, 1993; Terry, 1990) in the area of faculty development in educational technology concluded that a faculty member's primary concern was related to students and their achievements. Other researchers (Boyer, 1990; Ferguson & Morris, 1993; Petty & Rosen, 1987) have also supported the contention that a faculty member's positive reaction to their work setting can carry over to the classroom and ultimately have a positive impact on student outcome and success. Boyer (1990) stated that teaching "should be a dynamic endeavor that involves all of the analogies, metaphors, and images that can build bridges between the teacher's understanding and the student's learning" (p. 23). The results of this study supported those findings, suggesting that "students" are an important variable in a faculty member's decision to adopt electronic technologies for use in the delivery of instruction.

Shared values in the department and peer support are two variables purported by Rogers to be congruent with favorable innovation adoption decisions. According to Blackburn and Lawrence (1995), those who lack support from colleagues and "who do not have a strong sense

of shared purpose with others in their institution may not only be demoralized; they may also find it difficult to establish a supportive learning environment for their students" (p. 254). Rogers found that a great deal of interdependence occurs among members of a department, and that peers can have either a positive or a negative influence on an innovation adoption decision. Havelock and Zlotolow (1995) also found that individuals who can provide peer support in large social networks and have gained their colleagues' respect could accelerate innovation decisions.

Friends, according to Darley and Beniger (1981), can also help to generate either a positive or negative evaluation of an innovation. It is through these social networks with individuals who share similar beliefs, education, and social status that innovation adoption takes place (Rogers, 1995). Likewise, Massy, Wilger and Colbeck (1994) found that "the more frequently individuals interact, both formally and informally, the more likely they are to discuss issues related to teaching and undergraduate education" (p.14). The present study supported these previous findings regarding the importance and influence of shared values, peer support, and friends upon the innovation decision process.

Organizational factor variables such as physical resource support in the area of technology hardware and software are addressed in numerous studies based on Rogers' diffusion of innovation theory (Brace & Roberts, 1996; Craig, 1995; Kelly, 1996). The findings of these studies concluded that training and support were essential to the adoption of technology. In other support of Rogers' work, a faculty survey at a large midwestern university identified physical resources and improvement in student learning as two of the most influential factors in an innovation adoption decision by faculty members (Spotts & Bowman, 1993). Physical resource support was an area of importance to faculty in this study.

Authority innovation decisions, according to Rogers (1983), are choices made by a few individuals in a formal or informal system who possess power, status, or technical expertise. Mandates from the university would be an example of that type of innovation decision. Faculty members in this study were apparently aware of that type of authoritative innovation decision action and recognized its influence in their decision to adopt electronic technologies for use in the classroom.

Recent technology adoption research suggests that personal motivation, defined as the willingness of an individual to try a new information technology, will moderate the relationship between perceptions about technologies and intentions to use them (Agarwal & Prasad, 1998). A faculty member's proclivity as it relates to a personal interest in his or her improvement in teaching appeared to be the most important variable among the personal motivational factor variables. This is supported by Herzberg's theory that hygiene factors, described as the need for self-fulfillment and self-actualization, are necessary preconditions to influencing an individual's motivation. Closely related to an interest in improvement in teaching is a faculty member's personal interest in student learning. Shulman (1993) found that master teachers acquire more than content knowledge; they get practice with a variety of instructional methods. Excellent teachers learn what it takes to make students understand a concept, apply it, and integrate it (Shulman, 1993). Responses to the personal motivational factor variables in this study corroborate previous findings that faculty members are highly motivated by intrinsic rewards to participate in electronic technology usage (Boyer, 1990; Diamond & Adam, 1993; Edgerton, 1993).

Prior innovation studies (Davis, 1991; Havelock & Zlotolow, 1995; Kelman, 1983; Krackhardt, 1992) have assumed that social and organizational factors are influential in the

innovation decision process. In this study, interestingly, none of these factors appeared to have a relationship with demographic characteristics such as rank, tenure status, level of experience, or adopter category. This finding runs counter to the traditional innovation adoption literature.

Other demographic characteristics such as size of the institution and department have consistently been found to increase the adoption and use of newer innovations. (Brace, 1996; Craig, 1995; Kelly, 1996; Rogers, 1995) This current study found that even though faculty members had recognized mandates from the university as important in its influence on their decision to adopt electronic technologies, there was no correlation between size of the institution and size of the department with significant social, organizational, and personal motivational factor variables.

Finally, adopter categories, according to Rogers, are the classifications of members of a social system based on their decisions of when they chose to adopt an innovation. These categories each have specific characteristics and differ from one another in terms of personality, socioeconomic status, and communication behaviors. Faculty members in this study self-identified themselves as one of Roger's five adopter categories, and after completing a series of questions was placed into *a priori* adopter categories. The results suggested that there were no consistencies observed between the two categories.

Implications for Future Practice

This study suggests many implications for future practice. Both the faculty member and those administrators involved in the use of electronic technologies can benefit from these findings.

Faculty members can benefit from these results in several ways; as seen in this study, they seem to be aware of the social influences of students, shared values, peers, and friends in

their decision to adopt electronic technologies. The importance of these aforementioned social influences may not be apparent to all faculty members. As faculty members have become more isolated, possibly due to variables such as autonomy, specialization, generational splits, and rank differences, those social variables may not be as readily acknowledged. It is important that faculty members become aware of the important influence they have upon their colleagues. Faculty members also need to be aware that favorable attitudes toward the adoption of newer innovations can become contagious.

Classroom teaching methods have evolved, and technology has certainly been a part of that evolution. The present findings suggest that faculty members are using a computer and a projector in the classroom, are using email for student contact outside the classroom, and are using internet searches and research. But the results also suggest that faculty members are not using the many different types of electronic technologies, such as on-line bulletin boards, chat rooms, and web-based lecture notes and tutorials, which would assist their students even more. For faculty members, this can be an indication that they need to expand their knowledge of the many types of electronic technologies that will not only address their students' needs but may also help to streamline their administrative tasks.

The results of this study also reinforce the need for administrators to be made aware of the many organizational factor variables that can assist and affect a faculty member's decision to use and adopt electronic technologies. Organizational factor variables such as physical resource support are imperative if a technology innovation is to be adopted successfully. As technologies become more complicated, reliable and appropriate, support for their operation and use become increasingly more important.

Mandates from the university were found to be significant in influencing a faculty member's decision to adopt electronic technologies. The role of governance is to establish policy and provide procedural advice and guidance. Furthermore, administrators need to establish policies and procedures for technology planning, acquisition, enhancement, and replacement of resources. Without this leadership and commitment from university administration, the employment of newer technologies has a greater chance of failing or not being implemented at all.

Administrators and faculty members may also need to work with information technology staff at colleges to broaden the types of computer and technology training that would enhance their teaching methods. These findings suggest that only a few electronic technologies were adopted and used often by faculty members, but this may be due in part to a lack of appropriate training. It is incumbent for administrators to provide the fiscal support and for faculty members to be willing to spend the time necessary to learn these newer applications.

Recommendations for Future Research

The present study offers opportunities for future research to more fully examine other variables and factors that may contribute to or influence a faculty member's decision to adopt electronic technologies for the delivery of instruction. First, this study addressed a limited number of social, organizational, and personal motivational factor variables. Future research might identify a larger set of these types of variables to more fully ascertain their influence on a faculty member's behavior. As well, more insight might be gained from a specifically delineated set of variables that would break out or describe each of the variables in more explicit terms.

Another avenue for research that should prove to be useful would involve students, their responses to technological use in the classroom and their preferences. If this feedback could be

usefully coordinated with efforts to motivate faculty members, more faculty members might be inclined to attempt innovation through technology use in one of more forms. Further, institutional rewards, if they could be tied to a faculty member's use of technology and to positive student outcomes, would offer additional insight into motivating faculty members.

It would be of interest to investigate more closely the actual relationship between self-identified adopter categories and institutional use of technology. In other words, universities with a high number of self-identified innovators should correspondingly have a high use of technology. Such studies might assist administrators in addressing concerns over what actually does motivate faculty members in their decision-making process as it relates to electronic technology use in the classroom.

Additional studies might concentrate on adopter categories and the adopter behavior characteristics that are addressed within each category. Individuals, their organizational circumstances, and available technologies are all complex. It might offer additional insight if adopter type behaviors could be more richly described with additional characteristics, thus producing a more accurate representation of the faculty member's adoption status.

Certainly, a number of comparisons might prove interesting. For example, it would be interesting to learn what differences, if any, exist between academic disciplines, between geographic regions, between individual states, between colleges, and between types of institutions (e.g., public vs. private) in their adoption and use of electronic technologies in the delivery of instruction.

Finally, this sample was admittedly somewhat small, focusing on a limited number of regional academic institutions. Future research efforts might prove valuable if a larger sample could be obtained.

Conclusion

Findings of the present study indicate that faculty members are influenced by their own personal motivations to improve their teaching methods and to enhance student learning through the use of technology. Though personal motivational variables not directly addressed in Rogers' diffusion of innovation theory, they are supported by both social and organizational factor variables, which are, according to Rogers, contribute to the innovation adoption decision.

Colleges and universities need to identify ways to motivate faculty members to at least try newer innovative methods. With the recognition of the social, organizational, and personal motivational variables and resulting factors, both faculty members and administrators could be made aware of the critical components necessary to construct and support a successful innovation adoption decision.

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APPENDIX A: Cover Letter

November 27, 2000

Dr.
Department of Accounting
Marshall University
Marshall, WV

Dear. Dr.

I am asking for your help in my doctoral dissertation research. My research focuses on the factors that influence faculty members' use of electronic technologies in the delivery of instruction.

Enclosed with this letter is a questionnaire that asks a variety of questions about your institution and more specifically your opinions and attitudes related to the factors that influenced your use electronic technology in the delivery of instruction. I am asking you to please fill out the questionnaire and return it back to me in the next several days. Any comments that you have may be placed on the questionnaire. After completion of the questionnaire, please return it in the enclosed, self-addressed envelope.

Do not write your name on the questionnaire. The confidentially of your responses will be assured because the results of the study will be summarized.

If you are interested in receiving a summary of my findings, please enclose your request with the completed questionnaire or contact me directly. I want to thank you in advance for returning the questionnaire.

Cordially,

B. Dawn Medlin

APPENDIX B: Questionnaire

The objective of this survey is to identify factors that influence faculty members' use of electronic technologies in the delivery of instruction. PLEASE DO NOT IDENTIFY YOURSELF ON THIS SURVEY. ALL INDIVIDUAL RESPONSES WILL REMAIN CONFIDENTIAL. ONLY THE AGGREGATE RESULTS WILL BE REPORTED. Thank you for participating in this survey.

FOR PURPOSES OF THIS SURVEY, ELECTRONIC TECHNOLOGY IS DEFINED AS USING A COMPUTER AS A TOOL FOR THE DELIVERY OF INSTRUCTION.

1. What is the approximate student enrollment at your university/institution? _____

2. How many full-time faculty members are in your department? _____

3. Please indicate your current academic rank, how long you have been at this rank, and approximately the total number of years in the profession?

Rank	**Years at Current Rank**	**Total Number of Years in the Profession**
Full Professor	____ Years	
Associate Professor	____ Years	_____
Assistant Professor	____ Years	
Other	____ Years	

4. I am **(Please check only one response)** Tenured Non-tenured (tenure track)

   Full-time Non-tenure track Part-time/Adjunct Other _____

5. How do you rank your level of experience in the use of electronic technology for the delivery of instruction?

   Please check only one response.

   Non-participant Novice Proficient Expert

   a) **If Non-participant**, thank you for your participation and please return the survey as soon as possible.
   b) **Otherwise, please continue to Question 6.**

6. Please select which of the following labels **best** describes your disposition toward the adoption of change:

   Type 1 (traditional, refer to past for your guidance, resist new innovations until certain that it will not fail).
   Type 2 (cautious about change, require convincing of the economic necessity of a change, uncomfortable with uncertainty).
   Type 3 (consider fully all consequences, interact frequently with your peers, willing to change to a new way or method but not willing to be a leader in the process).
   Type 4 (make judicious innovation decisions, decrease uncertainty by fully evaluating something new, use interpersonal networks within your immediate area to gain more information).
   Type 5 (venturesome, obsessed with trying new things, seeker of information outside of immediate area).

7. Please select the response option (**1 = Never, 2= Seldom, 3 = Occasionally, 4 = Often, 5 = Almost all the time**) that best describes the frequency of your use of each of the following electronic technologies that you used **this past semester.**

1=Never (0%) 2=Seldom (1-25%) 3=Occasionally (26-50%) 4=Often (51-75%) 5=Almost all the time (76-100%)	
	(Please circle one)
a) Used a Computer and projector in the classroom (e.g., PowerPoint, Excel, Simulation software)……	***1 2 3 4 5***
b) Used Email as the primary source of student contact outside the classroom ……	***1 2 3 4 5***
c) Created and used an On-line Syllabus with hyperlinks to class resources ……	***1 2 3 4 5***
d) Used personally designed Web-based lectures, notes, and tutorials ……	***1 2 3 4 5***
e) Used personally designed Web-based tests or quizzes ……	***1 2 3 4 5***
f) Used prepackaged commercial products (e.g., WebCT, CourseInfo) to present Web-based lectures, notes, and tutorials ……	***1 2 3 4 5***
g) Provided web-based grades ……	***1 2 3 4 5***
h) Used Internet research and searches……	***1 2 3 4 5***
i) Exchanged student written work via the web (e.g., email attachments, digital drop boxes, discussion forums, etc.) ……	***1 2 3 4 5***
j) Enabled and supported student group work in virtual environments……	***1 2 3 4 5***
k) Enabled and supported collaboration among students via web-based programs …	***1 2 3 4 5***
l) Used totally audio web-based systems for instruction or review ……	***1 2 3 4 5***
m) Used totally video web-based systems for instruction or review……	***1 2 3 4 5***
n) Conducted asynchronous forums ……	***1 2 3 4 5***
o) Used On-line Bulletin Boards ……..….	***1 2 3 4 5***
p) Used On-line Chat rooms…..……	***1 2 3 4 5***
q) Conducted academic advising in virtual environments……	***1 2 3 4 5***
r) Other (please specify) _____	

8. Please select the most appropriate response option (**1 = Strongly Disagree, 2= Disagree, 3 = Agree, 4 = Strongly Agree**) that best describes your attitudes and predisposition toward the following:

1 = Strongly Disagree 2= Disagree 3 = Agree 4 = Strongly Agree	
	(Circle one)
a) I don't rush into decisions to try something new ……	***1 2 3 4***
b) I would prefer to be a follower, not a leader, in all situations……	***1 2 3 4***
c) I only enjoy socializing with people who share similar values in trying new things .	***1 2 3 4***
d) I like interacting frequently with my peers ……	***1 2 3 4***
e) If I don't like something I will just discontinue using it ……	***1 2 3 4***
f) I am among the first in my professional or social life to try new things ……	***1 2 3 4***
g) I will try new things once they have been thoroughly tested and guaranteed not to fail.……	***1 2 3 4***
h) I consider myself to be an empathetic person ……	***1 2 3 4***
i) I have the ability to understand and apply highly technical knowledge ……	***1 2 3 4***
j) I like to base my decisions on past experiences……	***1 2 3 4***
k) I welcome all opportunities to be a leader in my professional or social life……	***1 2 3 4***
l) I can make a quick decision to try something new ……	***1 2 3 4***
m) I prefer that things not change but remain the same most of the time……	***1 2 3 4***
n) I am cautious and deliberate in my decision-making, preferring to know all the variables when making a decision to try something new ……	***1 2 3 4***
o) I am well respected and sought out for advice in my professional area ……	***1 2 3 4***
p) I prefer to reduce the uncertainties associated with new things by researching and evaluating them closely……	***1 2 3 4***
q) I am willing to try new things but prefer not to be in a leadership position……	***1 2 3 4***
r) I am traditional by nature ……..	***1 2 3 4***
s) I feel better about trying new things when my colleagues or friends show strong support……	***1 2 3 4***
t) I don't feel that I have to be the first to try something new in my professional or social life ……..	***1 2 3 4***

9. How important have the following factors been in your decision to adopt electronic technologies in the delivery of instruction? Please select the most appropriate response option (**1 = Not Important, 2= Somewhat Important, 3 = Important , 4 = Very Important, 5 = Not Applicable**).

1 = Not Important 2= Somewhat Important 3 = Important 4 =Very Important 5 = Not Applicable	
	(Circle one)
a) Peer Support ……	***1 2 3 4 5***
b) Peer Pressure ……	***1 2 3 4 5***
c) Mentors ……	***1 2 3 4 5***
d) Shared values in my department ……	***1 2 3 4 5***
e) Friends ……	***1 2 3 4 5***
f) Students ……	***1 2 3 4 5***
g) Mandate from the University……	***1 2 3 4 5***
h) Institutional Reward System ……	***1 2 3 4 5***
i) Formal Recognition on a Department, College, University level……..	***1 2 3 4 5***
j) Physical Resources (Equipment, Hardware, Software) ……	***1 2 3 4 5***
k) Personal interest in instructional technology……	***1 2 3 4 5***
l) Personal interest in improvement in my teaching ……	***1 2 3 4 5***
m) Personal interest in enhancing student learning ……	***1 2 3 4 5***

Thank you for completing this survey.

BEVERLY DAWN MEDLIN

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Boone, NC 28607
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EDUCATION:

Ed.D — Virginia Polytechnic Institute and State University
Graduation Date: December, 2001
Major: Educational Leadership and Policy Studies
Dissertation Title: "The factors that may influence a faculty member's decision to adopt electronic technologies in instruction".

M. A. — Appalachian State University, May, 1980
Major: Political Science
Minor: Administration and Higher Education

B. A. — Appalachian State University, May, 1978
Major: Political Science
Minor: Business Administration

EXPERIENCE:

07/98-present — Lecturer, Department of Information Technology and Operations Management
Academic Advisor
Walker College of Business
Appalachian State University
Boone, NC 28608

Responsibilities have included teaching Introduction to Management Information Systems, COBOL, and Internet and E-commerce courses using HTML, JavaScript, Dreamweaver, Fireworks, Adobe Photoshop as well as other web development application programs and tools.
Advisement of College of Business Students.
Trip Co-Leader, College of Business United Kingdom Summer Study Abroad, 1999.

01/96-06/98 — Director of Multimedia Services
Lecturer, Information Technology and Operations Management
Walker College of Business
Appalachian State University, Boone, NC 28608

Responsibilities included recommendations regarding computer hardware and software purchase, configuration, and installation. Designed, developed, implemented, and maintained multiple classrooms with multimedia capabilities. Served as a liaison between different departments within the College on issues related to multimedia usage.
Taught workshops and seminars related to Computer Application Programs.

08/88-12/95 — Lecturer, Department of Decision Sciences, College of Business,
Academic Advisor
Appalachian State University, Boone, NC 28608

Responsibilities included: Teaching Introduction to Management Information Systems; part-time advising in the College of Business Advising Center; Trip

Leader, College of Business Summer Study Abroad to Sweden, 1993; Assistant Trip Leader College of Business Summer Study Abroad in England, 1991.

07/87-08/88 Operations Support Analyst
General Telephone of the South, Durham,NC

Responsible for coordination and administration of the GTE Calling Card Program, which entails extensive use of mainframe computing; coordination of revisions for Service Representative material; monitoring of sales results of Service Representatives for the total company; and coordinating the CSOC Sales Award Program. Extensive use of various microcomputer spreadsheet, database, and word processing packages.

07/85-07/87 Assistant Supervisor, Telephone Survey Unit
Research Triangle Institute, Raleigh, NC

Assistant Supervisor--Telephone Survey Unit. I worked there part-time for 4-6 months each year since 1985.

01/85-07/87 Customer Service Representative--Business Accounts,
General Telephone of the South, Durham, NC

Responsible for servicing business and corporate accounts and coordinating service and order processing with marketing departments in a four-state area. Promoted to Operations Support Group.

07/83-11/84 Front Desk Manager
Holiday Inn West, Durham, NC

Responsible for hiring, training and supervision of seven employees; handled employee/customer problems; scheduling, staffing and budgeting; coordinated reservations for large groups; coordinated activities with sales and various other hotel departments.

11/82-07/83 Reservationist
Holiday Inn Downtown, Raleigh, NC

Handled reservations, sales, accounting, and customer services. Promoted to Front Desk Manager.

05/82-11/82 Part-Owner and Sales Director
Universal Consolidated Services, Raleigh, NC

Sales manager for firm providing professional referral services for physicians, attorneys, accountants, and other professionals. Supervised a staff of ten salespersons; coordinated all marketing and advertising functions; compiled sales and market research data; conducted staff development and training activities. The firm went out of business in November 1982.

02/81-05/82 Director of Alumni Affairs and Assistant Director of Development
Lees- McRae College, Banner Elk, NC 28604.

Served as Assistant Director of Summer Programs for the college. Coordinated on-going fundraising activities through the Annual Giving Program, monthly alumni meetings, publishing of a quarterly Alumni Newsletter; organization of homecoming activities; preparation of budgets; and preparation and submission of Federal/State grants to support program activities.

PUBLICATIONS/PRESENTATIONS:

"Student Views of the Importance of Technical and Non-Technical Skills for Successful IT Professionals", Journal of Computer Information Systems. Fall 2001 with Vannoy and Dave.

"Ethics in business program curricula: An empirical investigation of U.S. students attitudes and perceptions", International Journal of Management. 2001. Volume 1 with Byerly and Dave.

"Instructional Assistants: Managing an Underutilized Asset", Proceedings, SE Informs. October 2001 with Bereki.

"Self-Measurement of Skills for the IT Profession: Student Views", Proceedings, SE Informs. October 2001 with Vannoy and Dave.

"Moral and Ethical Development Opportunities in Business Program Curricula: An investigation of "Soft" versus "Hard" disciplines", Proceedings, October 2001 with Byerly and Dave.

"What are student's views concerning the necessary skills needed to be successful in the Information Technology Profession? ", Proceedings, SE Informs, October 2000 with Vannoy and Dave.

"How Important Is The Study of Business Ethics to Students Preparing For Professional Business Careers? ", Proceedings, SE Informs, October 2000 with Byerly and Dave.

"Student' s Views on Team-Oriented Research Projects and the Oral Presentation of their Findings", Proceedings, SE Informs, 1999 with Vannoy and Dave.

"A Review of Information Technology in Production and Operations Management: A Global Perspective", Proceedings, 2nd Annual International Conference on Operations & Quantitative Management, 1999, p. 241- 246 with Dave.

"A Study of Grade Distribution Between Gender and Use of Presentation Technology", Palmetto Review, 1999, Volume 2, p. 35 – 38 with McCarthy.

"A Study of Grade Distribution Between Genders in an Introductory CIS class", Proceedings, SE Informs, 1998 with McCarthy.

"Creating Simple Multimedia Presentation using ScreenCam©," Proceedings, 15th Annual Meeting, ISECON, 1998, p. 10-11 with Harris.

"Multimedia Technology as a Learning Tool: A Study of Demographic and Cultural Impacts," Journal of Computer Information Systems, International Association for Computer Information Systems, 1996, p. 18-21 with Harris and Dave.

"Multimedia Technology as a Teaching Tool", Proceedings, 26th Annual Meeting, Decision Sciences Institute, Southeast Region, 1996, p.205-207 with Dave.

WORKSHOPS AND SEMINARS:

"Advantages of Using Screen Capture Software as a Teaching Enhancement Tool," ISECON, October 1998 with Harris.

"Multimedia Technology in the Classroom: A Symposium," Proceedings, 24th Annual Meeting, Decision Sciences Institute, Southeast Region, 1994, p. 350.

"Enhancing Classroom Teaching Through the Use of Multimedia Technology," an invited presentation to the Tennessee Business Educators Association Annual Meeting in Gatlinburg, Tennessee, 1993.

"How to Keep the Joy in Academic Advising When You Have Staff Burnout, a State Budget Crunch, and 2000 Students," National Academic Advising Association Conference, Greenville, South Carolina, 1991.

"Challenges Associated with Offering Developmental Advising Services," panel discussion at the Mid-South Regional Conference of the National Academic Advising Association, Lexington, Kentucky, 1989.

FUNDED PROJECTS:

"A Multimedia Project for the Classroom," a May-June Project funded by the Hubbard Center, 1993.

"An Internship Database for College of Business Students," a May-June Project funded by the Hubbard Center, 1991.

"An Evaluation Instrument for Student Advising," a May-June Project funded by the Hubbard Center, 1990.

PROFESSIONAL DEVELOPMENT:

Web CT and Pedagogical Uses, Appalachian State University. Boone, NC, 2001

Advanced Dreamweaver, Appalachian State University, Boone, NC, 2001

Web Design Conference in Charlotte, NC, 2000

Introduction to Cobol, StepOne, Kansas City, 1998

Introduction to Multimedia, Syllabus Press, Raleigh, NC, 1997

Introduction to Multimedia, UNC-Wilmington, 1995

Introduction to Multimedia, IAT Workshop, Durham, NC, 1995

Computer Conference for Educators, ACIS IBM, Raleigh, NC, 1992

Software AG Presentation, IBM, Charlotte, NC, 1992

IBM Interface Seminar - Currency '90 Update: LANS, Connectivity, OS/2 Technology, Charlotte, NC, 1990.

"Teaching the MIS Course: Remaking the Widow Maker," presented by Dr. David Kronke, MIS Currency Session, Raleigh, NC, 1989.

PROFESSIONAL AFFILIATIONS AND SERVICE:

Judge for Student Papers, 1997 Annual Meeting, Southeast Decision Sciences Institute, Richmond, Va.

Student Track Chair, 1996 Annual Meeting, Southeast Decision Sciences Institute, Atlanta, Ga.

Director of Placement, 1995 Annual Meeting, Southeast Decision Sciences Institute, Wilmington, NC

Associate Program Chairperson, 1993 Annual Meeting, Southeast Decision Sciences Institute, Chattanooga, TN.

Associate Program Chairperson, 1992 Annual Meeting, Southeast Decision Sciences Institute, Savannah, GA.

North Carolina Information Systems Network, Fall, 1992, Assistant Program Coordinator and Facilitator, Inaugural Meeting

Conference Facilitator, 1990 Annual Meeting, Southeast Decision Sciences Institute.

Decision Sciences Institute (1988 – Present)

Southeast Decision Sciences Institute (1988 – Present)

COLLEGE AND UNIVERSITY COMMITTEES/SERVICE:

University:

SACS Educational Support Committee (2000 - 2001)

Centennial Campaign for Appalachian--College of Business (1998)

Technology Committee/Laptops for Students (1997)

Search Committee Chair, Assistant to the Provost for Women's Concerns (1997)

Coordination Committee for Equity Issues (1996 - 2000)

Academic Integrity Board (1992 - 1995)

Sexual Harassment Committee (1993 - 1997)

Campaign for Appalachian--Director, College of Business Campaign (1991)

College:

Study Abroad Planning Committee (1999 -2001)

Teaching, Service, Research Award Committee (1999)

Technology Committee Chair (1997 - 1998)

Search Committee for Department Chair (1996)

College of Business Women's Concerns Task Force (1995 - present)

Scholarship Committee (1991 - 94)

Department:

Departmental Curriculum Committee (2001)

Departmental Personnel Committee (2000 - 2001)

Study Abroad Committee (1998 - present)

Departmental Personnel Committee (1998 - 1999)

Departmental Personnel Committee (1996 - 1997)

CIS1025 Common Exam Committee (1997)

MIS Textbook Committee (1996)

MIS Search Committee (1996)

Representative for International Studies (1995 - present)

Departmental United Way Representative (1991 - 1999)

Chairperson, Decision Sciences Department Brochure Committee (1989)

Family Day Representative (1988 - present)

Additional Service:

Human Resource Workshops on Adobe Photoshop, 2000; Web Design, 1999;

Creating Web Pages, 1999.

Principals in Residence Program Computer Training (1996 - 1999)

Multimedia Slide Show, Honors Day (1995)

Faculty Advisor, Sigma Nu (1994 - 1998)

Developed and Presented Parents' University, a Parents' Workshop on Business Computing (1991 - 1997)

Created a slide show presentation for the College of Business (1991)

Faculty Advisor, Phi Beta Lambda (1988 - 1991)

Faculty Advisor, DPMA Student Chapter (1988-1991)

HONORS AND COMMUNITY ACTIVITIES:

Nominee, Outstanding Teacher of the Year (1991-98)

Board Member and Team Captain, Walk-a-thon for Cancer (1997 - 2001)

Board Member, OASIS (1995 - 1998)

Board Member, 1989 - 1992 Northwest Regional March of Dimes

Chairperson, 1989-1990 March of Dimes Annual "Walk America"

Chairperson, 1989 March of Dimes "Jail and Bail"