

Perceived Values of Computer-Mediated Communication Use

for Business Instruction

by

Cynthia Carlton Gillispie

Dissertation submitted to the Faculty of the

Virginia Polytechnic Institute and State University

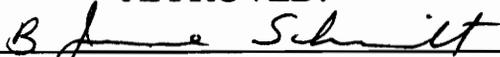
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

IN

VOCATIONAL AND TECHNICAL EDUCATION

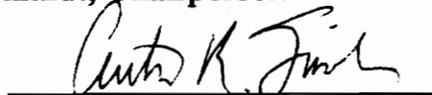
APPROVED:



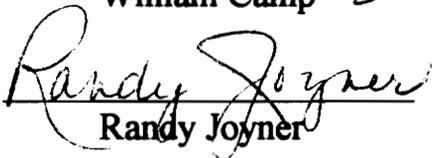
B. June Schmidt, Chairperson



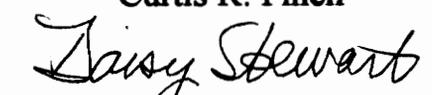
William Camp



Curtis R. Finch



Randy Joyner



Daisy Stewart

October 23, 1996

Blacksburg, Virginia

Keywords: Business faculty, Computers, Communication, Rogers

LD

5655

V856

1996

6555

c.2

PERCEIVED VALUES OF COMPUTER-MEDIATED
COMMUNICATION USE FOR BUSINESS INSTRUCTION

by

Cynthia Carlton Gillispie

Dr. B. June Schmidt, Chairperson

Vocational and Technical Education

(ABSTRACT)

A number of benefits have been associated with using computer-mediated communication (CMC) to improve instruction. CMC is a blend of computer and telecommunication networks, which are used to compose, store, deliver, and process communication. CMC has the potential of becoming a powerful means of merging information from a variety of sources. CMC is relevant to collaboration, student participation, and individualized instruction. It can be used for daily information exchange among colleagues, between faculty and their students, among students, for delivering distance education, and for providing access to resources and information.

The purpose of the study was to determine the perceived values of CMC use for instructional purposes, perceptions of its use as they relate to

Rogers' theory, and extent of its use as reported by business faculty at four North Carolina universities. The population for the study consisted of all business faculty from four colleges or schools of business at North Carolina universities. Business deans at these four universities provided 290 names of business faculty. Of these, 172 (59%) responded to the survey, 121 (42%) indicated that they used computer-mediated communication, and 51 (17%) indicated they did not use CMC for instructional purposes. Demographically, randomly selected non-respondents and randomly selected late respondents were similar to randomly selected early respondents.

The Diffusion of Innovations Theory provided the theoretical framework or paradigm for the study. Developed by Rogers, it was used to evaluate the extent to which computer-mediated communication was accepted by business faculty for instructional use. Data were collected by a mail survey.

The findings revealed that for business faculty to adopt CMC in their instruction, they need adequate support, training, equipment, and software. Business faculty's perceptions of CMC, as it relates to Rogers' five characteristics (compatibility, complexity, observability, relative advantage,

and triability), show that complexity, observability, and triability are the least important in their adoption of CMC use for classroom instructional purposes.

Most business faculty made limited use of CMC for instructional purposes. Their main uses of CMC were personal messaging and conducting research.

ACKNOWLEDGMENTS

The author is indebted to Dr. B. June Schmidt, major professor, and Dr. William Camp for their patience and guidance. The author also wishes to thank other committee members for their support. They include Dr. Curtis R. Finch, Dr. Randy Joyner, and Dr. Daisy Stewart.

First and utmost I give thanks to God for giving me hope. For encouragement and prayers, the author is indebted to Mr. and Mrs. Perry and Daisy Carlton (parents); Brenda, Dorienda, Daisy, Freda, Angenette, Chelle, and Pam (sisters); Perry Jr., Presenteno, and Gary (brothers); Sherri Ray and Jane DeShield (guarddaughters); members of Toastmasters #439; nieces; nephews; aunts; uncles; cousins; in-laws; friends; members of Eta Omicron Omega Chapter, Alpha Kappa Alpha Sorority, Inc.; members of McConnell Road Church of Christ, and members of the Department of Animal Science.

Special gratitude is extended to Dr. George Johnson, Dr. Anthony Yeboah, Dr. Donald McDowell, Dr. Alton Thompson, Dr. Geraldine Ray, Dr. Willie Willis, Dr. Sandra C. Alexander, and Mr. Mitch Arnold for their wise counseling provided during the author's studies and research work.

TABLE OF CONTENTS

	Page
ABSTRACT	ii
ACKNOWLEDGMENTS	v
LIST OF TABLES	ix
FIGURE	xi
 Chapter	
1. INTRODUCTION	1
Background of the Problem	1
Rogers' Theory	6
Need for the Study	8
Purpose	12
Research Questions	14
Limitations of the Study	14
Delimitation of the Study	15
Definition of Terms	15
Summary	19
2. LITERATURE REVIEW	21
Overview	21
Adoption and Diffusion of an Innovation	21
Rogers' Five Characteristics of an Innovation	30
Summary	36
Administrative Support and the Perceived Values of CMC in Higher Education	37
Summary	40
CMC and Distance Education	40
Summary	45
Present Use of CMC	46

TABLE OF CONTENTS (CONTINUED)

	Page
Summary	51
Perceptions of CMC	52
Summary	57
Changing Teaching Methods	57
Summary	61
3. METHODOLOGY	62
The Population	63
Research Design	64
Data Collection	65
Validation	67
Pilot Testing the Survey	71
Analysis Procedures	72
Summary	82
4. FINDINGS	83
Description of Respondents	84
Characteristics of Respondents and Non-Respondents	85
Characteristics of Early and Late Respondents	88
Findings Related to Perceived Values of CMC Use ..	90
Perceptions of CMC Use Related to Rogers' Five Characteristics (Respondents versus Non- Respondents and Early versus Late Respondents ..	96
Use of CMC (Respondents versus Non-Respondents and Early versus Late Respondents)	99
Perceptions of CMC Use Related to Rogers' Five Characteristics	99

TABLE OF CONTENTS (CONTINUED)

	Page
Use of CMC for Instructional Purposes	103
Use of CMC Explained by Perceptions of Rogers' Five Characteristics and Perceived Value of CMC	106
Summary	112
5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	115
Summary of the Study	116
Data Source and Methods	117
Findings	121
Conclusions	128
Implications for Education	130
Recommendations for Further Research	132
6. REFERENCES	135
7. APPENDICES	144
Appendix A: Letter to the Deans	144
Appendix B: Cover Letter and Survey Instrument Sent to Respondents	147
Appendix C: Follow up Post Card, Letter, and Telephone Dialogue	153
Appendix D: Letter to Second Panel of Experts	157
Appendix E: Values Assigned to Survey Instrument	160
BIOGRAPHICAL SKETCH	166

TABLES

Table	Page
1	Tally of Panel Responses (n=5) to Items on the Survey Instrument 70
2	Mailing Procedure Used as Proposed by Dillman 73
3	Variables Used in Regression Models 81
4	Characteristics of Respondents 86
5	Characteristics of Randomly Selected Respondents and Non-Respondents 87
6	Characteristics of Early and Late Respondents 89
7	Analysis of the Respondents' Perceptions of CMC (Advantages) 92
8	Analysis of the Respondents' Perceptions of CMC (Disadvantages) 93
9	T-test of Outcomes Comparing Non-Respondents and Respondents on Rogers' Five Characteristics 97
10	T-test of Outcomes Comparing Early and Late Respondents on Rogers' Five Characteristics 98
11	Tally for Paired Combinations of Rogers' Five Characteristics 101
12	Respondents' Ratings of Statements Describing Rogers' Five Characteristics 102

TABLES (CONTINUED)

Table		Page
13	CMC Time and Options Used by Respondents for Classroom Instruction	104
14	Regression Analysis Outcomes for the Dependent Variable Use Score	108
15	Regression Analysis Outcomes for the Dependent Variable Option	110
16	Regression Analysis Outcomes for the Dependent Variable Time	111

FIGURE

Page

Figure 1. Paradigm of the adoption and diffusion of an innovation by an individual within a social system (Rogers 1962, 1983)	24
---	----

Chapter 1

INTRODUCTION

Background of the Problem

We are living in the "Information Age". Roberts, Blakeslee, Brown, and Lenk (1990) stated that the number of computers, all storing information, has skyrocketed from one in 1946 to well over 30 million in the 90s. They further stated that a study in the late 1970s estimated that Americans were exposed to over 8.7 million words a day through newspapers, books, radio, and television. Similarly, the Office of Technology Assessment (OTA) has calculated that American businesses handle over 400 billion documents each year, and that the number is growing by 72 billion documents each year. Educators need to be able to use the information for classroom instruction. They must be able to find what they need quickly and efficiently, and they must bring together information from a variety of sources. Today, opportunities exist to enhance the delivery of instruction through Computer-Mediated Communication (CMC). Answering questions, solving problems, and exploring new ideas require that people work

together. This collaboration requires communication with people in the next office, in another city, or around the world. Some educators are utilizing CMC for classroom instruction to help manage the complexities of an information-based society.

CMC refers to communicating at a distance by means of a network that utilizes personal or mainframe computers as a communications medium (Holden & Mitchell, 1993; Basham, 1991). This communication includes any educational exchange of information available at a distance. Transmitted information may include textual, graphic, or other types of data interchanged from site to site, most often using telephone lines. Information formats include electronic mail, electronic bulletin boards, computer conferencing, and on-line data bases and information banks. Instruction may be delivered through correspondence study, computer-mediated course work, live (one-way or interactive) or pre-recorded televised courses (utilizing satellite, ground or microwave broadcast), and audio-teleconferencing (telephone) courses. CMC is also multidimensional. It can use not only text and graphics, but also animation, video, and sound sequenced

with multiple information paths that allow for a dynamic, interactive interface (Defining software...p.16)

Many public networks exist including ADVOCNET (Adult and Vocational Network of the National Center for Research in Vocational Education, University of California, Berkeley) and networks such as those available from MCI, AT&T communications, and GTE Telnet that can be obtained by subscription. Other examples of CMC systems include the Conferencing System (CoSy) at the University of Guelph, Ontario. CoSy is similar to electronic mail and uses filing and organizing power of a host computer to support group discussions. In the CoSy, a user can communicate with others on subjects of interest. Students who logged on more frequently found conferencing more effective for getting help, socializing, and saving time and money than those who logged on less frequently (Mason, 1989a).

In spite of CMC's advantages there is a down side to incorporating CMC use into instructional delivery. According to Romiszowski and Jost (1989), one of CMC's disadvantages is that it may promote procrastination, allowing students to leave the response

for later, and perhaps in some cases they may fail to respond altogether. This adds to the complexity of developing instructional structure in that students may, at any time, be in the process of inputting new comments related to different stages of the development of a topic. Another disadvantage that originates from the distance communication aspects of CMC is that faculty lose some of the benefits offered by face-to-face group situations (Romiszowski & Jost, 1989). When the discussion drifts off the topic, it often takes longer and is more difficult to bring the group back on task than in a typical class setting. Further, responses are longer and more complex. CMC, which is still in its beginning stages, can also be time consuming and difficult to learn and implement.

Even for its disadvantages, a number of universities are promoting CMC use for instructional delivery. For example, the British Open University uses CMC in a course with over 1200 students who have discussions on their points of view and interests. Syracuse University also uses CMC as part of an instructional system. CMC used as part of instruction on a whole has not been widely adopted

(Hamilton & Thompson, 1992). The lack of experience with and understanding of the technology related to electronic media are reasons educators have not more widely used the technology for instruction (Rogers, 1987; Scrogan, 1987). CMC may become more readily accepted as universities, high schools, and even elementary schools promote innovative teaching methods (Romiszowski & Jost, 1989). One goal would be to integrate CMC into the curriculum so that it becomes a tool that is as easy to use as a calculator. This ease of use would promote CMC as instructional media.

CMC systems can reconstruct the way educators interact with colleagues and put geographically distant researchers and professional specialists in touch with one another all over the world (Kamper, 1991). CMC can serve to facilitate collaboration and cooperation among state university system institutions to provide expanded course offerings. Through CMC, students and faculty can send and receive electronic mail and participate in ongoing electronic forums that facilitate discussion (Willis, 1991). These experiences have helped develop a powerful rapport among scholars in a field of interest. To

achieve cooperation and collaboration among educators using CMC, the users must progress through an adoption diffusion cycle.

Rogers' Theory

According to Rogers (1983), an adoption diffusion cycle occurs as people become aware of an innovation. An innovation is an idea that is perceived as being new by the individual (Rogers, 1962). Following the awareness of an innovation, educators must involve themselves in an evaluation process. They evaluate the innovation and decide to implement or reject it based on the perceived value of the innovation. The perceived value of an innovation is judged by the users' perception. The Diffusion of Innovations Theory of Rogers (1962, 1983, 1995) provides a theoretical framework or paradigm for this process. Rogers' framework can be used to evaluate acceptance of an innovation.

Rogers noted that the perceived value of an innovation plays a vital role in communicating the idea to another person. Communicating the idea to another person is often referred to as the diffusion

process. The person or persons who use the innovation are referred to as users. Users can serve as filters. If the users have a poor perception of an innovation, the innovation will be filtered out of the system; but if the users have a positive perception of the innovation, they filter the innovation through the system (Rogers, 1986). Therefore, users' perceptions of an innovation are an important consideration in determining whether the innovation makes its way through a specific group of people. A specific group of people with the same goals are identified as a social system (Rogers, 1962).

Rogers (1983) concluded that there are five characteristics users utilize to judge the value of an innovation. These characteristics are compatibility, complexity, observability, relative advantage, and triability. These characteristics of the innovation can be summarized as follows: if an innovation is to be a success, the individuals will need to perceive it as being compatible with what is already being used. It must be relatively simple to use, visible to others, have an advantage over current methods being used, and be capable of being tried before being implemented. Hamilton and Thompson (1992), Greenberg and

McDermott (1977), Helsel (1972), Oppenheimer (1970), and Griliches (1960) all indicated that, with the exception of complexity, each perceived characteristic is positively related to use of an innovation. In this study, the research assumption is that business faculty's perceptions of these five characteristics of CMC are related to their CMC use.

Instructors must keep abreast of the changing technology in order to be more professionally competent and successful in their careers. This could result in a change in the current teaching methods. However, educational change does not occur overnight. The introduction of information technology initiates a chain reaction in the curriculum, instruction, and organization of education (Chen & Brovey, 1985).

Need for the Study

Since 1960, research has been done in the area of computer use in organizations. Most of this research has not focused on the computer as a communication medium, but rather use of computers as information processors, computation devices, and simulators of human

mental functions (Rice & Bair, 1984). Previous research (Scott, 1993; Tella, 1992; Shedletsky, 1992; Thorpe, 1989) has focused on learner outcomes related to CMC use on the post-secondary level and user-acceptance of CMC. However, literature reviewed for this study did not reveal any research that addressed perceived value for instructional purposes. In fact, there has been little concrete evidence available to support the idea that the computer provides a superior instructional vehicle (Gunsett, 1994; Carrie & Sales, 1987)

Thus, if CMC has the potential of becoming one of the most powerful instructional tools available to educators, what are the perceived values of CMC use for instructional purposes? A need exists to better understand the perceived value of using computers for instructional purposes and how faculty use computers as a medium for communication. D'onofrio and Slama (1983) summarized this need when they stated "ignorance of computers will render people as functionally illiterate as does ignorance of reading, writing, and arithmetic" (p. 143).

Computer communication has become important for helping people organize and distill information. Many benefits are claimed for using CMC in instruction. These include: (a) CMC establishes a democratic environment for group interaction and learning; (b) CMC provides a record of the entire course; (c) students don't miss any of the instruction due to absenteeism or daydreaming; (d) students respond more to questions and ideas; (e) students learn from each other; and (f) teacher comments become more interactive (Romiszowski & Jost, 1989; Chen & Brovey, 1985).

One of the often cited reasons for using CMC in instruction is to provide a better, more interesting way to present course content. To think that all aspects of learning can be improved by using CMC may be unrealistically optimistic; however, the delivery of course content can be enhanced with CMC (Romiszowski & Jost, 1989). Clark (1985) suggested that..."computers also seem to afford many potential benefits as a curriculum for schools and as a sophisticated and flexible delivery vehicle for instruction" (p. 137).

Assessing the use of CMC is important to educators because they have a vested interest in improving instruction. With the advancements in information processing of the 1970s, 1980s, and 1990s, business educators have accepted that new technology must be recognized, learned, and used in the classroom. Therefore, research on CMC can provide information to contribute to the understanding of the evolution of computer-mediated communication use for instructional purposes.

Outcomes of this study can be used to: (a) provide information on the perceptions of CMC use as it relates to Rogers' characteristics of an innovation; (b) identify factors inherent to CMC that affect implementation; (c) identify the perceived value and extent of CMC use for instructional purposes; and (d) identify how business faculty are presently using CMC for classroom instruction.

The outcomes help in determining the time that faculty need to invest if they are to achieve successful implementation of CMC for classroom instruction. For future adopters of CMC, the outcomes can also help identify and explain factors that contribute to the use of

CMC. The results provide insight into advantages and disadvantages associated with CMC use. The analyses of the respondents' perceptions of CMC use related to Rogers' theory and the perceived value of CMC use for instructional purposes serve to substantiate the application of Rogers' theory. In addition, this study can assist policy makers as they formulate decisions about CMC's potential uses.

Purpose

CMC provides educators with instructional tools that be useful in meeting information challenges of today. Satellites, video recorders, and computerized data bases can eliminate not only distance barriers but time barriers as well. CMC can make the teaching and learning process more flexible and instruction more effective in aspects such as speed, cost effectiveness, flexibility, and convenience (Romiszowski & Jost, 1989). CMC can expand, not limit, what faculty do when they teach.

The need to determine how business faculty perceive the value of CMC provided the impetus for this study. By determining the

perceived values of CMC, adoption or rejection of it can be examined. Rogers' Diffusion of Innovations Theory was utilized as a framework to guide this study. The study focused on one aspect of Rogers' theory, the perceived characteristics related to adoption of an innovation.

The focus of the study was business faculty's perceptions of CMC use as they relate to Rogers' five characteristics of importance in the adoption of an innovation: compatibility, complexity, observability, relative advantage, and triability. Respondents' perceived value of CMC use for instructional purposes was also investigated, with their personal characteristics, including age and educational level, serving as salient features of the study. In addition, this study examined respondents' use of CMC options. Therefore, the purpose of this study was to determine the perceived values of CMC use for instructional purposes, perceptions of its use as they relate to Rogers' theory, and extent of its use as reported by business faculty at four North Carolina universities.

Research Questions

To achieve the purposes of the study, four research questions were addressed.

1. What are business faculty's perceived values of using CMC for instructional purposes?
2. What are business faculty's perceptions of using CMC as they relate to Rogers' five characteristics for adopting an innovation?
3. How extensively is CMC being used for classroom instruction as reported by business faculty?
4. To what extent do business faculty's perceptions of Rogers' five characteristics for adopting an innovation and their perceived values of CMC use for instructional purposes explain their use of CMC?

Limitations of the Study

This study is limited to faculty from colleges or schools of business in four universities in North Carolina. It is also limited to those faculty who reported using CMC in relation to their instruction.

Delimitation of the Study

Multiple t-tests were used in Section D of the survey instrument in analyzing the data; therefore, a probability existed that 1 comparison out of 20 involved a Type I error.

Definition of Terms

Adoption Process. "The mental process through which an individual passes from first hearing about an innovation to final adoption"

(Rogers, 1962, p. 17).

Compatibility. "The degree to which an innovation is consistent with existing values and past experiences, and needs of the potential adopters" (Rogers, 1962, p. 126).

Complexity. "The degree to which an innovation is perceived as difficult to understand and use" (Rogers, 1962, p. 126).

Computer-Mediated Communication (CMC). "CMC is the use of the computer to facilitate information exchange between people. There are many characteristics that help delineate this new communications

medium. This includes: time independence; space/distance independence; flexibility and spontaneity of spoken conversation; permanent (written) record of conversations; emphasis on content rather than sender; and potential for group learning and collaboration.

CMC is the set of possibilities which exist when computer and telecommunication networks are used as tools in the communication process: to compose, store, deliver, and process communication"

(Johnston, 1992, p. 5).

Computer-Mediated Communication Systems (CMCS). A Computer-Mediated Communication System allows individuals and groups of people to carry on discussions and conversations over a computer network regardless of time and place constraints via messages keyed in to microcomputers connected by telephone to a central computer.

Such a system is in many ways an ideal medium for students, tutors and course team members involved in distance education courses

(Johnston, 1992).

Diffusion of Innovations Theory. Diffusion of Innovations Theory provided the theoretical framework for the study. Developed by

Rogers, it allows insight into the user's perception of an innovation and thus future rate of innovation use over time among groups with the same goals. This phenomena is sometimes called the adoption and diffusion process.

Diffusion. The spread of a new idea from the creator to the user (communicating an idea to another person). Diffusion occurs among persons. Diffusion is concerned with innovation and the adoption of the innovation. Diffusion of an innovation through a social system is determined by the perceived value of the innovation (Rogers, 1962).

Distance Education. Any educational options available at a distance which include audio-teleconferencing and pre-recorded television courses, one-way or interactive, and correspondence study (Romiszowski & Jost, 1989).

Innovation. "An idea perceived as new by the individual" (Rogers, 1962, p. 13).

Internet. "Generally (not capitalized), any collection of distinct networks working together as one. Specifically (capitalized), the world-wide network of networks that are connected to each other using

the IP protocol and other similar protocols. The Internet provides file transfer remote login, electronic mail, news, and other services" (Krol, 1992, p. 358).

Network. "System that permits the sharing of resources such as computing power, software, and input/output units by different computers" (Stern & Stern, 1993, p. 635).

Observability. "The degree to which the results on an innovation are visible" (Rogers, 1983, p. 16).

On-line Databases and Information Banks. Users may store, send, or retrieve information which may include library materials, text, or graphic files or software programs through these. (Krol, 1992).

Perception. "The way in which an individual responds to any sense or impression which he/she detects" (Rogers, 1962, p. 303).

Rate of Use. "The relative speed with which an innovation is used by the members of a social system" (Rogers, 1962, p. 134).

Relative Advantages. "The degree to which an innovation is superior to ideas it supersedes" (Rogers, 1983, p. 15).

Triability. "The degree to which an innovation may be experimented with on a limited basis" (Rogers, 1983, p. 15).

Summary

Chapter 1 contains the background information for this study, Rogers' theory, need for the study, purposes, and research questions. This Chapter also contains limitations and delimitation of the study and definitions of terms. The purpose of this study is to determine the perceived values of Computer-Mediated Communication (CMC) use for instructional purposes, perceptions of its use as they relate to Rogers' theory, and extent of its use as reported by business faculty at four North Carolina universities. Rogers' Diffusion of Innovations Theory provided the framework or paradigm needed for this study. Rogers' framework is useful in determining how innovations may be adopted and/or used. This study focused on one aspect of Rogers' theory--the five characteristics that adopters use to judge the value of an innovation. These characteristics are compatibility, complexity, observability, relative advantage, and triability.

Chapter 2, the literature review, contains information on previous research studies pertinent to this study. Chapters 3, 4, and 5,

the methodology, the findings, and the conclusions follow. The survey instrument is provided in the Appendices.

Chapter 2

LITERATURE REVIEW

Overview

Rogers' Diffusion of Innovations Theory and research related to it are summarized in Chapter 2. This chapter is organized into seven separate sections: adoption and diffusion of an innovation, Rogers' five characteristics of an innovation, administrative support and the perceived value of CMC in higher education, CMC and distance education, present use of CMC, perceptions of CMC, and changing teaching methods. Each section contains an individual summary.

The literature review examines the long-term vision of CMC for aiding instruction and supporting collaborative efforts on the post-secondary level. It also addresses adoption of an innovation studies completed by researchers who have used Rogers' characteristics which guided this study.

Adoption and Diffusion of an Innovation

Diffusion of innovation studies have been drawn from fields

such as agriculture, medicine, education, industry, and community development. Rogers (1983) demonstrated that there is a substantial base of empirical studies regarding adoption and diffusion of innovations that point in consistent directions. In particular, the studies highlight the importance of social interaction and suggest that adoption of innovations is a process that takes place in a pattern, over time, and is influenced by innovation characteristics (compatibility, complexity, observability, relative advantage, and triability). These characteristics are used in this study to examine the perceived value of an innovation.

What is the process by which innovations become adopted?

While there is no universally accepted theory, Rogers has developed a paradigm of the adoption of an innovation by an individual within a social system. This paradigm is useful to researchers because it provides a framework that may be utilized to develop studies to predict the rate at which innovations may be adopted. Rogers' paradigm was developed in 1962 and has been slightly revised. Rogers' typology characteristics were identified in 1962 as compatibility, complexity, communicability, divisibility, and relative advantage. Today, Rogers'

typology are known as compatibility, complexity, observability, relative advantage, and triability.

Rogers has written several books on diffusion of innovations (Rogers, 1962, 1983, 1986, 1995). The adoption and diffusion of an innovation will be explained further, but before it can be fully understood, there are key terms that must be defined as they relate to Rogers' theory.

Figure I depicts the adoption/rejection of an innovation by an individual in a social system in three major divisions: (a) antecedent, the individual's identity and the perception of the situation; (b) process, how the individual becomes aware of the innovation; and (c) results, the individual in a social system either adopts or rejects the innovation. When the individual in a social system adopts a new method, the procedure involves going through the adoption process, which entails experiencing the innovation's perceived characteristics.

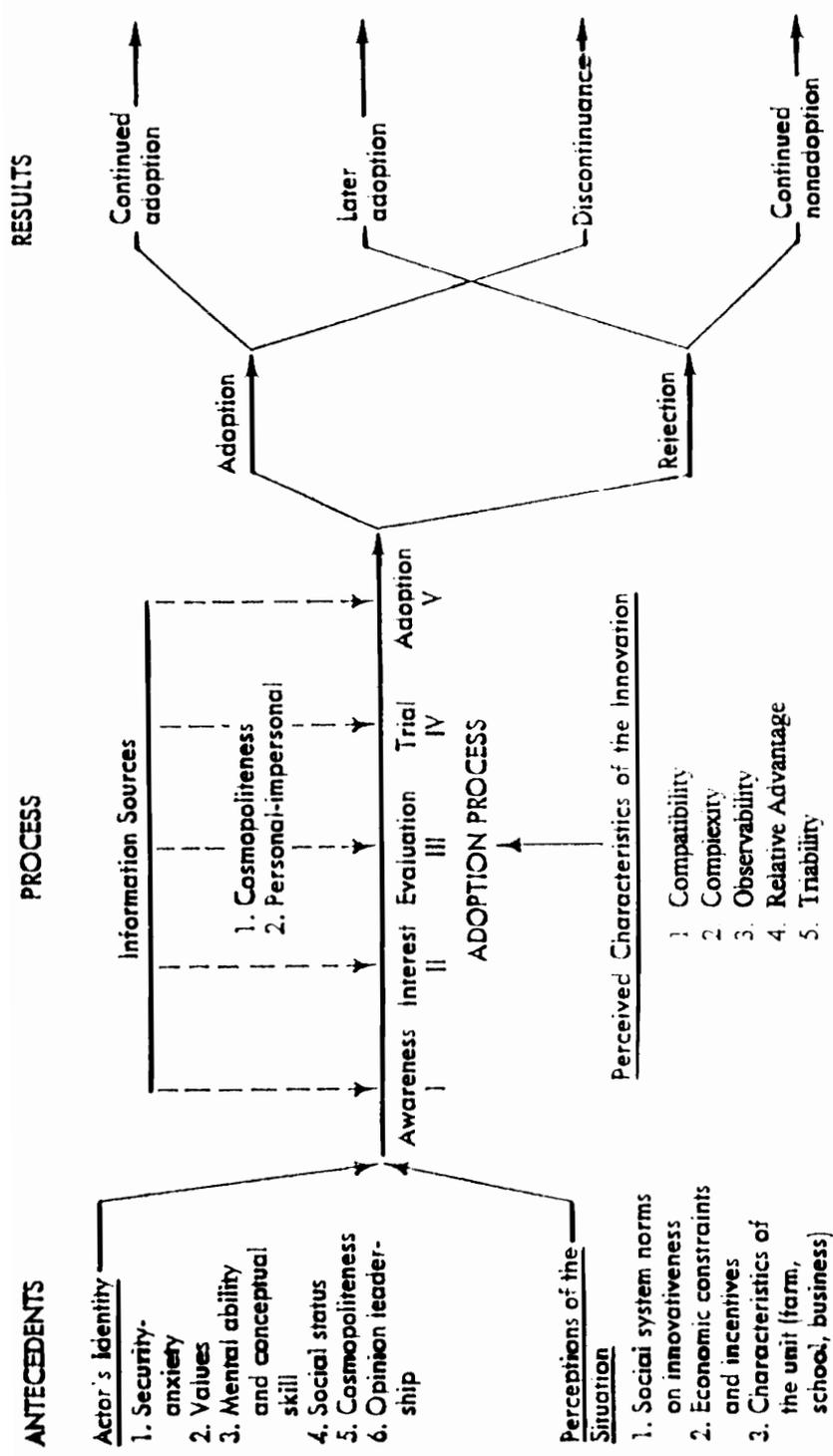


Figure 1: Paradigm of the Adoption and Diffusion of An Innovation by An Individual Within A Social Systems (Rogers, 1962, 1983)

Diffusion Process. There are four crucial elements in the analysis of the diffusion of innovation: (a) its innovation, (b) its communication from one individual to another, (c) its place in a social system, and (d) its impact over time. Innovation is an idea perceived as new by the individual; diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication because the messages are concerned with ideas. Communication is a process in which participants create and share information with one another in order to reach a mutual understanding. The diffusion process is the spread of a new idea from the creator to the users (communicating an idea to another person). A social system refers to a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. And lastly, over time refers to the period of time from when an individual hears about the innovation and until the individual decides to adopt it.

Adoption Process. Adoption is a decision to continue full use of an innovation indicating that the adopter is satisfied with the

innovation. The adoption process is the mental process through which an individual passes from first hearing about an innovation to final adoption. The adoption process differs from the diffusion process in that diffusion occurs among persons while adoption is an individual matter.

As previously stated, there are four elements in the analysis of a diffusion of innovation. One of the important ingredients of the diffusion and adoption processes is the innovation. Among the members of a social system, some innovations diffuse from first introduction to widespread use in a few years; other innovations require more time. The individual's perception of the characteristics of any innovation may be utilized in predicting the rate of its adoption. The rate of adoption is the relative speed with which an innovation is adopted by the members of a social system, and is described by the length of time required for a certain percentage of the members of a social system to adopt an innovation.

The five characteristics of adopting an innovation (Figure 1) described by Rogers include compatibility (the degree to which an

innovation is consistent with existing values and past experiences, and needs of the potential adopters); complexity (the degree to which an innovation is perceived as difficult to understand and use); observability (the degree to which the results of an innovation are visible to others); relative advantage (degree to which an innovation is superior to ideas it supersedes); and trialability (the degree to which an innovation may be experimented with on a limited basis). It is Rogers' opinion that these five characteristics of an innovation are researchable and may enhance the prediction of acceptance of an innovation. The Diffusion of Innovations Theory allows insight into the user's perception of an innovation and thus future rate of innovation use. Individuals' perceptions of an innovation's characteristics help to explain the different rate of adoption among different groups. Rogers has maintained that the perception of an innovation's characteristics by individuals in a social system affects its acceptance. Many factors affect this perception, for example, individuals in a social system who have adopted an innovation influence those who have not yet adopted the idea.

In the past ten years, Diffusion of Innovations Theory has been used by many researchers, including Kehr (1986), Jackson (1986), Griffiths (1986), Elliot and Scott (1983), and Pierce (1981). These studies focused on different segments of Rogers' framework.

Highlighted below are brief overviews of research studies using Rogers' framework.

Kehr (1986) studied the adoption process for personal computers by faculty in business administration and teacher education at the graduate college and university levels. Diffusion theory was tested as it related to the adoption of an innovation. The study sample consisted of 412 full-time faculty members at five accredited graduate schools. The instrument used was a self-reporting questionnaire.

Jackson (1986) studied educational reform in China. Rogers model was used as a framework for describing the phenomena under observation. It identifies four crucial elements in the diffusion of new ideas: (a) the innovation itself; (b) communication through certain channels; (c) time; and (d) the social system. Griffiths (1986) studied four aspects of the diffusion of innovation in library and information

services: (a) when and why innovation occurs in the library and information field; (b) what linkages (communication channels) exist that result in a flow (dissemination) of information; (c) what model(s) and methods have been effective in the diffusion process; and (d) what options and recommendations are needed to developed a plan for diffusion networks for library innovation.

Elliot and Scott (1983) stated that a comprehensive theory of instruction is needed which: (a) acknowledges the centrality of communication to instruction; (b) recognizes that instruction involves changes in student knowledge and behavior; and (c) reflects a systematic orientation to instruction. The literature on diffusion, particularly in the area of the communication of innovation, provides a logical step toward meeting the needs of Elliot's and Scott's research. The results of the study indicate that the innovation-decision process, change agent characteristics, and attribution of the innovation are three elements affecting the successful communication of an innovation.

Pierce's (1981) study described vocational teachers' awareness and use of innovative teaching practices in the State of New York.

The results of the study indicated that newer teachers tend to be more aware of new innovations. As their years of teaching increased, their knowledge of these innovations decreased. Researchers have also found a correlation between education and innovations. The greater the educational level of instructors, the more likely they are to be innovative. Rogers concluded that the educational attainment of instructors was related to speed of adoption.

These studies are not specifically related to Rogers' perceived characteristics related to adopting an innovation. However, they are cited to illustrate studies that have used different segments of Rogers' framework.

Rogers' Five Characteristics of an Innovation

Rogers' diffusion of innovation characteristics may be used as a framework for describing the phenomena which are under adoption.

Rogers' five characteristics of innovations are used to derive generalizations from studies of extent of use of a new innovation.

These characteristics (compatibility, complexity, observability, relative

advantage, and triability) are discussed in this section as they relate to an innovation. The perceived characteristics are discussed as they were grouped by previous researchers. Compatibility, complexity and relative advantage are discussed first in this section as they relate to an innovation.

Griliches (1960) contended that both congruence (compatibility) and profitability (relative advantage) were key variables in the adoption of hybrid sorghum. Griliches' contention was that complexity is more difficult to perceive than other characteristics of the innovation.

Griliches (1960) explained about 60% of the variation in rate of adoption of farmer's planting hybrid sorghum measured by the slope of the S-shaped adoption curve based on profitability. Griliches utilized aggregate data from crop reporting districts and states in his analysis and made no particular claim that similar results would be obtained when individual farmers were used as the unit of analysis. An idea must be seen as compatible with the needs of the individual. The compatibility, relative advantage, and simplicity of an innovation are positively correlated with its rate of adoption and complexity are

negatively related to rate of adoption (Greenberg & McDermott, 1977; Helsel, 1972; Fliegel & Kivlin, 1966).

Fliegel and Kivlin (1966) conducted personal interviews with 229 Pennsylvania dairy farmers. The investigation used farmers' perceptions of fifteen attributes of each of 33 dairy innovations to predict the rate of adoption for the innovations by this sample of Pennsylvania farmers. Results revealed innovations perceived as most economically rewarding and least risky were adopted more rapidly. The complexity, observability, and triability of the innovations were less highly related to the rate of adoption, but innovations that were more compatible with farmers' values were adopted more rapidly.

According to Rogers (1962), if an innovation can be tried before it is wholly implemented, and if people can observe its operations before making a commitment, user rate should increase. According to a survey conducted by Wolf and Fiorino (1973), educators are not prone to implement full-scale adoption of an innovation without first having trial-adopted and evaluated it. Without a preliminary trial-adoption and accompanying evaluation, it is extremely difficult to

determine how appropriate a given innovation is for a given target population. The lack of trial-adoption and accompanying evaluation may be one of the primary reasons why so many diffusion efforts fail in educational systems. Observability is the extent to which the innovation's effects are clearly observable to the potential adopter and peers. The more amenable the innovation is to demonstration, the more likely it is to be adopted (Zaltman & Lin, 1971). The observability and triability of an innovation are positively correlated with its rate of adoption (Helsel, 1972).

The relative advantage of CMC, which encompasses distance education, is that it has the potential to be cost-effective and cost-efficient depending upon the design of the system (Rumble, 1987). Using CMC for instruction is not simple; it means a departure from traditional methods (classroom lecture and textbooks). CMC allows one to choose when to respond to another individual's command. This is done when the user decides to use the computer. This offers the benefit of allowing one to think out a more structured, more complex response, and provides the benefit of allowing the user to participate at

times that are personally convenient (Jost, 1990-1992). More students respond to questions and ideas, with responses longer and more complex than in a traditional classroom. Advantages of CMC are gained when a faculty member sees the process as an opportunity to improve the existing curriculum and create new curriculum by obtaining professional assistance in areas such as design, graphics development, and evaluation. A major advantage for researchers is the decrease in travel time when researchers have double duty for both instruction and research. The relative advantages of an innovation are positively correlated with its rate of adoption (Greenberg & McDermott, 1977; Helsel, 1972; Griliches, 1960).

Greenberg and McDermott (1977) used Rogers' theory on perceived characteristics of an innovation to study the debut of a black television station. The potential adopters' perceptions of the innovation's attributes were assessed by telephone to evaluate the station's effectiveness in reaching the black audience. A two-wave telephone survey was conducted within metropolitan Detroit, Michigan, the main target area for Channel 62 broadcasting. The

questions were structured according to Rogers' five attributes necessary for adoption of an innovation: compatibility, complexity, observability, relative advantage, and triability. The results were that triability and observability were moderately related to the measure of adoption, relative advantage was related to the measure of adoption, and compatibility was strongly related to the measures of adoption. Complexity was of questionable importance as a predictor of adoption.

Helsel's (1972) study attempted to determine the relationship between teachers' perceptions of an innovation's characteristics and their acceptance of these same innovations. Rogers' typology identified five basic characteristics of change: compatibility, communicability, complexity, divisibility, and relative advantage. Twenty-five innovations were chosen from a pool of 45 change items. The questionnaires were distributed to 33 elementary and secondary teachers in two central Illinois schools. The sample consisted of the entire staff of a small elementary school and a random selection of the faculty of a larger secondary school. Partial correlation analysis was used. The results confirmed the initial prediction that teachers'

perceptions of relative advantage and compatibility are positively related to their acceptance of innovation, and complexity is negatively related to acceptance of innovation.

Whether or not an innovation has a great degree of advantage over the idea it is replacing is not important to its adoption. What does matter is whether the individual perceives the innovation as worthwhile. Thus, measuring the potential adopters' perceptions of compatibility, complexity, observability, relative advantage, and triability of an innovation allows examination of the extent it will be adopted.

Summary

The literature review in this section is related to Rogers' Diffusion of Innovations Theory which guides this study. The focus of this study was on one segment of Rogers' theory--perceived characteristics of an innovation (compatibility, complexity, observability, relative advantage, and triability). This section serves to illustrate research on Rogers' theory of perceived value of an innovation. It can be summarized as follows: compatibility,

observability, relative advantage, and triability are positively related to the acceptance of an innovation while complexity is negatively related to acceptance of an innovation. Research findings were in agreement with Rogers' theory (1962, 1983) on the perceived value of characteristics of an innovation.

Administrative Support and the Perceived Values of CMC in Higher Education

According to Rogers, there is less motivation to continue using an innovation without administrative support. In fact, there is a possibility that users of an innovation will discontinue use all together.

Hussain (1990) studied the role of adoption of instructional innovation as perceived by faculty innovators at a large university. He examined two research questions: (a) Is there any significant relationship between general departmental support and adoption of instructional innovations by faculty innovators at a large university? and (b) Is there any significant relationship between specific departmental support and adoption of instructional innovations by

faculty innovators? The study employed a cross-sectional survey method. Subjects were all faculty members at Michigan State University who voluntarily developed and used instructional innovations in their departments. A 30-item structured questionnaire was used to gather data from 55 subjects. Pearson correlation was used to determine the relationship between general departmental support and adoption, while partial correlation was used to determine the relationship between specific departmental support and adoption. The findings indicated a significant relationship between general departmental support and adoption of innovations by faculty innovators. With regard to the second question, findings revealed significant relationships between office support and adoption, colleagues' support and adoption, and chairman's support and adoption. No significant relationships were found between financial support and adoption, policy support and adoption, and technical support and adoption.

Rogers (1985) completed a study utilizing nine schools located in the San Francisco Bay area to examine the patterns by which

microcomputers are accepted and implemented in high schools. The study focused on: (a) the process of the behaviors and decisions leading to the acquisition of microcomputers, and (b) their subsequent implementation. Findings indicated that external pressures, rather than sound instructional practice, force educators to adopt microcomputers; school planning is usually insufficient to adopt microcomputers to the curriculum; introduction of the microcomputers produces a great deal of uncertainty and attendant anxiety in schools that adopt it; and, however "fragile" the microcomputer may be, it is probably not a fad that will pass away.

Computer use is important in higher education. Ognibene (1989) stated that although computers are found in many classrooms, they are often poorly integrated into classroom instruction, and many sit idle. Ognibene further stated that after more than 1,000 classroom visitations by Goodlad's research team, that Goodlad concludes in A Place Called School that the lack of instructional variety in classrooms exists. This has brought much attention to CMC use within colleges and universities.

Summary

Literature reviewed in this section contains information related to general administrative support, adoption of instructional innovations by faculty, and the relative advantage of an innovation (one of Rogers' perceived characteristics of an innovation) in higher education.

According to Rogers, an innovation must have administrative support and have an advantage over the idea it supersedes if it is going to be successful.

CMC provides changing technology available to enhance instruction related to administrative support substantiates Rogers' theory of the importance of top level administrative support. Without top level administrators' support, the innovation will be lost before the users acquire knowledge of its potential success.

CMC and Distance Education

Distance education refers to any situation where a separation of learner and instructor by time, place, or any other factor that does not allow for face-to-face interaction (Schwier, 1994). Distance delivery

systems range from traditional correspondence courses to innovative experiments using video and computer technology (Schwier, 1994, p. 75). The computer can bridge the distance between the teacher and the learner across time and space similar to two people linked via the telephone. A two-way communication link is a critical element in distance education (Holden & Wedman, 1993). CMC provides for interaction of two modes. Computers can be linked together to form networks that span distance and time through "network-specific tools" such as e-mail, and through conferencing (Schwier, 1994). Networks can be designed to serve a very limited population, similar to a school classroom or they can be open to the general public. The connections between each member of a group are maintained by a computer through modems and telephone lines. The impact of learning by this method is summarized in Gunawardena's & Boverie's (1993) study where CMC was compared with similar interaction in non-equivalent traditional classes. The total population was 74 students. The distance learning class was comprised of 15 students, ten on-campus and 5 off-campus. The others were traditional students. To determine

whether students interacted with the media used in traditional classes compared to the distance class, a two factor ANOVA was used for analyzing the interaction of learning styles and media, methods of instruction, and group functioning. Results indicated no significant difference in the interaction of learning styles (distance or traditional) and media and methods of instruction. The results indicate that one method is not that better than the other. Both are unique and offer advantages.

The rapid pace of CMC technological developments is complemented by the fact that distance education has become a viable means for many institutions to maintain enrollments at a desirable level; a critical concern when enrollment by traditional college-age students (18-22 years) is declining (Well, 1990). The appeal of distance education is enhanced by its increasing academic respectability, high quality instructional materials, and tutor support systems that have helped to establish comparable quality of distance and face-to-face instruction (Wells, 1990). Some universities with both face-to-face and distance education materials use the latter for

students in residence because of their superior quality of the materials (Wells, 1990).

The terms CMC and distance education are often used in conjunction with each other. An example of this is the conference system (CoSy) that was developed at the University of Guelph. The Open University pioneered the first use of the computer conferencing in mass distance education in 1988, when it was used to provide tutorial support to more than 1,300 students in the United Kingdom via electronic mail and conference messages. Mason's (1990) study of the use of the system in the first year revealed that (a) only one-third of the students logged on extensively; and (b) the primary values of the medium were increased communication, a reduced sense of isolation, and direct feedback from tutors to the central staff and to students. Olaniran (1992) studied utilizing a commercially developed conferencing software (Quickmail) to allow other researchers to gain easy access to the software and form a basis for future comparative study. Quickmail was used to compare the effects of face-to-face and CMC among 144 undergraduate participants on communicating

variables in a two-stage (idea generation and idea evaluation) design. Results indicated that more ideas were generated with CMC than in face-to-face, and participants engaged in more off-task comments in face-to-face than in CMC. No differences were found on process satisfaction, decision outcome satisfaction, and consensus.

Another example of computer-mediated conferencing systems is the Electronic Information Exchange System (EIES) which was developed at the New Jersey Institute of Technology in the 1970s. The Because It's Time Network (BITNET), a major university-based network, was founded in 1981 jointly at the City University of New York and Yale. BITNET links over 480 American colleges and universities and an equivalent number in Asia, Canada, Europe, Latin America, and the Middle East (Updegrave, Muffo, & Dunn, 1990). By 1990, Turner noted that BITNET, forerunner to the Internet, will reach into Eastern Europe adding to the list of 45 countries now participating. Approximately 22 North American colleges and universities offer course work through CMC (Rice, 1990). Some universities offer degree programs entirely on-line (Levinson, 1989).

CMC has been found as an effective media for course delivery especially for graduate seminars (Harasim, 1990; McGrath, Thurston, & McLellan, 1990; Mason & Kaye, 1989; Romiszowski & de Haas, 1989).

The Educational Native American Education Network (ENAEN) was established in 1988. ENAEN was initially designed to explore how CMC might be used to improve the educational environment. CMC/Distance education systems, which provide instruction to large numbers of students spread over wide geographical areas, characteristically use a range of different media and teaching methods, each associated with particular learning goals.

Summary

Distance education as it relates to CMC is not extensively used to replace traditional teaching but to enhance it and to service larger populations. The use of technology as a computer-mediated link between the educational system and the learner, allows for a broader participation in basic education, training, and retraining, as well as in higher education. The key factors that appear to influence perceived

value of CMC for effective learning as it relates to distance education include: (a) the ease with which the basic mechanics of the system can be learned and implemented with the proper training; (b) the design of the electronic social environment within which interactions occur; and (c) the relative importance of CMC as a communications tool compared with other available media and channels of communication (Kaye, 1989).

High schools have traditionally used distance education to offer compulsory courses that the local schools could not offer. With recent improvements in delivery methods and significant advances in technology, distance education now provides an effective alternative to meeting the needs of students. Distance education can also serve as a means of promoting community survival, as a growing number of students take courses via a number of distance education delivery systems.

Present Use of CMC

According to Rogers, until an individual knows about the use of a new idea, the individual cannot begin to form an attitude toward it.

He also stated that the success of an idea/innovation is the degree to which the results are visible to others. The easier it is for individuals to see the results, the more likely they are to adopt. Understanding how CMC is presently being used stimulates peer discussion of a new idea, as the peers ask the adopter for evaluation information about it.

Use of CMC has grown, especially in social communication systems such as distance education. CMC provides students with the opportunity for social interaction with other students. A number of universities are using CMC in various ways. Tella (1992) studied content, themes and topics, and analyzed the way the English language was used in e-mail. The research methodology was an ethnographic approach complemented by a thematic and linguistic analysis on content and language. The Finnish participants consisted of six classes in three senior secondary schools with four teachers of English. The foreign participants consisted of schools in Britain and the United States with further contacts in Austria, Canada, Germany, Iceland, Japan, and Sweden. Data were gathered during fieldwork November 1989 to May 1990. Results of the study indicated that process-led

collaborative e-mail communication encouraged writing and exchanging ideas across the world. The collaborative efforts made writing more public, bringing social and negotiation skills into focus; whole modes of writing became more versatile. Further, e-mail formed a new repository of teaching and learning materials. E-mail written on-line resembled oral communication; while off-line writing showed more textual and linguistic coherence and organization; and for e-mail artistic, emotive, and poetic language was widely used as well as referential or informative use of the target language.

Thorpe (1989) studied teachers in the United Kingdom's Open University who used a computer-mediated communication system called CoSy in 1988 to document their experiences with and attitudes toward the system. The results of interviews and analysis of log sheets revealed that: (a) the sample of teachers (n=10) showed a range in usage of the CoSy system from low to high, consistent with the expected range of use in the population as a whole; (b) all but 30% of the teachers reached the expected 20 hours a week on-line use; (c) teacher usage of the system decreased during the first year as extensive

browsing gave way to developing more efficient ways for using the system; (d) the system was used for electronic mail, teleconferencing, and general conversation purposes; (e) factors affecting student usage included cost, workload, difficulties of using the software, and disappointment with the conference results; (f) electronic mail and telephone usage were more popular than conferencing, but none of the three was as popular as the more traditional face-to-face exchange; and (g) typical of most innovations, those who had difficulty with the system used it less and were less enthusiastic about its continuation than those who found it easy to use. It was recommended that future use of the system should contain a less ambitious range of conferences, and that teachers should be better trained to use the system and to help their students use it.

Scott (1993) used a system of microcomputers interconnected with electronic meeting system software as a possible means of overcoming the grading and participation disparity problems associated with group work sessions conducted in face-to-face meetings. The purpose of the study of 20 undergraduate business students at the

University of Northern Colorado was to determine the effect of computer-mediated communications on the productivity and the participation pattern of groups involved in collaborative problem-solving activities. The results showed that students were more productive in accomplishing task objectives and participated more uniformly when working together using computer-mediated communications. The researcher noted that computer-mediated communications can function effectively as an alternative means of teaching collaborative problem-solving.

Hellerstein (1986) explored the social uses of CMC, identifying users and amounts of time spent using two related systems. Interviews and observations of computer users suggest that a large, socially active computing subculture is based at the University of Massachusetts, Amherst campus. The hypothesis tested was that members of a subculture of primary users would be the heaviest users of the various available electronic mail and electronic conference systems. A questionnaire was administered directly through a special computer program on the University's mainframe. Light users of the electronic

mail system reported they used the system to communicate with friends and to get help with homework. Heavy users more frequently used it for social purposes--mainly to initiate friendships and to arrange personal meetings. Light users reported using the conference facility mainly to alleviate boredom. Further, heavy users reported spending less time communicating over the telephone and having less face-to-face communication than light users.

Summary

The literature review in this section is related to "observability" (one of Rogers' perceived characteristics of an innovation). It addressed whether physical demonstration and evaluation contribute to CMC's use. The literature revealed that CMC is being used for social communication systems such as distance education. Research outcomes indicate that CMC (a) provides students with the opportunity for social interaction with other students; (b) affects English language usage; (c) impacts productivity and the participation patterns of groups involved in collaborative problem-solving activities; (d) and relates to amounts of time spent using electronic conference systems by primary

and light users. The observability of the use of CMC is important because it provides evidence of the perceived value of CMC use.

Perceptions of CMC

According to Rogers (1986), if individuals have a poor perception of an innovation, the innovation will be filtered out of the system, but if the individuals perceive the innovation as worthy, they filter the innovation through the social system (the targeted audience).

Lewis (1992) examined the socio-technical impact of CMC on students' attitudes towards computers, CMC, and their classes. Five classes at universities across America (119 students and faculty) participated in COMCONF, a BITNET computer conference which provided a unique laboratory for observations of CMC processes in an actual application of the technology to specific and practical ends. In addition, each class was administered a questionnaire at the end of the term to evaluate on-line education, learning styles, life satisfaction, and fun in the classroom. Results indicated that despite differences in class content, instructional methodologies, and CMC technologies, there no

discernible characteristics surfaced which clearly distinguish the class studied during the COMCONF exercise. Results showed, however, that the truly distinguishing characteristic of the COMCONF users was the way they separated into the "work mechanics" and "straphangers". "Work mechanics" are individuals who design work and provide direct or indirect value to the organization's products at every level, from the CEO to the last worker in the distribution chain. Organizational "straphangers" are individuals who fill organizational slots, maybe even work long and hard hours, but do not contribute to the organization's process or progress. Results suggested that the degree of integration of CMC into the class requirements as a fundamental part of the classroom process, and the degree of freedom that the students had for choosing classes, were both positively correlated with the emergence of "work mechanics" as opposed to "straphangers" in the class.

The resistant attitude of faculty toward using CMC applications is an obstacle that will need to be overcome in order to ensure the success of future instructional CMC applications (Holden & Mitchell, 1993). Levin (1984) traced the introduction of microcomputers in two

elementary schools, one middle school, and one high school in San Diego County, California. Levin's study determined whether or not the process of introducing microcomputers in education includes the necessary elements for change outlined by (a) a positive concept of the change involvement of those affected and (b) the development of constituencies. Four teachers from each school were interviewed and observed in their classrooms. Data were collected on their training on microcomputers, their attitudes about microcomputers in the schools, their strategies for integrating computers into their classrooms, and conflicts engendered at all levels of the school system. In general, the study revealed a positive attitude on the part of teachers, principals, district administrators, and groups outside the schools toward the introduction of computers.

There are a number of studies on positive feedback of new innovations. "Feasibility of Computer Networking in Education," a study submitted to the thirteenth session of the Alaska State Legislature (1983) was conducted to determine the feasibility and desirability of computer networks for instruction and educational administration in

Alaska. Five major activities were carried out to collect the necessary information: (a) interviews with representatives of other Alaskan government agencies; (b) a survey of district office staff; (c) a survey of a large sample of Alaska educators; (d) a meeting with representatives from state agencies and local districts; and (e) a review of technical information. The surveys and discussion with Alaska educators suggest that they believe the quality of education in their localities could be enhanced by improved communications resulting from computer networking efforts. Conclusions from the study included that the Department of Education should conduct activities to investigate implementation of educational networks, but should not preclude providing support in other areas of educational technology.

Rafky and Beckerman (1971) studied the relative effects of self-interest and altruistic motives on teacher acceptance of educational innovation after the effects of the following classes of variables have been taken into account: personal attributes, characteristic of the school system, characteristic of the school, career patterns, and psychological predispositions. Using a method of partial and multiple

correlation, they found that the willingness of 240 elementary school teachers to devote time and effort to the implementation of 15 new programs is more strongly related to self-interest than to altruism.

Hamilton and Thompson (1992) used Rogers' Diffusion of Innovations Theory as a theoretical base to study early adopters' use of an electronic communication network for teachers that was developed at the College of Education, Iowa State University; i.e., the Electronic Educational Exchange (EEE). The EEE is designed to provide a convenient method for the exchange of ideas between student teachers, practicing teachers, and Iowa State faculty, and to provide telecommunications experience for the three groups. Thirty-five subjects were selected from a list of the most frequent EEE users in the spring of 1990, including university professors, graduate students, student teachers, and educators from the surrounding area. The questionnaire used in the study elicited personal characteristics early adopters have in common from the subjects as well as their initial and current perceptions of the EEE in five categories: compatibility, complexity, observability, relative advantage, and triability. The

subjects' current perceptions of the system were higher than their initial perceptions.

Summary

Are the perceived values of CMC a determining factor for users' adoption? This section provides research documentation related to users' perceived value of an innovation. The information in the literature review confirms Rogers' conclusion about the perceived value of an innovation. His theory is that an individual's perception of an innovation can be used in examining acceptance. He also noted that an individuals' perception of an innovation help to explain the different rates of adoption among different groups. The focus of this study is the perceived values of an innovation which is judged by the users' perception.

Changing Teaching Methods

The literature has substantiated that non-CMC-using faculty oppose changing their teaching methods (Willis, 1991; Maddux, 1991; Bull, Harris, Lloyd, & Short, 1989). Rogers (1983) noted that many change programs fail because they seek to swim against the tide of the

individuals' cultural values without steering toward the individuals' perceived needs. The individual who seeks to make the change must have knowledge of the persons' needs, attitudes, beliefs, their social norms, and leadership structure, if programs of change are to be tailored to fit the person. In other words, the idea must be compatible with existing values, past experiences, and needs of potential users. An idea that is more compatible is less uncertain to the potential adopter.

Orlosky and Smith (1972) provided insights from a study of major change efforts of the past 75 years by reviewing a variety of instructional curriculum and organizational changes in education. Some of their major conclusions were as follows: changes in methods of instruction were more difficult to make successfully than changes in curriculum or administration; any change that requires a teacher to abandon an existing practice and replace it with a new practice risks defeat (strong incentive for retaining the existing one); and lack of a diffusion system will lead to nonacceptance of change.

The heart of a curriculum is the textbook and so far most people are not ready to change that. The following are the characteristics of the traditional curricula emanating from printed form (Chen & Brovey, 1985): (a) Once the information is packaged and printed in the textbook, it is difficult to change it; (b) the selection and choice of information for the textbook is often decided irrespective of the learner or the teacher; (c) the scope and sequence are often determined by the authors, independent of the idiosyncratic needs of the students or teachers; (d) the number of alternative, redundant textbooks which could provide certain flexibility, are limited in school practice (usually, only one text is being used per classroom, thus limiting the students to information within a particular textbook); (e) the cognitive level aimed at by the printed format textbook is inflexible (usually, it is intuitively aimed at a non-existing "average student"); and (f) the printed format of the current curricula is by definition "non-interactive". The interaction with the information is mediated via a teacher.

Shedletsky (1992) decided to teach an undergraduate "theories of communication" seminar course that had been listed but not taught

for 12 years or more. The professor asked for advice on how to teach the course by sending an electronic mail message over an information network. The sometimes contradictory advice concerning the proposed textbook (Littlejohn's "Theories of Human Communication") convinced the professor to stick with this challenging text with a philosophical bent. The professor decided to relate issues of theory to what matters to students by using CMC as part of the learning process. Students were provided with computer accounts and instruction in how to send, receive, print, and save electronic mail messages. Even though 20% of each student's final grade was based on a journal of electronic mail, the students did not eagerly embrace CMC. A few weeks before the end of the semester, students responded to a brief questionnaire concerning their use of and attitudes toward CMC. A total of 19 responses were received. Results indicated that: (a) using electronic mail, as it was done in this course, is likely to produce a fair share of student resistance; (b) access to computer terminals was essential; and (c) most students liked the experience and thought that it facilitated seminar participation.

Summary

The literature reviewed in this section relates to "compatibility," one of Rogers' perceived characteristics of an innovation. According to Rogers, innovations must be compatible with existing values, past experiences, and needs of potential users. An innovation that is more compatible is less uncertain to the potential adopter.

The literature related to change in teaching methods can be summarized as follows: (a) changes in teaching methods of instruction are apparently more difficult to make successfully than changes in curriculum or administration; and (b) the heart of a curriculum is the textbook and so far most people are not ready to change that.

The literature documents Rogers' conclusion that the lack of a diffusion system will lead to a resistance to change. And, if top level administration does not address the problem of adequate diffusion, the perceived value of an innovation can be of little importance. Using a new innovation is likely to produce a fair share of resistance which can lead to abandonment.

Chapter 3

METHODOLOGY

This chapter includes the design, sampling procedures, and instrumentation that were used in this study. The methods of data collection and data analyses procedures are also presented. The purpose of the study was to determine the perceived values of CMC use for instructional purposes, perceptions of its use as they relate to Rogers' theory, and extent of its use as reported by business faculty at four North Carolina universities. Rogers' Diffusion of Innovations Theory provided a framework for the study which addressed four research questions.

1. What are business faculty's perceived values of using CMC for instructional purposes?
2. What are business faculty's perceptions of using CMC as they relate to Rogers' five characteristics for adopting an innovation?
3. How extensively is CMC being used for classroom instruction as reported by business faculty?

4. To what extent do business faculty's perceptions of Rogers' five characteristics for adopting an innovation and the perceived values of CMC use for instructional purposes explain their use of CMC?

The Population

The population for the study consisted of all business faculty from four North Carolina universities. From the Higher Education Directory, National Center for Education Statistics, U. S. Department of Health, Education, and Welfare/ Education Division (Podolsky, 1974-1975), deans, directors, and chairs at these four North Carolina universities were identified. Letters requesting lists of business faculty and their mailing addresses were mailed to the business deans, chairs, and directors. A sample of the letters appear in Appendix A. Responses were received from all four institutions. Business deans at these four universities provided 290 names.

Research Design

Ex post facto research procedures were used for this study. In ex post facto research, "the causes are studied after they presumably have exerted their effect on another variable" (Borg & Gall, 1989, p. 537). According to Borg and Gall (1989), this method is sometimes called causal-comparative because it is aimed at the discovery of possible causes and effects of a behavior pattern or personal characteristic. This can be accomplished by comparing subjects in whom this pattern or characteristic is present with similar subjects in which it is absent or present to a lesser degree. For example, ex post facto research (causal-comparative method) can be used to study factors related to CMC use (a behavior pattern) or the perceptions of CMC's perceived value (personal characteristics). This can be done by assessing the perceived values between the two extremes: highest to lowest, respectively. This study examined patterns of CMC use, perceptions of its use as they relate to Rogers' theory, and perceived values of its use as reported by business faculty at four North Carolina universities using ex-post facto design.

Data Collection

The data collection was limited to a mail survey. The survey instrument, which has four parts (Sections A, B, C, and D), appears in Appendix B. In Section A, information is requested about respondents' gender, job title, highest degree earned, age, and years of teaching experience. Section A was also used to gather information on CMC classroom instructional uses, and CMC media, CMC technologies, and computers systems used. In addition, the respondents were asked the year they first used CMC for instructional purposes and how much time CMC was used for classroom instruction each week.

Section B and Section C were designed to gather information on the perceived values of CMC use as they relate to compatibility (associated with the users style of teaching, views, existing values, past experiences, and needs); complexity (associated with skills, training, and level of difficulty in CMC use); observability (associated with demonstrations and evaluations); relative advantage (associated with perceived advantages over other innovations as determined by cost, both time and monetary, and users' perceptions); and triability

(associated with the number of different trial opportunities and experimentation with the innovation's use). Section D was designed to gather information on perceived values (associated with advantages and disadvantages) of CMC use for instructional purposes.

Section B was used to determine which of Rogers' five characteristics contributed the most to the adoption of CMC use. Respondents circled the characteristic of each pair of characteristics that contributed the most to their adoption of CMC for instructional purposes. Each characteristic had the possibility of being selected from 0 to 4 times. Section C was also used to address respondents' perceived values of CMC use as they relate to Rogers' five characteristics of an innovation: compatibility, complexity, observability, relative advantage, and triability. The instrument contains 6 items to address each of the five characteristics. The 6 items for each of the characteristics provided a totaled of 30 statements, which were randomly distributed on the survey instrument. Section D of the instrument was used to gather information on the perceived values of incorporating CMC use in instruction.

Validation

Rogers' (1986) and Hamilton and Thompson's (1992) surveys were used as a source for developing the items in Sections C and D of the survey. Rogers' five characteristics of an innovation were also used as a source for developing Sections B, C, and D. The items in Sections B, C, and D were obtained from a review of Rogers' theory and the literature review on the perceived value of CMC use.

To further establish the validity of the instrument, two panels of experts reviewed it. Each person on the panel was called and asked to participate in the survey instrument review. Based on the results of the telephone calls, each panel reviewer was mailed a packet that included a letter with instructions and materials. The letter appears in Appendix D. The panel members were selected on the basis of their reputations for computer usage and expertise in their disciplines. The first panel consisted of five experts: an English professor, an information technology coordinator and computer consultant, a computer systems administrator, an agricultural economist, and a statistician. Based on the first review, the following changes were made to the instrument:

(a) six items were added to address each of Rogers' five characteristics, for a total of 30 items; (b) the CMC technology heading was changed to CMC media use; (c) some of the media, technology, and computer systems options were rearranged so that the headings corresponded with the options; (d) some of the survey items were re-written for clarity and understanding; and (e) five items that were redundant were dropped from the original 35 items in Section C.

There were also five experts in the second review: three business education teacher educators, a statistician, and an agricultural animal nutritionist. This panel validated the items in Section C of the instrument.

To determine the validity of the Section C items, a matching exercise was implemented with index cards. Two different types of 3 x 5 colored index cards were developed. One set of index cards was blue and contained the definitions of Rogers' five characteristics. The other set of cards was white and contained the statements related to Rogers' five characteristics of an innovation. The panel was instructed to match the statements (white cards) with the definitions (blue cards).

The matching was done to determine the clarity and understanding of the innovation based on Rogers' five characteristics (compatibility, complexity, observability, relative advantage, and triability). The experts had to determine which of the white cards were related to the blue cards that contained the definitions of Rogers' characteristics. The majority, 3 out of 5, had to confirm that the items agreed with the original intent for the item to be considered for use on the instrument. Table 1 contains information about the panel's validation of the items.

Based on the results of the validation panel reviewers, concerns with the Section C items were addressed. On a whole, the items were appropriately matched. However, there were 7 items (2, 8, 15, 18, 22, 24, 25) that initially presented a problem. The panel members did not match the items as expected. The difficulty appeared to be with the blue index cards that contained the definitions. Therefore, the definitions were expanded to improve clarity. The 5 blue cards containing the expanded definitions of Rogers' theory and the 7 white cards containing statements related to Rogers' theory were

Table 1

Tally of Panel Responses (n=5) to Items on the Survey Instrument

Item	Agree ^a	Disagree ^b	Item	Agree ^a	Disagree ^b
1	4	1	16	4	1
2 ^c	3	2	17	3	2
3	4	1	18 ^c	5	
4	5		19	3	2
5	3	2	20	3	2
6	4	1	21	4	1
7	5		22 ^c	5	
8 ^c	5		23	5	
9	3	2	24 ^c	5	
10	4	1	25 ^c	3	2
11	4	1	26	4	1
12	5		27	4	1
13	4	1	28	5	
14	4	1	29	4	1
15 ^c	4	1	30	4	1

^aAgree means the validation panel experts classified the item in the same category as intended.

^bDisagree means the validation panel experts classified the item under a different characteristic (Rogers' model) than the one intended.

^cItems that the panel of experts did not initially classify under the intended category.

then resubmitted to the panel of experts. The same procedures as followed previously were used for the 7 white index cards and the 5 blue index cards. All of the white cards containing statements were then matched to the blue card definitions by at least 3 of the 5 responding panel members.

The validation panel experts assisted in verifying the usability and internal consistency of the instrument. The revised instrument was then used in a pilot test.

Pilot Testing the Survey

The pilot test was completed with the vocational and technical education faculty (n=18) at Virginia Polytechnic Institute and State University, Blacksburg, Virginia. After the completion of the pilot test, Section B directions on the survey instrument were re-written for clarity. The data collected from the survey instrument were analyzed. Completion of the trial analyses provided anticipated outcomes; thus, the survey instrument was sent to business faculty at the four North

Carolina universities included in the study. The survey as used appears in Appendix B.

Analysis Procedures

A coded survey was sent to each faculty whose name appeared on the mailing lists of faculty members received from the deans, chairs, and directors. As the faculty responded to the survey, their names were removed from the list of outstanding respondents. Table 2 shows the mailing procedure used in this study which were those proposed by Dillman (Frankfort-Nachmias & Nachmias, 1992).

Copies of correspondence sent to the respondents appears in Appendix C. Telephone calls were made to each respondent who had not responded after being mailed the second replacement instrument.

According to Wunsch (1991), generally, the response rate for a survey needs to be more than 70% or the data cannot be assumed to be representative of the population. The data may be valid, but should not be generalized to other similar populations. Therefore a follow-up of non-respondents completed through telephone calls to 10 randomly selected individuals who responded to selected information on the

Table 2

Mailing Procedure Used as Proposed by Dillman^a

Mailing	Time
First mailing	Week 1
Postcard follow-up	Week 2
First replacement questionnaire	Week 3
Second replacement	Week 4

^aFrankfort-Nachmias & Nachmias, 1992

survey instrument. The non-respondents' information was compared to 10 randomly selected respondents. Also a comparison was made between late and early respondents, since late respondents often resemble non-respondents (Miller & Smith, 1983). T-tests were used to test for non-respondent bias to establish the respondents' representativeness of the population.

The Statistical Package for Social Science (SPSS Version 6.0) was used to process all data to answer the research questions. An *a priori* alpha level of .05 was used throughout this study. The values assigned to the instrument responses appear in Appendix E.

Research Question 1. What are business faculty's perceived values of using CMC for instructional purposes?

Survey items used to answer Research Question 1 were related to perceived values (associated with advantages and disadvantages) of using CMC for instructional purposes. There were 25 perceived value items. Respondents were asked to circle their response for each item on a scale from strongly agree to strongly disagree, with strongly agree being the most positive or most negative response for the perceived

value of using CMC for instructional purposes. Values were assigned to the scale with 4 being the highest and 1 being the lowest. Reverse coding was used for negative items. Information for Research Question 1 was collected through Section D on the survey instrument.

On the 1-4 scale, a value of 2.5 was taken to indicate neutrality. The question implies a null hypothesis that respondents would hold neutral perceptions regarding the perceived values of CMC use for instructional purposes.

$$\text{Thus } H_0: \mu - 2.5 = 0$$

$$H_a: \mu - 2.5 \neq 0$$

The t-test of the hypothesis of neutrality of responses related to the perceived values of CMC for instructional purposes was calculated as follows for each of the 25 items in Section D.

$$t = \frac{\bar{X} - 2.5}{S_e}$$

\bar{X} = mean value for 25 items related to the perceived values of CMC use for instructional purposes.

$$S_e = SD / \sqrt{n}$$

SD (standard deviation) indicates extent of variability or dispersion of scores about the mean. The mean and standard deviation, taken together, provide a description of how valuable respondents perceived CMC to be for instructional use.

Use of multiple t-tests led to the probability that the family of conclusions will contain at least one Type I error which is called the familywise error rate (FW). The completed set of comparisons determining if the mean values were different than 2.5 for the 25 items related to the perceived value of CMC use for instructional purposes were called the family of conclusions.

Research Question 2. What are business faculty's perceptions of using CMC as they relate to Rogers' five characteristics for adopting an innovation?

The items in Sections B and C were used to answer Research Question 2. In section B, the respondents identified Rogers' characteristics (compatibility, complexity, observability, relative advantage, and triability) that contributed most to their adoption of CMC use. In Section C, the respondents were asked to rate their

perceptions of the 30 items related to Rogers' five characteristics on a scale from strongly agree to strongly disagree, with strongly agree being the most positive response. Values were assigned to the scale with 4 being the most positive response and 1 being the most negative.

For Section B, pair values were calculated based on frequency of a particular characteristic being circled. For example, the five characteristics when paired resulted in 10 pair combinations with each characteristic listed 4 times. Thus, the maximum value a characteristic could have was 4 and the minimum was 0. Responses to the likert-type items in Section C were compiled according to those related to each of Rogers' five characteristics. The responses ranged from strongly agree, assigned a value of 4, to strongly disagree, assigned a value of 1. Reverse coding was used for negative items. The overall score for each characteristic was obtained by tally. Means and standard deviations were computed.

Research Question 3. How extensively is CMC being used for classroom instruction by business faculty?

The survey items used to answer Research Question 3 identified the amount of time used related to instruction each week and the number of different CMC options used. There were nine CMC classroom instructional uses, three CMC media, eight CMC technologies, and seven CMC computer systems that were identified. The respondents were asked to check all items that they used. In addition, spaces for respondents to add items were provided. Information for Research Question 3 was collected from Section A, items 6 through 10 on the survey instrument.

The mean, standard deviation, and minimum and maximum values were calculated from responses for survey item 10 regarding time. Frequency counts were compiled from responses to survey items 6 through 9 regarding uses of CMC.

Research Question 4. To what extent do business faculty's perceptions of Rogers' five characteristics for adopting an innovation and their perceived values of CMC use for instructional purposes explain their use of CMC?

Survey items used to answer the research question identified the perceptions of CMC as they relate to Rogers characteristics of an innovation and the perceived values of using CMC for instructional purposes (see explanations for Research Questions 1 and 2).

Information for Research Question 4 was collected from Section A, Section C, and Section D on the survey instrument.

The hours used for CMC instruction and the number of CMC options used were combined to provide an overall "use" score. Equal weight was assigned to the hours of use and number of options used as reported by each respondent through the use of Z scores.

$$\text{Thus, } Y_j = Z_{(\text{hrs})j} + Z_{(\text{options})j}$$

Where Y_j = CMC use score for each individual respondent (j).

In addition, time and options were calculated separately.

Three multiple regressions were computed to explain the variance in the use score, time, and options related to Rogers' five characteristics and the perceived values of CMC use for instructional purposes. The standardized regression models used follow:

$$Y_{\text{Use}} = \beta_1 R_1 + \beta_2 R_2 + \dots + \beta_6 V$$

$$Y_{\text{Time}} = \beta_1 R_1 + \beta_2 R_2 + \dots + \beta_6 V$$

$$Y_{\text{Options}} = \beta_1 R_1 + \beta_2 R_2 + \dots + \beta_6 V$$

Where R_1, \dots, R_5 = score relating to Rogers' five characteristics

(compatibility, complexity, observability,

relative advantage, and triability)

β_1, \dots, β_6 = standardized regression coefficient

V = score related to perceived value

Variables used in the regression models appear in Table 3.

Table 3

Variables Used in Regression Models

Variables	
Dependent Variable	
Regression 1 Use Score	Y ^a
Regression 2 Time	Y
Regression 3 Option	Y
Independent Variable	
Compatibility ^b	R ₁
Complexity ^b	R ₂
Observability ^b	R ₃
Relative Advantage ^b	R ₄
Triability ^b	R ₅
Perceived Value ^c	V

^aHours used for CMC instruction and the number of CMC options used were combined to provide an overall use score. Equal weight was assigned *a priori* to the hours of use and number of options used as reported by each respondent through the use of Z scores.

^bRespondents rated 6 likert-type items with four options for each characteristic. Thus, these variables could range from 0 to 24.

^cRespondents rated 25 likert-type items, with four options each for perceived value. Thus, this variable could range from 0 to 100.

Summary

Two-hundred and ninety business faculty at four universities in North Carolina represented the population for the study.

The purpose of the study was to determine the perceived values of CMC use for instructional purposes, perceptions of its use as they relate to Rogers' theory, and extent of its use as reported by business faculty at four North Carolina universities. Rogers' Diffusion of Innovations Theory provided the framework for the study which addressed four research questions. The data collection instrument was a four page survey with a cover letter. Two panels of experts validated the items on the survey instrument.

Ex post facto research procedures were used for the study. The data were analyzed through use of frequency counts and descriptive statistics, one sample t-tests, paired t-tests, multiple t-tests, and multiple regression statistics.

Chapter 4

FINDINGS

Chapter three explained the sampling procedure, study design, instrumentation, data collection, and data analysis. The purpose of this chapter is to report findings relative to the research questions posed by this study.

This study examined the perceived values of CMC use for instructional purposes, perceptions of its use as they relate to Rogers' theory, and extent of its use as reported by business faculty at four North Carolina universities. More specifically, the research questions associated with the study were:

1. What are business faculty's perceived values of using CMC for instructional purposes?
2. What are business faculty's perceptions of using CMC as they relate to Rogers' five characteristics for adopting an innovation?
3. How extensively is CMC being used for classroom instruction as reported by business faculty?
4. To what extent do business faculty's perceptions of Rogers' five

characteristics for adopting an innovation and the perceived values of CMC use for instructional purposes explain their use of CMC?

Findings relevant to these questions are presented in this chapter. First, a description of the responding business faculty is given. Second, outcomes of the data analyses completed to answer the research questions are presented.

Description of Respondents

The population for the study consisted of all business faculty from four North Carolina universities. Business deans at these four universities provided 290 names of business faculty. Of these, 172 (59%) responded to the survey, 121 (42%) indicated that they use computer-mediated communication (CMC) for instructional purposes, and 51 (17%) indicated they did not use CMC for instructional purposes. To compare respondents to non-respondents, a follow-up of 10 randomly selected non-respondents was completed to solicit selected information on the survey instrument. Since late respondents tend to be similar to non-respondents, a comparison was also made between late and early respondent groups (Miller, & Smith, 1983).

As shown in Table 4, respondents included 86 males (71%), 34 females (28%), and 1 missing value (1%). The job titles for the respondents were 1 instructor (1%), 37 assistant professors (31%), 36 associate professors (30%), 33 professors (27%), 13 others (10%), and 1 missing value (1%). The highest degrees earned were as follows: 11 M.S./M.As (9%), and 109 Ed.D./Ph.Ds (90%), and 1 missing value (1%). The respondents ranged in age from 27 to 70 years old. The mean age of the sample was 46. The respondents' teaching experience ranged from 2.5 years to 45 years with a mean number of years for respondents' teaching experience being 15. The year the respondents first started using CMC for instructional purposes ranged from 1971 to 1996.

Characteristics of Respondents and Non-Respondents

Respondents were compared to non-respondents as shown in Table 5. Each of the ten randomly selected respondents and ten randomly selected non-respondents were comprised of 5 males (50%) and 5 females (50%). The job titles for the respondents were 5 assistant professors (50%), 2 associate professors (20%), 1 professor (10%), and 2 others (20%) as

Table 4

Characteristics of Respondents

Characteristic	N	Percent	Mean
Gender			
Male	86	71	
Female	34	28	
Missing Value	1	1	
Total	121	100	
Job Titles			
Instructors	1	1	
Assistant Professors	37	31	
Associate Professors	36	30	
Professors	33	27	
Other	13	10	
Missing Value	1	1	
Total	121	100	
Highest Degree Earned			
M.S./M.A.	11	9	
Ed.D./Ph.D.	109	90	
Missing Value	1	1	
Total	121	100	
Age	117		46
Teaching Experience	118		15

Table 5

Characteristics of Randomly Selected Respondents and Non-Respondents

Characteristics	Respondents ^a			Non-Respondents ^a		
	N	%	Mean	N	%	Mean
Gender						
Male	5	50		5	50	
Female	5	50		5	50	
Job Title						
Asst. Professor	5	50		5	50	
Assoc. Professor	2	20		3	30	
Professor	1	10		1	10	
Other	2	20		1	10	
Highest Degree Earned						
M.S./M.A.	1	10		0	0	
Ed.D./Ph.D.	9	90		10	100	
Age	10		39	10		42
Teaching Experience	10		17	9		14

^a10 randomly selected respondents and 10 randomly selected non-respondents.

compared to the non-respondents who were 5 assistant professors (50%), 3 associate professors (30%), 1 professor (10%), and 1 other (10%). The highest degrees earned for the respondents were 1 M.S. (10%) and 9 Ed.D/Ph.Ds (90%) as compared to the non-respondents who had all earned Ed.D/Ph.Ds (100%). The mean age of the respondents was 39 as compared to the non-respondents age of 42. The mean teaching experience for the respondents was 17 as compared to 14 years for the non-respondents. Thus, the demographic characteristics of the randomly selected non-respondents were similar to those of the randomly selected respondents.

Characteristics of Early and Late Respondents

Ten randomly selected early respondents were compared to 10 randomly selected late respondents as shown in Table 6. The randomly selected early respondents were obtained from the first 50 respondents who responded to the survey instrument and the randomly selected late respondents were obtained from 50 respondents who responded to the survey instrument last. The early respondents were comprised of 7 males (70%)

Table 6

Characteristics of Early and Late Respondents

Characteristics	<u>Early Respondents^a</u>			<u>Late Respondents^a</u>		
	N	%	Mean	N	%	Mean
Gender						
Male	7	70		8	80	
Female	3	30		2	20	
Job Title						
Asst. Professor	2	20		4	40	
Assoc. Professor	6	60		4	40	
Professor	2	20		2	20	
Highest Degree Earned						
Ed.D./Ph.D.	10	100		10	100	
Age	10		49	8		41
Teaching Experience	10		17	10		15

^a10 randomly selected early respondents and 10 randomly selected late respondents.

and 3 females (30%) as compared to the late respondents who were 8 males (80%) and 2 females (20%). The job titles for the early respondents were 2 assistant professors (20%), 6 associate professors (60%), and 2 professors (20%) as compared to late respondents who were 4 assistant professors (40%), 4 associate professors (40%) and 2 professors (20%). The highest degrees earned for the all of the randomly selected early and randomly selected late respondents were Ed.D/Ph.Ds (100%). The mean age for the early respondents was 49 as compared to 41 years for the late respondents. The mean teaching experience for the early respondents was 17 as compared to 15 years for the late respondents. Here too, the demographic characteristics of the 10 randomly selected late respondents were similar to the 10 randomly selected respondents.

Findings Related to Perceived Values of CMC Use

The first research question was: What are business faculty's perceived values of using CMC for instructional purposes?

There were 25 perceived advantage and disadvantage items on the survey instrument to address this research question. They appear in Section

D of the survey instrument and are listed in Table 7 (advantages) and Table 8 (disadvantages). Table 7 and Table 8 contain outcomes indicating whether means for each advantage and disadvantage are different than a neutral response. Further the outcomes indicate whether the respondents agreed or disagreed that the statements were advantages or disadvantages of CMC use for classroom instructional purposes.

The respondents perceived values (associated with the advantages and disadvantages) of CMC were based on a scale from 4 (SA-Strongly Agree) to 1 (SD-Strongly Disagree), with 4 being the highest response and 1 being the lowest response. Reverse coding was used for the negative responses (1 for Strongly Agree to 4 for Strongly Disagree). On the 1-4 scale (advantages) and 4-1 scale (disadvantages), a value of 2.5 was taken to indicate neutrality. The null hypothesis implies that respondents would hold neutral perceptions regarding the perceived values of CMC use for instruction.

Table 7

Analysis of the Respondents' Perceptions of CMC

Advantages of CMC Use	Number of Cases	Mean	SD	SE of Mean	t-value	df	Probability ^a
Useful technology	119	3.37	.58	.05	16.35	118	.000
Eliminates distance barriers	120	3.00	.66	.06	8.29	119	.000
Facilitates collaborative efforts	119	2.97	.57	.05	8.98	118	.000
Provides for student participation	118	2.94	.57	.05	8.34	117	.000
Facilitates individualized instruction	117	2.83	.66	.06	5.39	116	.000
Serves more students at one time	116	2.81	.70	.07	4.80	115	.000
Provides immediate feedback	115	2.78	.59	.06	5.14	114	.000
Can work at any site	116	2.63	.73	.07	1.91	115	.058
Eliminates time barriers	120	2.58	.80	.07	1.15	119	.253
Provides group interaction	110	2.56	.66	.06	1.02	109	.312
Provides a record of the entire course	114	2.39	.70	.07	-1.61	113	.111
Eliminates students' daydreaming	117	1.98	.73	.07	-7.65	116	.000
Eliminates students' absenteeism	116	1.91	.68	.06	-9.29	115	.000

^aComparing respondents' mean value to a value of 2.5 for a test of respondents' mean being different than a neutral response.

Table 8

Analysis of Respondents' Perceptions of CMC^a

Disadvantages of CMC Use	Number of Cases	Mean	SD	SE of		df	Probability ^a
				Mean	t-value		
Promotes procrastination	113	2.97	.59	.06	8.54	112	.000
Responses long and disorganized	112	2.87	.47	.05	8.16	111	.000
Takes too much time to learn	117	2.76	.61	.06	4.62	116	.000
Takes too much time to implement	117	2.67	.63	.06	2.86	116	.005
Lacks face-to-face communication	119	2.18	.78	.07	- 4.40	118	.000
In the beginning phases is expensive	116	2.10	.68	.06	- 6.31	115	.000
Requires changes in methods of instruction	120	2.10	.59	.05	- 7.48	119	.000
Requires access to specialized equipment	120	2.04	.61	.06	- 8.18	119	.000
Requires access to specialized software	121	1.99	.52	.05	-10.66	120	.000
Requires knowledge of on-line resources	120	1.98	.60	.06	- 9.58	119	.000
Must be trained to use CMC options	118	1.94	.63	.06	- 9.63	117	.000
Requires the support of top level administration	121	1.75	.60	.05	-13.81	120	.000

^aComparing respondents' mean value to a value of 2.5 for a test of respondents' mean being different than a neutral response. Reverse coding was used for the disadvantage items.

Comparing respondents' mean values to a value of 2.5 for a test of respondents' means being different than a neutral response revealed that there was not a significant difference from neutrality for the following advantages of CMC use: can work at any site, eliminates time barriers, provides group interaction, and provides a record of the entire course.

However, respondents' mean responses were significantly different from the 2.5 neutral response for the following advantage items: useful technology, eliminates distance barriers, facilitates collaborative efforts, provides for student participation, facilitates individualized instruction, serves more students at one time, provides immediate feedback, eliminates students' daydreaming, and eliminates students' absenteeism.

Comparing respondents' mean values to a value of 2.5 for a test of the respondents' means being different from a neutral response revealed there was a significant difference for all the listed disadvantages of CMC use.

The analysis of the respondent's perceptions of CMC the findings revealed that generally they agreed with the perceived value statements. Two advantages were not perceived as advantages. They were eliminates students' daydreaming and eliminates students' absenteeism. The respondents

neither agreed nor disagreed with four advantage statements. They were can work at any site, eliminates time barriers, provides group interaction, and provides a record of the entire course. The findings that did not support previous studies by Romiszowski and Jost (1989) and Chen and Brovey (1985).

The respondents did agree with findings of Willis (1991) and Romiszowski and Jost (1989) on the following advantages: useful technology, eliminates distance barriers, facilitates collaborative efforts, provides for student participation, facilitates individualized instruction, serves more students at one time, and provides immediate feedback. The findings further revealed that respondents disagreed with the disadvantages of CMC use on the following items: promotes procrastination, responses long and disorganized, takes too much time to learn, and takes too much time to implement. The respondents were in agreement with Willis (1991) and Romiszowski and Jost (1989) that the following items were disadvantages of CMC use: lacks face-to-face communication, in the beginning phases is expensive, requires changes in methods of instruction, requires access to specialized equipment, requires access to specialized software, requires

knowledge of on-line resources, must be trained to use CMC options, and requires the support of top level administration.

Perceptions of CMC Use Related to Rogers' Five Characteristics
(Respondents versus Non-respondents and Early versus Late Respondents)

The items reported in Table 9 indicate no significant differences between respondents' and non-respondents' perceptions of using CMC as they relate to four of Rogers' characteristics: compatibility, observability, relative advantage, and triability. However, there was a significant difference between complexity for respondents and non-respondents. The t-value was significant at the .003 level, with the mean for the non-respondents being .60 and the mean for the respondents being 2.30.

The items reported in Table 10 indicate no significant difference between early and late respondents' perceptions of using CMC as they relate to Rogers' five characteristics for adoption of an innovation: compatibility, complexity, observability, relative advantage, and triability.

Table 9

T-test of Outcomes Comparing Non-Respondents and Respondents on Rogers' Five Characteristics^a

Variable	N of Pairs	df	Mean	t-value	2-tail Sig
Compatibility	10	9		-.45	.664
Non-Respondents			2.80		
Respondents			2.50		
Complexity	10	9		-4.02	.003
Non-Respondents			.60		
Respondents			2.30		
Observability	10	9		.94	.373
Non-Respondents			1.40		
Respondents			1.00		
Relative Advantage	10	9		1.91	.089
Non-Respondents			3.50		
Respondents			2.80		
Triability	10	9		.63	.545
Non-Respondents			1.50		
Respondents			1.10		

^a10 randomly selected non-respondents and 10 randomly selected respondents.

Table 10

T-Test of Outcomes Comparing Early and Late Respondents on Rogers' Five Characteristics^a

Variable	N of Pairs	df	Mean	t-value	2-tail Sig
Compatibility	9	8		1.15	.282
Early			2.78		
Late			3.11		
Complexity	8	7		.51	.626
Early			2.13		
Late			1.88		
Observability	9	8		.51	.622
Early			.78		
Late			.56		
Relative Advantage	9	8		.64	.537
Early			3.33		
Late			2.89		
Triability	9	8		.00	1.000
Early			1.22		
Late			1.22		

^a10 randomly selected early respondents and 10 randomly selected late respondents.

Use of CMC

(Respondents versus Non-respondents and Early versus Late Respondents)

The hours used for CMC instruction and the number of CMC options used were combined to provide an overall use score. Equal weight was assigned to the hours of use and number of options used as reported by each respondent. Results revealed there was no significant difference between the use scores of the respondents and non-respondents. Also, there was no significant difference between use scores of early and late respondents. The t-value for respondents versus non-respondents was $-.54$ and for early versus late respondents it was 1.68 .

Perceptions of CMC Use Related to Rogers' Five Characteristics

The second research question was: What are business faculty's perceptions of using CMC as they relate to Rogers' five characteristics for adopting an innovation?

The tally from the five characteristics paired (total of 10 pairs) that contributed the most to the respondents use of CMC revealed that relative

advantage (associated with perceived advantages over other innovations as determined by cost, both time and monetary, and the user's perception) and compatibility (associated with the user's style of teaching, views, existing values, past experiences, and needs) ranked the highest among the five characteristics. The five characteristics when paired resulted in 10 pair combinations with each characteristic listed 4 times. Thus, the maximum value a characteristic could have was 4 and the minimum was 0. Table 11 contains the paired combination rankings for all 5 of Rogers' characteristics. Relative advantage (2.93) and compatibility (2.54) means were the highest, while complexity (1.84), triability (1.36), and observability (1.20) means were the lowest. This was in agreement with Rogers' (1995) most recent work and Fliegel and Kivlin's (1966) study of an adoption of an innovation.

Results from responses to the 30 items on the survey instrument regarding perceptions of CMC use related to Rogers' five characteristics are reported in Table 12. The items were randomly placed on the instrument. For the six items related to triability, the mean was 3.11 on a scale of 1 to 4. For compatibility, relative advantage, and observability, the respondents had means ranging from 2.96 to 2.79. Complexity had the lowest mean, 2.37.

Table 11

Tally for Paired Combinations of Rogers' Five Characteristics^a

Characteristics	n ^b	Mean	Tally
Relative Advantage	107	2.93	314
Compatibility	107	2.54	272
Complexity	107	1.84	170
Triability	107	1.36	144
Observability	107	1.20	128

^aEach characteristic paired to examine which contributed or would contribute most to the respondents' use of CMC (Section B on the survey instrument).

^bNumber of respondents who responded to the paired combinations of Rogers' five characteristics.

Table 12

Respondents' Ratings of Statements Describing Rogers' Five Characteristics^a

Variable	Mean	Std Dev	Minimum	Maximum	n ^b
Triability	3.11	2.08	13	24	100
Compatibility	2.96	2.09	11	24	105
Relative Advantage	2.80	2.28	9	24	106
Observability	2.79	2.42	10	24	90
Complexity	2.37	1.45	10	19	115

^aSection C on the survey instrument contained 6 statements related to each of Rogers' five characteristics of an innovation.

^bNumber of respondents who rated all 6 statements for each characteristics.

The results for the 30 items on the survey instrument regarding perceptions of CMC use related to Rogers' five characteristics were in agreement with Greenberg and McDermott (1977), Helsen (1972), Zaltman and Lin (1971), Rogers (1962, 1983), and Griliches (1960) findings that complexity is least important in the adoption of an innovation. Rogers has maintained that the perception of an innovation's characteristics by individuals in a social system affects its acceptance.

Use of CMC for Instructional Purposes

The third research question was: How extensively is CMC being used for classroom instruction as reported by business faculty?

The information reported in Table 13 indicates time and options respondents used for CMC classroom instructional purposes. The average time respondents used CMC for classroom instruction was 4.30 hours per week with a range of 0 to 40. The frequency distribution for time revealed that 84% of the respondents reported time use for CMC as 5 hours or less. The most frequently used options, with 50% or more using them were e-mail

Table 13

CMC Time and Options Used by Respondents for Classroom Instruction

Variable	Mean	Std. Dev	Minimum	Maximum	N	Percent
<u>Descriptive Analysis</u>						
Time	4.30	6.64	.00	40	116	
<u>Frequency Distribution of Options</u>						
<u>Classroom Instruction</u>						
Personal messages related to instruction					79	65
Research					71	59
Teaching ideas					56	46
Collaborative efforts					45	37
Curriculum matters					43	36
General educational issues					33	27
Classroom management techniques					31	26
Games					7	6
Educational technology					23	19
Other					14	12
<u>CMC Media</u>						
Computer network					114	94
Modem (analog or digital)					57	47
Data phone lines					38	31
Other					7	6

Table 13 continues

Table 13 Continued

CMC Time and Options Used by Respondents for Classroom Instruction

	N	Percent
<u>CMC Technologies</u>		
E-mail	117	97
Software application (word processing, etc.)	104	86
World Wide Web	96	79
On-line databases and information banks	71	59
Graphic or data interchange from site to site	56	46
Wide-Area Information Server	46	38
Usenet	28	23
Datagram	2	2
Other	2	2
<u>Computer Systems</u>		
Personal computers	106	88
Network file server	78	64
Mainframe	71	59
Gopher (menu-based)	67	55
Listserve	37	31
Bulletin board systems (workstations)	21	17
Gateway (transfer data-terminal)	15	12
Other	6	5

(97%), computer network (94%), personal computers (88%), software application (word processing, etc.) (86%), world wide web (79%), personal messages related to instruction (65%), network file server (64%), research (59%), on-line databases and information banks (59%), mainframe (59%), and gopher (55%).

The least used CMC options for classroom instruction were educational technology (19%), bulletin board systems (17%), gateway (12%), games (6%), and datagram (2%). Other uses reported in the Other category ranged from 2% to 12%. They included netscape, CD-ROM, powerpoint slide presentations, BITNET, on-line statistics, and homework lab assignments.

Use of CMC Explained by Perceptions of Rogers' Five Characteristics and Perceived Value of CMC

The fourth research question was: To what extent do business faculty's perceptions of Rogers' five characteristics for adopting an innovation and the

perceived values of CMC use for instructional purposes explain their use of CMC?

Three multiple regressions were calculated to explain the extent of CMC use based on the respondents' perceptions of Rogers' five characteristics and the perceived values of CMC use for instructional purposes. Further, multiple regression was used to determine whether each predictor variable (compatibility, complexity, observability, relative advantage, triability and perceived value) influenced the criterion variables (use score, options, time).

The regression analyses for the dependent variable "Overall Use" had a probability of .0603. Thus compatibility, complexity, observability, relative advantage, triability, and perceived value did not contribute significantly in predicting this dependent variable. The results of the regression analysis appear in Table 14.

Table 14

Regression Analysis Outcomes for the Dependent Variable Use Score

Analysis of Variance			
	DF	Sum of Squares	Mean Square
Regression	6	11.07599	1.84600
Residual	114	100.92401	.88530
Multiple R	.31447		
R Square	.09889		
Adjusted R Square	.05147		
Standard Error	.94090		

F = 2.08517 Probability = .0603

Variables in the Equation

Variable	B	SE B	Beta	t	Prob. t
Compatibility	-.076640	.053577	-.154296	-1.430	.1553
Complexity	-.058833	.069182	-.086145	-.850	.3969
Observability	-.070838	.056664	-.152938	-1.250	.2138
Relative Advant.	.067193	.051266	.148436	1.311	.1926
Triability	.055015	.054575	.107602	1.008	.3156
Perceived Value	.038958	.022128	.170608	1.761	.0810
Constant	-1.205634	2.219072		-.543	.5880

The regression analyses for use of options had a probability of .2072. Thus, again, compatibility, complexity, observability, relative advantage, triability, and perceived value, the independent variables, did not contribute significantly in the prediction of the dependent variable, options. The results of the regression analysis appear in Table 15.

The regression analysis for time had a probability of .0355. Observability, with a probability level of .0061, contributed significantly in the prediction of the dependent variable time. The results of the regression analysis appear in Table 16.

As time decreases, perceptions of importance of observability also decrease. Eleven percent of the variation in time can be explained on the basis of independent variables in the regression.

Table 15

Regression Analysis Outcomes for the Dependent Variable Option

Analysis of Variance			
	DF	Sum of Squares	Mean Square
Regression	6	8.21813	1.36969
Residual	114	108.78187	.95423
Multiple R	.26503		
R Square	.07024		
Adjusted R Square	.02131		
Standard Error	.97685		

F = 1.43539 Probability = .2072

Variables in the Equation

Variable	B	SE B	Beta	t	Prob. t
Compatibility	-.127764	.055624	-.251666	- 2.297	.0234
Complexity	-.041682	.071825	-.059713	- .580	.5628
Observability	.072337	.058828	.152800	1.230	.2214
Relative Advant.	.003557	.053224	.007688	.067	.9468
Triability	.001416	.056660	.002710	.025	.9801
Perceived Value	.031753	.022974	.136049	1.382	.1696
Constant	-.416622	2.303840		- .181	.8568

Table 16
 Regression Analysis Outcomes for the Dependent Variable Time

Analysis of Variance			
	DF	Sum of Squares	Mean Square
Regression	6	12.65163	2.10861
Residual	114	106.34837	.89779
Multiple R	.33168		
R Square	.11001		
Adjusted R Square	.06317		
Standard Error	.94752		

F = 2.34865 Probability = .0355

Variables in the Equation

Variable	B	SE B	Beta	t	Prob. t
Compatibility	.001080	.053954	.002147	.020	.9841
Complexity	-.057082	.069669	-.082483	-.819	.4143
Observability	-.159587	.057062	-.340023	-2.797	.0006
Relative Advant.	.087657	.051626	.191098	1.698	.0923
Triability	.066263	.054959	.127899	1.206	.2304
Perceived Value	.029310	.022284	.126671	1.315	.1910
Constant	-1.078174	2.234676		-.482	.6304

Summary

Chapter 4 presented findings related to the four research questions of the study. For Research Question 1, there were two findings: first, respondents' mean rating being different than a 2.5 neutral response; and second, whether respondents agreed or disagreed that the survey items in Section D were advantages or disadvantages of CMC use for classroom instructional purposes.

When comparing respondents' mean value to a value of 2.5 for neutrality of response, no significant difference was found for the following advantages of CMC use: can work at any site, eliminates time barriers; provides group interaction, and provides a record of the entire course. However, there was a significant difference on all the listed disadvantage statements.

The respondents disagreed that the following items were advantages of CMC use for classroom: eliminates students' daydreaming and eliminates students' absenteeism. The respondents also disagreed that the following items were disadvantages of CMC use for classroom: promotes

procrastination, responses long and disorganized, takes too much time to learn, and takes too much time to implement.

For Research Question 2, when the respondents circled importance of Rogers' five characteristics presented in pairs, they rated relative advantage and compatibility as most important. Complexity, observability, triability were rated as least important. Findings from respondents' ratings of the 30 items on the survey instrument related to Rogers' five characteristics revealed that compatibility, observability, relative advantage, and triability were rated highest and complexity was rated lowest.

For Research Question 3, the average time respondents used CMC for classroom instructional purposes was 4.30 hours a week, with a range of 0 to 40 hours. The most frequently used options for classroom instruction were research and personal messages related to instruction. The most frequently used options for CMC media, CMC technology, and computer systems were computer network, e-mail, software application (word processing, etc.), on-line databases and information banks, world wide web, gopher, network file server, mainframe, and personal computers. The least frequently used CMC options for classroom instruction were games and educational

technology. The least frequently used options for CMC media, CMC technology, and computer systems were datagram, gateway, and bulletin board systems.

For Research Question 4, multiple regressions were used to determine whether the predictor variables (compatibility, complexity, observability, relative advantage, triability, and perceived value) explained variance in the criterion variables (combined use score option and time, options, and time).

The findings revealed compatibility, complexity, observability, relative advantage, triability, and perceived value did not contribute significantly to explaining combined use score nor options. However, observability did contribute significantly to explaining time.

The findings revealed that demographics between early and late respondents were similar. Further, respondents and non-respondents were similar demographically. Findings also revealed there were no significant difference between respondents and non-respondents on four of Rogers' five characteristic of an innovation. However, a significant difference existed between respondents and non-respondents in complexity in the use of an innovation with non-respondents rating complexity as less important.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The first section of this chapter contains a summary of the study. The summary is followed by a presentation of conclusions, implications for education, and recommendations for further research.

Benefits have been associated with improving instruction through the use of computer-mediated communication (CMC). Johntson (1992, p. 5) broadly defined CMC as "the use of computers to facilitate information exchange between people...(with this communication medium being delineated by)..time independence, space/distance independence, flexibility and spontaneity of spoken conversation, permanent (written) record of conversations, emphasis on content rather than sender, and potential for group learning and collaboration." CMC is the set of possibilities that exists when computer and telecommunication networks are used as tools in the communication process: to compose, store, deliver, and process communication. The benefits include (a) establishing a democratic environment for group interaction and learning; (b) providing an environment

for students to learn from each other; and (c) enhanced interactive comments from teachers to students (Romiszowski & Jost, 1989; Chen & Brovey, 1985).

Examining factors related to the use of CMC is important to business educators because they have a vested interest in adopting this innovation for improving their instruction. However, their perception of CMC can determine whether they will adopt it. Rogers (1983, 1995) identified five characteristics that influence the adoption of an innovation. These characteristics are compatibility, complexity, observability, relative advantage, and triability. Simply stated, if an innovation is to be a success, the individuals adopting it will need to perceive it as being compatible with what is already being used, relatively simple to use, visible to others, having an advantage over current methods being used, and capable of being tried before being implemented.

Summary of the Study

The purpose of the study was to determine the perceived values of CMC use for instructional purposes, perceptions of its use as they relate to Rogers' theory, and the extent of its use as reported by business faculty at

four North Carolina universities. The research questions associated with this study were:

1. What are business faculty's perceived values of using CMC for instructional purposes?
2. What are business faculty's perceptions of using CMC as they relate to Rogers' five characteristics for adoption of an innovation?
3. How extensively is CMC being used for classroom instruction as reported by business faculty?
4. To what extent do business faculty's perceptions of Rogers' five characteristics for adopting an innovation and their perceived values of CMC use for instructional purposes explain their use of CMC?

Data Source and Methods

The population for the study consisted of all business faculty from four North Carolina universities. In the fall of 1995, the business faculty were sent a survey instrument that requested demographic information about them, information about their perceived values of using CMC for instructional purposes, their perceptions of the use of CMC related to Rogers' five characteristics, and information about their extent of CMC use. To establish

validity of the instrument, two panels of experts reviewed it. The panel members were selected based on their reputations for expertise in computer usage, knowledge of Rogers' Diffusion of Innovations Theory, and knowledge of survey instrument development. Further, the instrument was pilot tested with faculty at a university in Virginia.

One week after the initial survey mailing, respondents received a follow-up card, one week later a replacement survey, and one week later a second replacement survey followed by telephone calls. This procedure yielded a return of 172 surveys (59%), of which 121 (70%) of the respondents indicated that they used CMC for instructional purposes and 51 (30%) indicated that they did not. Two procedures were used to assess whether non-respondents were comparable to respondents. First, 10 randomly selected non-respondents were contacted by telephone and their telephone responses were compared to 10 randomly selected respondents. Second, 10 randomly selected early respondents were compared to 10 randomly selected late respondents, since late respondents tend to resemble non-respondents.

For the first research question, respondents rated 25 items related to perceived values (advantages and disadvantages) of using CMC for instructional purposes on a four-point scale of strongly agree to strongly disagree, with strongly agree being the most positive or most negative response. The 25 items were randomly distributed on the survey instrument. The value of 4 was assigned to strongly agree and the value of 1 to strongly disagree. Reverse coding was used for negative items. On the 1-4 scale, a value of 2.5 was taken to indicate neutrality. The question implied a null hypothesis that respondents would hold neutral perceptions regarding the perceived values of CMC use for instructional purposes. T-tests for the hypotheses of neutrality of responses related to the perceived values of CMC for instructional purposes were calculated. Further, the means and standard deviations established the relative value respondents assigned CMC use for instructional purposes.

For the second research question, respondents rated their perception of 30 items related to Rogers' five characteristics on a four-point scale of strongly agree to strongly disagree. The 30 items were randomly distributed on the survey instrument. The value of 4 was assigned to strongly agree and

the value of 1 to strongly disagree. The overall score for a characteristic was obtained by totaling responses to the 6 items related to it and finding the average for the six items. Means, standard deviations, minimum, and maximum values were computed. In addition, the five characteristics were paired, resulting in 10 pair combinations with each characteristic listed 4 times. The overall score for each characteristic was obtained by a tally that was based on frequency of a particular characteristic being circled.

For the third research question, respondents indicated CMC options they used. These included 9 CMC classroom instructional uses, 3 CMC media, 8 CMC technologies, and 7 CMC computer systems. Respondents also estimated the number of hours per week that they use CMC for instructional purposes. Frequency counts were compiled from responses regarding uses of CMC; and for responses regarding time, the mean and standard deviation were computed.

For the fourth research question, respondents identified their perceptions of CMC as they relate to Rogers' characteristics of an innovation and the perceived values of using CMC for instructional purposes. The hours used for CMC instruction and the number of CMC options used were

combined to provide an overall use score. Equal weight was assigned to the hours of use and number of options used by each respondent through the use of Z scores. Three multiple regressions were computed to explain variance in use scores, in time, and in options used related to ratings assigned to Rogers' five characteristics and perceptions of advantages and disadvantages of CMC use for instructional purposes.

Findings

The usable responses came from 86 males, 34 females, and 1 respondent not providing gender information. One percent were instructors, 31% assistant professors, 30% associate professors, 27% professors, 10% other, and 1% missing value. Their average age was 46, average teaching experience was 15 years, and 90% had earned doctoral degrees.

Demographically, randomly selected non-respondents and randomly selected late respondents were similar to randomly selected early respondents.

T-tests comparing non-respondents' with respondents' perceptions of the adoption of CMC related to Rogers' five characteristics were not significantly different except for the characteristic of complexity. The non-respondents rated it lower than respondents. T-tests comparing

responses of early versus late respondents were not significant for any of Rogers' five characteristics.

The following paragraphs summarize findings for the four research questions posed in the study:

Research Question 1: What are business faculty's perceived values of using CMC for instructional purposes?

There were two sub-questions: first, whether means for each advantage and disadvantage were different than a neutral response; and second, whether respondents agreed or disagreed that the statements were advantages or disadvantages of CMC use for classroom instructional purposes.

Comparing the respondents' mean values to a value of 2.5 for a test of the respondents' means being different from a neutral response revealed no significant differences from neutrality for the following advantages of CMC use: can work at any site, eliminates time barriers, provides group interaction, and provides a record of the entire course, with t-values of 1.91, 1.15, 1.02, and -1.61 respectively.

Regarding the second sub-question, generally the respondents agreed with the perceived value statements, but did not support previous studies by Romiszowski and Jost (1989) and Chen and Bovey (1985) for two advantages (i.e., respondents in this study did not perceive the two items as advantages). They were: eliminates students' daydreaming and eliminates students' absenteeism, with means of 1.98, and 1.91, respectively. The respondents neither agreed nor disagreed with four of the advantage statements. They were: can work at any site, eliminates time barriers, provides group interaction, and provides a record of the entire course, with means of 2.63, 2.58, 2.56, and 2.39, respectively.

The respondents agreed with findings of Willis (1991) and Romiszowski and Jost (1989) that the following were advantages: useful technology, eliminates distance barriers, facilitates collaborative efforts, provides for student participation, facilitates individualized instruction, serves more students at one time, and provides immediate feedback.

Comparing respondents' mean values to a value of 2.5 for a test of the respondents' means being different from a neutral response revealed there was a significant difference for all the listed disadvantages of CMC use.

The findings further revealed that respondents disagreed that four disadvantages of CMC use were actually disadvantages. They were promotes procrastination, responses long and disorganized, and takes too much time to learn, and takes too much time to implement, with means of 2.97, 2.87, 2.76, and 2.67, respectively.

The respondents agreed with Willis (1991) and Romiszowski and Jost (1989) that the following were disadvantages of CMC use: lacks face-to-face communication, in the beginning phases is expensive, requires changes in methods of instruction, requires access to specialized equipment, requires access to specialized software, requires knowledge of on-line resources, must be trained to use CMC options, and requires the support of top level administration.

Research Question 2. What are business faculty's perceptions of using CMC as they relate to Rogers' five characteristics for adopting an innovation?

The tally from the five characteristics paired (total of 10 pairs) that contributed the most to the respondents use of CMC revealed that relative advantages and compatibility were perceived as most important, with means of 2.93 and 2.54 respectively. Complexity, triability, observability had

similar means, 1.84, 1.36, and 1.20, respectively. The respondents, thus, perceived relative advantage and compatibility as important in their adoption of CMC and complexity, triability, and observability as less important in the adoption of CMC. This was in agreement with Rogers' (1995) most recent work and Fliegel and Kilvin's (1966) study of an adoption of an innovation.

Respondents' ratings of the six statements related to each of Rogers' five characteristics indicated, however, that triability with a mean of 3.11 was perceived as most important. Compatibility, relative advantage, and observability, had similar means, 2.96, 2.80, and 2.79, respectively.

Complexity had the lowest mean, 2.37. The respondents, thus, agreed that they perceived triability, compatibility, relative advantage, and observability as important in their adoption of CMC. They tended to disagree that complexity was important. This outcome supports the findings of other researchers including Greenberg and McDermott (1977), Helsen (1972), Zaltman and Lin (1971), Rogers (1962, 1983), and Griliches (1960).

Research Question 3: How extensively is CMC being used for classroom instruction as reported by business faculty?

The average time respondents used CMC for classroom instruction was 4.3 hours with a standard deviation of 6.6. Thus, the distribution was skewed. The frequency distribution for time revealed that 84% of the respondents used CMC for instruction 5 hours or less per week. Thus, the respondents use of CMC timewise was quite diverse. Sixty-five percent used CMC for messages related to instruction, 59% for research related to instruction, 46% for teaching ideas, 37% for collaborative ideas, 36% for matters related to curriculum, 27% for general educational issue information, 26% for classroom management, and 19% for educational technology. Interestingly only 6% reported use of CMC for games related to instruction.

Computer network was the primary CMC media used with 47% using a modem and 31% using data phone lines. As for as technologies used for instruction, 97% reported using e-mail, 86% software applications, 79% world wide web, 59% on-line databases and information banks, 46% graphic or data interchanges from site to site, 38% wide-area information server, 23% usenet, and 2% datagram. Personal computers were the primary computer system used, with 88% reporting personal computer use, 64%

network file server, 59% mainframe, 55% gopher, 31% listserve, 17% bulletin board systems, and 12% gateway.

Research Question 4. To what extent do business faculty's perceptions of Rogers' five characteristics for adopting an innovation and the perceived values of CMC use for instructional purposes explain their use of CMC?

Regression analyses outcomes revealed that compatibility, complexity, observability, relative advantage, triability, and perceived values of CMC use for instructional purposes did not contribute significantly in predicting criterion variables of use score and options. A significant relationship existed for observability as the predictor of the criterion variable time. As time decreased, the perception of importance of observability decreased. Eleven percent of the variation in time was explained on the basis of independent variables in the regression. Thorpe (1989) stated that decreased use of a system happens as extensive browsing gives way to developing more efficient ways for using the system. Thorpe (1989) further stated based on a study of teachers in the United Kingdom's Open University, who used a computer-mediated communication system called CoSy, that typical of most

innovations, those who had difficulty with a system used it less and were less enthusiastic about its continuation than those who found it easy to use.

Conclusions

Outcomes of the study reveal that the amount of time faculty use CMC for instruction is limited. First, approximately one-third of the 172 respondents returned surveys indicating that they did not use CMC for instructional purposes. Second, on an average the faculty who did use CMC devoted 4.3 hours per week to doing so even though CMC use is being broadly promoted for instructional purposes at the universities included in the study. Respondents using CMC, however, did so in a variety of ways. Further, they used a variety of technologies related to CMC.

The following conclusions are based on findings related to the four research questions of the study:

1. Business faculty tend to agree with advantages and disadvantages of CMC used for instructional purposes identified through the literature. Thus, for them to adopt the use of CMC in developing their instruction and using it with their students, they need adequate support, training,

equipment, and software. The business faculty who responded to this study agreed that 7 of 13 advantages identified from the literature were advantages. For 4 of the advantages, the respondents neither agreed nor disagreed that they were advantages. Further, they agreed that 8 of 12 disadvantages were disadvantages. For business faculty to adopt the use of CMC in their instruction, perceived disadvantages related to training that need to be addressed include: use of CMC options, knowledge of on-line resources, changes in methods of instruction, and face-to-face communication. The disadvantages that need to be addressed related to support include the need for top level administrative support and meeting expenses of CMC use. Those related to equipment and software include use of specialized equipment and use of specialized software.

2. Business faculty's perceptions of complexity, observability, and triability of CMC is least important of Rogers' five characteristics in their adoption of CMC. Thus, in encouraging them to use CMC, emphasis should be placed on providing opportunity to try CMC, to learn how it can complement what they are already doing, to understand advantages they

can gain from its use, and to observe others who are using CMC in their instruction (Rogers, 1995; Fliegel & Kivlin, 1966).

3. Most business faculty made limited use of CMC for instructional purposes. The respondents in this study used CMC an average of 4.3 hours per week, with 84% using it 5 hours or less. Further, their main uses of CMC for instructional purposes were personal messaging (65%) and conducting research (59%). This supports Hellerstein's (1986) findings.
4. Business faculty probably gain efficiency in using CMC with experience. The regression analyses revealed that the faculty use less time for CMC for instructional purposes and need less opportunity to observe its use. This supports Thorpe's (1989) findings.

Implications for Education

Several implications can be identified in the present study that may have relevance to educators:

1. CMC has the potential of becoming a powerful means that educators can use in bringing together information from a variety of sources. CMC is

relevant to collaboration, students' participation, and individualized instruction. It can be used as daily information exchange media among colleagues, between instructors and their students, among students, for delivering distance education, and for access to resources and information. However, for it to be broadly encompassed in instruction, disadvantages associated with its use must be addressed. As an example, top administration must provide the financial support needed to insure CMC success and they must provide users with the training to incorporate CMC use in their instruction.

2. When implementing CMC, perceived advantages and disadvantages of its use and perceptions related to Rogers' five characteristics affecting the adoption of CMC can be of value. For example, individuals who have a positive perception of the use of CMC filter their knowledge through a specific group of people, a specific group with the same goals. Thus, the survey used in this study can be used readily with other faculty to determine their concerns and priorities related to CMC. Faculty must perceive that CMC is compatible with their current needs, that it provides them an advantage over other instructional tools, and that it has

proven useful to their colleagues. They will then put forth the effort needed to confront complexities they face in using CMC and in adapting to instructional procedures that capitalize on its use.

3. On an average, the business instructors in this study did not devote extensive time to using CMC for instruction, although their use of it was quite diverse. Their use of it included exchanging e-mail messages, conducting research, finding teaching ideas, collaborating, and locating curriculum materials. As CMC technology continues to improve and use of it continues to grow in business, government, and education communities, instructors will become more dependent on ability to incorporate its use in their instruction. To do this, they will need support that provides them needed technology, training, time, and administrative commitment to do so.

Recommendations for Further Research

The findings and conclusions of this study are used to support suggestions for further research. This study focused on business faculty at four universities in North Carolina. It is recommended that the research be

extended to include other discipline areas so that outcomes may be more broadly generalized. Further, many instructors have not adopted CMC use in the classroom to improve instruction. A study should be conducted to determine: (a) Why instructors have not adopted CMC to determine assistance that is needed? (b) What technology is best suited to expanding the use of CMC into schools and classrooms? and (c) What individual characteristics of instructors are most likely to be related to their using CMC for instruction?

One of Rogers' five characteristics is triability. Triability is associated with different trial opportunities and experimentation with an innovation's use. Educators are not likely to implement full-scale adoption of an innovation without first having tried and evaluated it. Without a preliminary trial adoption and accompany evaluation, determining how appropriate a given innovation is for a given target population is difficult. Therefore, it is recommended that research be conducted to determine: (a) Does a relationship exist between trial opportunities and the extent of CMC use? If so, what is the relationship? and (b) Does experimenting with CMC affect its

rate of use? If so, how long does it takes a user to become comfortable with its use?

A final recommendation is that qualitative research be conducted to investigate why a person does or does not use CMC for instructional purposes. A qualitative study is more specific and indepth. It relies on human powers of observation and is more amenable to the diversity of individuals. It considers personal feelings as legitimate knowledge. Therefore, examining the practices and feelings of experienced users through qualitative research can facilitate helping inexperienced users to adopt this innovation.

References

- Basham, D. A (1991). The impact of computer-mediated communication on rural educators (doctoral dissertation, Northern Arizona University). Dissertation Abstracts International, 52 (7), 2509A.
- Borg, W., & Gall, M. D. (1989). Educational Research (5th ed.). White Plains, NY: Longman Publishing Group, p. 537.
- Bull, G., Harris, J., Lloyd, J., & Short, J. (1989). The electronic academical village. Journal of Teacher Education, 40 (4), 27-31.
- Carrier, C. A., & Sales, G. C. (1987). Pair versus individual work on the acquisition of concepts in a computer-based instructional lesson. Journal of Computer-Based Instruction. 14:11.
- Chen, D., & Brovey, D. J. (1985, October). Information technology and the educational system: Implications for organizational development. Paper presented at the National Technology Leadership Conference, Albany, NY. (ERIC Document Reproduction Service No. 290 456).
- Clark, R. E. (1985). Confounding in educational computing research. Journal of Educational Computing Research, 1 (2), 137-148.
- Defining software for the curriculum (1994, September). Syllabus 8 (1), 16-17.
- D'onofrio, M. J., & Slama, M. E. (1983, October). An investigation of the computer literacy resulting from the use of microcomputers in high school accounting classes. Delta Pi Epsilon. 25(4), 143-54.
- Elliot, S. M., & Scott, M. D. (1983, April). Communication based theory of instruction. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal, Canada.

- Fliegel, R. C., & Kivlin, J. E. (1966, November). Attributes of innovations as factors in diffusion. American Journal of Sociology. 72 (3), 235-248.
- Frankfort-Nachmias, C., & Nachmias, D (1992). Research methods in the social science (4th ed.). New York: St. Martin's Press.
- Greenberg, B. S., & McDermott, S. T. (1977, August). The debut of a black television station: Adoption of an innovation. Paper presented at the Annual Meeting of the Association for Education in Journalism. Madison, Wisconsin (ERIC Document Reproduction Service No. 153 227)
- Griffiths, J. M. (1986, November). Diffusion of innovation in library and information science. Final Report. King Research, Inc., Rockville, MD; Network Inc., Andover, MA (ERIC Document Reproduction Service No. 279 350).
- Griliches, Z. (1960). Congruence versus profitability: A false dichotomy. Rural Sociology, 25, 354-356.
- Gunawardena, C. N., & Boverie, P.E. (1993, November). Impact of learning styles on instructional design for distance education. Paper presented at the world conference of the International Council of Distance Education. Bangkok, Thailand (ERIC Document Reproduction Service No. 359 926).
- Gunsett, F. C. (1994). Proposal: Utilization of information technology to enhance academic programs. School of Agriculture. North Carolina A & T State University. Greensboro, NC.
- Hamilton, J., & Thompson, A. (1992, February). The adoption and diffusion of an electronic network for education. (ERIC Document Reproduction Service No. ED 347 991).

- Harasim, L. (1990). On-line education: Perspectives on a new environment. New York: Praeger Press.
- Hellerstein, L. (1986). Electronic messaging and conferencing with an emphasis on social use: An exploratory study. Paper presented at Annual Meeting of the International Communication Association. 36th, Chicago, IL. (ERIC Document Reproduction Service No. ED 277 062).
- Helsel, A. R. (1972, November). Teachers' acceptance of innovation and innovation characteristics. The High School Journal 56, 67-76.
- Holden, M., & Mitchell, W. (1993, March/April). The future of computer-mediated communication in higher education. Educom Review, 28 (2), 31.
- Holden, M. C., & Wedman, J. F. (1993). Future issues of computer-mediated communication: The results of a Delphi study. Educational Technology Research and Development, 41 (4), 5-24.
- Hussain, N. (1990, February). Departmental support: Its role in adoption of instructional innovations as perceived by faculty innovators at a large university. (ERIC Document Reproduction Service No. ED 323 932).
- Jackson, J. J. (1986, April). Developing policies for optimal diffusion of educational innovations in china. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA. (ERIC Document Reproduction Service No. 287 209).
- Johnston, V. L. (1992, December). Toward a global classroom: Using computer-mediated communication at UAA. University of Alaska Anchorage (ERIC Document Reproduction Service No. 356 759).

- Jost, K. L. (1990-1992). Computer-mediated communication Instructional Developments. A journal of the School of Education at Syracuse University. Syracuse University, New York School of Education. (ERIC Document Reproduction Service No. 350 973).
- Kamper, R. J. (1991, November). Computer-mediated communication: conquest of time and space or just another technological seduction. Educational Technology. 31 (11), 20.
- Kaye, T. (1989, September). Computer-supported collaborative learning in a mult-media distance education environment. Paper presented at the NATO Advanced Research Workshop. Maratea, Italy. (ERIC Document Reproduction Service No. 319 381)
- Kehr, G. P. (1986). The adoption process for personal computers by faculties in business administration and teacher education at the college and university level. (ERIC Document Reproduction Service No. ED 286 417).
- Kohl, J. W. (1969). Adoption, adoption stages and perceptions of the characteristics of innovations. California Journal of Educational Research, 20 (3), 120-131.
- Krol, E. D. (1992). The whole internet. Sebastopol, CA: O'Reilly and Associates, Inc.
- Levinson, P. (1989). Media relations: integrating computer telecommunications with educational media. In Kaye T. & Mason R. (Eds) Mindweave: The use of computer-Mediated communication in distance education. London: Pergamon.
- Lewis, R. (1992). A socio-technical view of COMCOMF. Paper presented at the Annual Meeting of the International Communication Association. (ERIC Document

Reproduction Service No. ED 351 713).

- Levin, S. A. (1984). Computers in education: The process of change. Interactive technology laboratory Report #2. (ERIC Document Reproduction Service No. ED 311 869).
- Maddux, C. D. (1991). Educational telecommunications: The road to maturity. Educational Technology, 31 (4), 7-9.
- Mason, R. (1990, May). Conferencing for mass distance education. Paper presented at the Guelph Symposium on computer mediated communication. Guelph, Ontario, Canada (ERIC Document Reproduction Service No. 327 151).
- Mason, R., & Kaye, A. R. (1989). An evaluation of CoSy on an Open University course. Mindweave: Communication computers and distance education. Oxford: Pergamon Press.
- Mason, R. (1989a). An evaluation of CoSy on an Open University course. In R. Mason & A. R. Kaye, (Eds.) Mindweave: Communication computers and distance education. Oxford: Pregamon Press.
- McGrath, D., Thurston, L. P., & McLellan, H. (1990). Training rural teachers in computer education: An evaluation of the distance learning methods. On-line Journal of Distance Education , 4 (2), 11.
- Miller, L. E., & Smith K. L. (1983). Handling nonresponse issues. Journal of Extension, 21 , 45-50.
- Ognibene, R. (1989, July). Computers in the classroom: A status report. Paper presented at the summer meeting of the association of teacher education. Tacoma, WA. (ERIC Document Reproduction Service No. 316 216).

- Olaniran, B. A. (1992, May). Computer-mediated communication in small group decisional stages. Paper presented at the Annual Meeting of the International Communication Association 42nd, Miami, FL (ERIC Document Reproduction Service No. ED 351 718).
- Oppenheimer, M. (1970). Successful and unsuccessful change in two educational settings. Journal of General Education, 22 (3), 175-185.
- Orlosky, D., & Smith, B. O. (1972). Educational change: its origins and characteristics. Phi Delta Kappan, 53(7), 412-414.
- Pierce, A. J. (1981, December 6). Should you be putting innovations into use in your industrial arts facilities. Paper presented at the Annual Convention of the American Vocational Research Association, Atlanta, GA (ERIC Document Reproduction Service No. ED 211 668).
- Podolsky, A (1974-75). Higher Education. Education directory. Washington, DC National Center for Education Statistics, U. S. Government Printing Office.
- Rafky, D. M., & Beckerman, M (1971). Teachers' acceptance of innovation: Self-interest, altruism, & professionalism. (ERIC Document Reproduction Service No. 079 267)
- Rice, R. E. (1990). Communicating about computers and communication: A course overview in Lederman, L. (Ed.) (1991). Communication Pedagogy: Theory & Practice, Norwood, NJ: Ablex.
- Rice, R. E., & Bair, J. H. (1984). New organizational media and productivity. In R. E. Rice (Ed.), The New Media. Beverly Hills: Sage.
- Roberts, N. G. , Blakeslee, G., Brown, M., & Lenk, C. (1990). Integrating telecommunications into education. Englewood Cliffs, New Jersey:

Prentice Hall.

Rogers, E. M. (1962). Diffusion of innovations. New York: The Free Press of Glencoe.

Rogers, E. M. (1983). Diffusion of innovations. New York: The Free Press of Glencoe.

Rogers, E. M. (1985). Microcomputers in the schools: A case of decentralized diffusion. (ERIC Document Reproduction Service No. ED 262 770).

Rogers, E. M. (1986). Communication technology: The new media in society. New York: The Free Press.

Rogers, E. M. (1995). Diffusion of innovations. New York: The Free Press. Simon & Schuster Inc.

Rogers, A. (1987, June). Telecommunications workshop presentation. National Educational Computing Conference. Philadelphia, Temple University.

Romiszowski, A. J., & de Haas, J. A. (1989, October). Computer-mediated communication for instruction: Using e-mail as a seminar. Educational Technology 29 (10), 7-14.

Romiszowski, A. J., & Jost, K. (1989, August). Computer conferencing and the distance learner: Problems of structure and control. Paper presented at the 1989 Conference on Distance Education. University of Wisconsin, Madison, Wisconsin.

Rumble, G. (1987). Why distance education can be cheaper than conventional education. Distance Education, 8 (1), 72-94.

- Schwier, R. A. (1994, May). Educational technology and educational reform in Saskatchewan. Saskatchewan University, Saskatoon. Department of Curriculum Studies (ERIC Document Reproduction Service No. 371 724)
- Scott, D. M. (1993). Teaching collaborative problems solving using computer-mediated communication. Paper presented at the Annual Meeting of the Association of Education and communication technology. New Orleans, LA. (ERIC Document Reproduction Service No. ED 354 869).
- Scrogan, L. (1987). Telecomputing: How to overcome the roadblocks. Classroom Computer Learning, 8(5), 40-45.
- Shedletsky, L. J. (1992, February). Computer-mediated communication to facilitate seminar participation and active thinking. Paper presented at the Annual Meeting of the Western States Communication Association 63rd Boise, ID (ERIC Document Reproduction Service No. ED 347 582).
- Stern, N., & Stern, R. A. (1993). Computing in the information age. New York: John Wiley and Sons.
- Tella, S. (1992). The adoption of international communications network and electronics mail into foreign language education. Journal of Educational Research, 36 (4), 303-312.
- Thorpe, M. (1989). The tutor perspective on computer-mediated communication in DT200: Introduction to information technology. Home computing evaluation project. (Report No. CITE-R-76) United Kingdom Open University.
- Turner, J. A (1990). Soviet Union, Eastern Europe to get link to U.S Computer Network. Chronicle of Higher Education. 37(11), A27.

- Updegrove, D. A., Muffo, J. A., & Dunn, J. A. Jr. (1990, Spring). Electronic mail & networks: New tools for university administrators. Cause/Effect 13, 41-48.
- Wells, R. A. (1990, September). Computer-mediated communication for distance education and training: Literature review and international resources. Boise State University, Idaho. (ERIC Document Reproduction Service No. 343 569).
- Willis, J. (1991). Computer-mediated communication systems and intellectual teamwork: Social psychological issues in design and implementation. Educational Technology, 31 (4), 10-20.
- Wolf, W. C., & Fiorino, A. J. (1973). A study of selected assumption underlying educational communication. Adult Leadership, 21 (1) 214-216.
- Wunsch, D. R. (1991, Summer). How to evaluate research as a research consumer. Instructional strategies an applied research series. Delta Pi Epsilon, 7(3), 3.
- Zaltman, G., & Lin, N. (1971). On the nature of innovations. American Behavioral Scientist. 14 (5), 651-673.

APPENDIX A
LETTER TO THE DEANS

(Sample Letter)

September 22, 1993

Dean's Office
XXXXXXXX
XXXXXXXX

Dear Sir:

I am presently completing a study on the teaching methods that are used in computer-mediated communication and I would like to personally contact each of the business instructors at your college to solicit their expertise in participating in this study.

If you can kindly provide me with the names and addresses of each business instructor by October 7, 1993 it would be greatly appreciated. My address is listed above and my fax number is 919-334-7288.

I look forward to hearing from you very soon.

Sincerely,

Cynthia Gillispie

(Sample Letter)

Second Request

Please forward to the right person

October 18, 1993

Dean's Office
XXXXXXXXXX
XXXXXXXXXX

Dear Sir:

I am presently completing a study on the teaching methods that are used in computer-mediated communication and I would like to personally contact each of the business instructors at your college to solicit their expertise in participating in this study.

If you can kindly provide me with the names and addresses of each business instructor by November 12, 1993, it would be greatly appreciated. My address is listed above and my fax number is 919 334-7288.

I look forward to hearing from you very soon.

Sincerely,

Cynthia Gillispie

APPENDIX B

**COVER LETTER AND SURVEY INSTRUMENT SENT TO
RESPONDENTS**

(Cover Letter)

January 30, 1996

Joe Doe

XXXXXXXXXX

XXXXXXXXXX

Dear Dr. Doe:

I am a doctoral student at Virginia Polytechnic Institute and State University and I am employed at NC A&T State University, Greensboro, NC.

I am presently conducting a study on computer-mediated communication use by post-secondary business faculty in North Carolina and I need your help to complete it. The information that you provide will remain confidential and a copy of the study will be provided at your request.

The survey that is attached will not take more than 15 minutes to complete. Would you kindly complete the survey and send it back to me by February 15, 1996.

Thank you for your help.

Sincerely,

Cynthia Gillispie

Gillispc@athena.NCAT.edu

SURVEY

Computer-Mediated Communication

Please take several minutes to complete this survey. The questions in Section A through Section D are part of a study examining business instructors' perceptions and uses of Computer-Mediated Communication (CMC) for instructional purposes. CMC refers to communicating at a distance by means of a personal, mini, or mainframe computer. This includes any educational options available at a distance. Transmitted information may include textual, graphic, or other types of data interchanged from site to site, most often using telephone lines. Formats include electronic mail, electronic bulletin boards, computer conferencing, and on-line data bases and information banks.

Your participation will be appreciated. Your responses are confidential and nonassociation is assured.

Please respond by November 30, 1995 using the enclosed stamped, addressed envelope to: Cynthia Gillispie, Webb Hall, NC A&T State University, Greensboro, NC 27411

SECTION A:

1. Please check: Male _____ Female _____
2. Job Title _____
3. Highest Degree Earned _____
4. Age _____
5. Years of Teaching Experience _____
6. How are you presently using CMC for classroom instruction? (Check all that apply)
 - _____ Research
 - _____ Teaching ideas
 - _____ Curriculum matters
 - _____ General educational issues
 - _____ Personal messages related to instruction
 - _____ Games
 - _____ Collaborative efforts
 - _____ Classroom management techniques
 - _____ Educational technology
 - _____ Other (please specify) _____
7. What CMC media do you use? (Check all that apply)
 - _____ Computer network
 - _____ Data phone lines
 - _____ Modem (analog or digital)
 - _____ Other (please specify) _____

8. What CMC technologies do you use? (Check all that apply)

- E-mail
- Software application (word processing, desktop publishing, spreadsheet, etc)
- Graphic or data interchange from site to site
- Datagram (like a telegram)
- On-line databases and information banks
- Usenet (exchange news, similar to a bulletin boards on other networks)
- Wide-Area Information Server (WAIS-look up information in data bases--eg libraries)
- World-Wide Web (WWW--finding and accessing Internet resources)
- Other (please specify) _____

9. What computer systems do you use? (Check all that apply)

- Bulletin board systems (workstations)
- Gateway (transfer data-terminal)
- Gopher (a menu-based for exporting Internet resources)
- Listserves
- Network file server (unix or PC)
- Mainframe (vax or units)
- Personal computers (lap top/desk top)
- Other (please specify) _____

10. How much time do you use CMC related to classroom instruction each week?
_____ hours

11. What year did you first start using CMC for instructional purposes?
_____ year.

Compatibility-----the degree to which CMC is compatible with your current teaching methods (associated with the user's style of teaching, views, existing values, past experiences, and needs).

Complexity-----the degree to which you perceive CMC as being relatively easy to understand and use (associated with skills, training, and level of difficulty).

Observability-----the degree to which you feel CMC is visible (associated with demonstrations and evaluations).

Relative Advantage-----the degree to which you see CMC as being better than other teaching methods that are presently being used (associated with perceived advantages over other innovations as determined by cost, both time and monetary, and the user's perceptions).

Triability-----the degree to which you have tried CMC use (associated with the number of different trial opportunities and experimentation with the innovation's use).

SECTION B:

Listed below are 10 pairs (5 pairs on the left and 5 pairs on the right). For each of the following pairs of perceived values, circle the one in each pair that has contributed or would contribute the most to your use of CMC. After completion of Section B, there should be ten perceived values circled (5 on the left and 5 on the right). The definitions of the perceived values appear in the chart.

- | | | | |
|--------------------|---------------|---------------|--------------------|
| Compatibility | Complexity | Observability | Triability |
| Relative Advantage | Triability | Complexity | Relative Advantage |
| Compatibility | Observability | Triability | Complexity |
| Relative Advantage | Compatibility | Observability | Relative Advantage |
| Complexity | Observability | Triability | Compatibility |

SECTION C:

For statements 1 through 30, circle the response that indicates your agreement/ disagreement with each item. The items address perceived value of CMC use as it relates to compatibility, complexity, observability, relative advantage, and triability. Please circle only one response.

- | | SA - STRONGLY AGREE | A - AGREE | D - DISAGREE | SD - STRONGLY DISAGREE | |
|----|----------------------------|------------------|---------------------|-------------------------------|--|
| SA | A | D | SD | | 1. CMC's experimental use is accelerated with the user's degree of innovative information seeking. |
| SA | A | D | SD | | 2. CMC use saves time. |
| SA | A | D | SD | | 3. CMC users must be trained to use CMC options. |
| SA | A | D | SD | | 4. CMC use must be compatible with the user's teaching style. |
| SA | A | D | SD | | 5. CMC use often fails because of the lack of a trial-adoption process. |
| SA | A | D | SD | | 6. CMC instructions are complex. |
| SA | A | D | SD | | 7. CMC use is related to the length of time CMC has actually been used. |
| SA | A | D | SD | | 8. CMC use is accelerated with observations of downlinks at the user's college. |
| SA | A | D | SD | | 9. CMC use must be compatible with the user's past experiences. |
| SA | A | D | SD | | 10. CMC has to be tried before it is wholly implemented. |
| SA | A | D | SD | | 11. CMC use fails because of a lack of evaluation. |
| SA | A | D | SD | | 12. CMC success depends on the extent to which its effects are clearly observable to the potential user. |
| SA | A | D | SD | | 13. CMC procedures are easy to use. |
| SA | A | D | SD | | 14. CMC requires that users observe how it is used before a commitment is made. |
| SA | A | D | SD | | 15. CMC is better than most other ideas used to enhance instruction. |
| SA | A | D | SD | | 16. CMC use requires keyboarding skills. |
| SA | A | D | SD | | 17. CMC use affects the user's style of communicating information. |
| SA | A | D | SD | | 18. CMC use must be compatible with the user's existing values. |
| SA | A | D | SD | | 19. CMC use is affected by attitude towards it. |
| SA | A | D | SD | | 20. CMC use requires troubleshooting and problem-solving skills. |
| SA | A | D | SD | | 21. CMC use is accelerated with the number of different trial opportunities. |
| SA | A | D | SD | | 22. CMC's trial use is accelerated with a positive perception of it. |
| SA | A | D | SD | | 23. CMC's ease of use determines extent of its use. |
| SA | A | D | SD | | 24. CMC use reduces transportation costs. |
| SA | A | D | SD | | 25. CMC use eliminates social and intellectual isolations. |
| SA | A | D | SD | | 26. CMC requires demonstration and evaluation of mass media use. |
| SA | A | D | SD | | 27. CMC must be experimented with before implementing it. |
| SA | A | D | SD | | 28. CMC use must be compatible with the user's needs. |
| SA | A | D | SD | | 29. CMC must be amenable to demonstration to be adopted |
| SA | A | D | SD | | 30. CMC use is cost efficient in the long run. |

SECTION D:

Items 1 - 25 address CMC use for instruction. Circle one response for each item.

- SA A D SD 1. CMC use eliminates time barriers.
- SA A D SD 2. CMC use provides a record of the entire course.
- SA A D SD 3. CMC users must be trained to use CMC options.
- SA A D SD 4. CMC use promotes procrastination.
- SA A D SD 5. CMC use facilitates collaborative efforts.
- SA A D SD 6. CMC responses tend to be long and disorganized.
- SA A D SD 7. CMC use provides immediate feedback.
- SA A D SD 8. CMC can serve more students at one time than traditional classroom approaches.
- SA A D SD 9. CMC is useful technology for corresponding all over the world.
- SA A D SD 10. CMC use requires knowledge of how to access on-line resources.
- SA A D SD 11. CMC use eliminates problems of students' absenteeism.
- SA A D SD 12. CMC use lacks face-to-face communication.
- SA A D SD 13. CMC use requires changes in methods of instruction.
- SA A D SD 14. CMC use facilitates individualized instruction.
- SA A D SD 15. CMC use provides a democratic environment for group interaction.
- SA A D SD 16. CMC users can work at any site.
- SA A D SD 17. CMC use requires access to specialized equipment.
- SA A D SD 18. CMC use eliminates problems of students' daydreaming.
- SA A D SD 19. CMC use requires the support of top level administration.
- SA A D SD 20. CMC use takes too much time to implement.
- SA A D SD 21. CMC use takes too much time to learn.
- SA A D SD 22. CMC use requires access to specialized software.
- SA A D SD 23. CMC use in the beginning phases is expensive.
- SA A D SD 24. CMC use eliminates distance barriers.
- SA A D SD 25. CMC use provides for student interaction/participation.

Thank you for taking the time to help with this study on the Perceived Value of CMC Use. I will be tabulating the results and copies will be available on request.

APPENDIX C
FOLLOW UP POST CARD, LETTER, AND
TELEPHONE DIALOGUE

SECOND REQUEST

POST CARD

JUST A FRIENDLY REMINDER!!!

A survey on "computer-mediated communication" was forwarded to you on January 30, 1996 requesting a response by February 15, 1996. Would you kindly take five minutes out of your busy schedule to complete the survey and forward it in the stamped, addressed envelope that was provided in the first request.

Your cooperation and understanding are very much appreciated.

Cynthia Gillispie

Third Request

March 25, 1996

Dr. Joe Doe
XXXXXXXXXX
XXXXXXXXXX

Dear Dr. Doe:

I am a doctoral student at Virginia Polytechnic Institute and State University and I am employed at NC A&T State University, Greensboro, NC.

I am conducting a study on the "Perceived Value of Computer-Mediated Communication Use for Business Instruction" and I need your help to complete it. The information that you provided will remain confidential and a copy of the study will be provided at your request.

The survey that is attached will not take more than 15 minutes to complete. Would you kindly complete the survey and return it to me by March 29, 1996.

Thank you for your help.

Sincerely

Cynthia Gillispie
Gillispc@athena.ncat.edu

Attachments

Stamped, addressed envelope was previously submitted

Fourth Request

Telephone Dialogue

Hello Dr. Doe. My name is Cynthia Gillispie and I am a doctoral student at Virginia Polytechnic Institute and State University.

I recently mailed to you a survey on Computer-Mediated Communication. This telephone call is a follow-up to ask you to please take five minutes out of your business schedule to respond to my survey. I really need your help to complete my study on Computer-Mediated Communication. If you have misplaced the first two copies, I will be glad to forward another copy.

Can I expect to hear from you by mail in the next couple of days?

Thank you kindly for taking time out of your schedule to talk to me.

APPENDIX D

LETTER TO SECOND PANEL OF EXPERTS

(Sample Letter)

1st letter--2nd Panel Reviewers

September 01, 1995

Dr. Joe Doe
XXXXXXXXXX
XXXXXXXXXX

Dear Dr. Doe:

Thank you for agreeing to help with the pilot test of my instrument. There are 5 blue cards and a total of 38 white cards. The blue cards contain the definition of Rogers' Theory and the white cards contain statements related to Rogers' Theory. You are to match the white cards with the blue cards.

On the white cards, CMC refers to computer-mediated communication. CMC means communicating at a distance by means of a personal mini, or mainframe computer. This includes any educational options available at a distance. Transmitted information may include textual, graphic, or other types of data interchanged from site to site, most often using telephone lines. Formats include electronic mail, electronic bulletin boards, computer Conferencing, and on-line data bases and information banks.

Feel free to revise the statements to improve clarity and understanding. After completion, would you kindly forward the cards to Dr. June Schmidt or me on or before September 15, 1995.

Again, I thank you for agreeing to serve in this capacity.

Sincerely,

Cynthia Gillispie

(Sample Letter)
September 25, 1995

2nd letter --- 2nd Panel Reviewers

Dr. John Smith
XXXXXXXXXX
XXXXXXXXXX

Dear Dr. Smith:

Thank you for helping me with my instrument. Your expertise is once again needed. On a whole the instrument items were appropriately matched. However, there were 7 items that presented a problem with most of the panel reviewers. Therefore, additional information is provided to improve the clarity of the definitions. There are 5 blue cards and 7 white cards. The blue cards contain the definition of Rogers' Theory and the white cards contain statements related to Rogers' Theory. You are to match the white cards with the blue cards.

On the white cards, CMC refers to computer-mediated communication. CMC means communicating at a distance by means of a personal, mini, or mainframe computer. This includes any educational options available at a distance. Transmitted information may include textual, graphic, or other types of data interchanged from site to site, most often using telephone lines. Formats include electronic mail, electronic bulletin boards, computer conferencing, and on-line data bases and information banks.

Feel free to revise the statement to improve clarity and understanding. After completion, would you kindly forward the cards to Dr. June Schmidt, Lane Hall, Vocational and Technical Education/Business Education, on or before October 9, 1995.

Once again, I thank you for serving in this capacity.

Sincerely,
Cynthia Gillispie

APPENDIX E

VALUES ASSIGNED TO SURVEY INSTRUMENT

VALUES ASSIGNED TO THE SURVEY INSTRUMENT

1 Male 2 Female

2. Job title

1 - Instructor

2 - Assistant Professor

3 - Associate Professor

4 - Professor

5 - Other

3. Highest Degree Earned

1 - B.S/BA.

2 - M.S/MA.

3 - Ph.D/ED.D.

4. Age

Actual age

5. Years of Teaching Experience

Actual years

6. Present use of CMC for classroom instruction

1 - 0 Research

1 - 0 Teaching ideas

1 - 0 Curriculum Matters

1 - 0 General Educational Issues

1 - 0 Personal message

1 - 0 Games

1 - 0 Collaborative efforts

1 - 0 Classroom management techniques

1 - 0 Educational technology

1 - 0 Other

7. CMC media

1 - 0 Computer network

1 - 0 Data phone lines

1 - 0 Modem

1 - 0 Other

8. CMC technologies

- 1 - 0 E-mail
- 1 - 0 Software application (word processing, desktop publishing, spreadsheet, etc.)
- 1 - 0 Graphic or data interchange from site to site
- 1 - 0 Datagram (like a telegram)
- 1 - 0 On-line Databases and Information Banks
- 1 - 0 Usenet (exchange news, similar to a bulletin boards on other networks)
- 1 - 0 Wide-Area Information Serves (WAIS-look up information in data banks--eg. libraries)
- 1 - 0 World-Wide Webb (WWW--finding and accessing Internet resources)
- 1 - 0 Other

9. Computer Systems

- 1 - 0 Bulletin Board Systems
- 1 - 0 Gateway (transfer data)
- 1 - 0 Gopher (a menu-based for exporting Internet resources)

1 - 0 Listserves

1 - 0 Network File System

1 - 0 Other

10. Time for classroom instruction each week

Actual time used

11. First started using CMC

Actual year

Section B: Characteristics that contributed the most to adoption

*0- 4 Compatibility

*0 - 4 Complexity

*0 - 4 Observability

*0 - 4 Relative Advantage

*0 - 4 Triability

* Number of times circled

Section C Perceived values of CMC

Values assigned, 1- 4 with 4 being strongly agree and 1 being strongly disagree (Reverse coding used for negative items).

Section D CMC use for instruction

Values assigned, 1- 4 with 4 being strongly agree and 1 being strongly disagree (Reverse coding used for negative items).

BIOGRAPHICAL SKETCH

Cynthia Carlton Gillispie

Objectives: To teach at the post-secondary level, to make significant contributions to the community, and to use my judgment in devising new and improved work approaches and methods.

Education: Virginia Polytechnic Institute and State University, Blacksburg, VA, Ph.D. Degree. Major: Vocational and Technical Education/Business Education. Dissertation Topic: "Perceived Values of Computer-Mediated Communication Use for Business Instruction."

University of North Carolina at Greensboro. Masters of Science in Business Education. Concentration: Management.

North Carolina A&T State University, Greensboro. Bachelor of Science in Business Education

Further Education: Guilford College of Continuing Education; NC A&T State University; Guilford Technical Community College; University of North Carolina at Greensboro; and Appalachian State University Center for Continuing Education.

Work Experience: September 1984-Present

Instructor: Guilford Technical Community College, Greensboro, NC.

Responsible for teaching business courses.

September 1978-present:

Administrator II: NC A&T State University, Greensboro. Serve as the principal administrative and/or management support person, serve as extension of authority, and relieve manager of operational and/or administrative details.

Professional Organizations: American Business Women's Association; Eta Omicron Omega Chapter, Alpha Kappa Alpha Sorority, Inc., vice-president

(1995-present), secretary (1993-1994); Delta Pi Epsilon, national business education honor society; Omicron Tau Theta, national graduate honorary professional society in vocational education; State Employees Association; NAACP; Top Ladies of Distinction; and Toastmasters #439, historian (1996-present).

Certificates and Honors: North Carolina Secondary Teacher's Certificate; Certificate of Merit, 1990, American Business Women's Association; Notary Public State of North Carolina; and Certificate of Recognition and Scholarship, 1993, National Headquarters, Alpha Kappa Alpha Sorority, Inc.


Cynthia Carlton Gillispie