PUBLIC SCHOOL EDUCATORS' USE OF COMPUTER-MEDIATED COMMUNICATION

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This study examined the uses of computer-mediated communication (CMC) by educators in selected public schools. It used Rogers' Diffusion of Innovation Theory as the underpinnings of the study. CMC refers to any exchange of information that involves the use of computers for communication between individuals or individuals and a machine.

This study was an exploration of difficulties users confront, what services they access, and the tasks they accomplish when using CMC. It investigated the factors that affect the use of CMC. The sample population was drawn from registered users on TENET, the Texas Education Network as of December 1997.

The educators were described with frequency and percentages analyzing the demographic data. For the research, eight indices were selected to test how strongly these user and environmental attributes were associated with the use of CMC. These variables were (1) education, (2) position, (3) place of employment, (4) geographic location, (5) district size, (6) organization vitality, (7) adopter resources, and (8) instrumentality Two dependent variables were used to test for usage: (1) depth or frequency of CMC usage and amount of time spent online and (2) breadth or variety of Internet utilities used. Additionally, the users' perception of network benefits was measured. Network benefits were correlated with social interaction and perception of CMC to investigate what tasks educators were accomplishing with CMC. Correlations,

crosstabulations, and ANOVAs were used to analysis the data for testing the four hypotheses.

The major findings of the study, based on the hypotheses tested, were that the socioeconomic variables of education and position influenced the use of CMC. A significant finding is that teachers used e-mail and for Internet resources less frequently than those in other positions. An interesting finding was that frequency of use was more significant for usage than amount of time spent online. This implied that an accessible computer and network connection was more important than the amount of time available to use it.

There was little evidence that place of employment, geographic location, or school district size influenced differences in use or nonuse of CMC features. Significant findings for Organization Vitality suggest that a school could contribute to usage by educators when computers and network connections that were close, convenient, and accessible. The Individual Resources of importance for usage were years of experience and confidence with computers and Internet usage. The heavy uses of CMC for communication attested to the importance of CMC in reducing practitioner isolation for many educators. Communication, professional development, work productivity, and professional information seeking showed significant relationships with network benefits and perceived CMC attributes.

CMC is a pervasive communication technology that continues to expand in all areas of society. For educators and education it is a venue promising great rewards.

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CHAPTER 1

INTRODUCTION

The focus of this study was to describe the users and uses of computer-mediated communication (CMC) in a public school environment. CMC referred to any exchange of information that involved the use of computers (Sproull & Kiesler, 1991; McClure, Bishop, Doty, & Rosenbaum, 1991). It involved the "full use of computer capabilities in education . . . to include the retrieval, manipulation, and exchange of information" (McDaniel et al., cited in Rothenberg, p. 278). CMC thus included the spectrum ranging from electronic mail to the use of World Wide Web (WWW) in search of professional or personal information and entertainment.

The goals of this study were to determine which educators were currently using CMC, for what they were using it, and how CMC affects their professional development. A concurrent goal was to establish the factors that influenced the acceptance and use of CMC. The objective of this study was to contribute to the knowledge of a specific electronic community of users — educators in the public schools.

These users are important because the educational professional is a "typical information worker occupation . . . whose main activity is producing, processing, or distributing information . . . " (Rogers, 1986, p. 10). From a theoretical viewpoint, information scientists need to assume some responsibility to theorize the impacts the "new" information technologies will have on people (Palmquist, 1992). From a practical standpoint, educational professionals in the schools are an important group to study since

they are responsible for the education of future generations. It is critical that educators, as gatekeepers or controllers of information, are knowledgeable about the potential of computer networks as an important source of receiving and distributing information. CMC could fill a void in educational organizations, as professionals in education generally lack opportunities to share thoughts and construct new knowledge about their teaching practice (Broholm & Aust, 1994; Castle, McClure & Gillingham, cited in Watts & Castle, 1992). By using CMC, educators have at their command innovative methods of finding information that can benefit their teaching and management. Just as importantly, they can also teach the students the use of networks, thus breaking the traditional classroom walls and preparing the student with skills for the 21st century.

Emergence of Networks

The computer is the catalyst for the revolution taking place in our society. More than a decade ago, *Time* magazine recognized that the technological upheaval in society was not due to a person but to a machine — the computer. Its front cover featured the computer as "Machine of the Year," a position normally given to a "Man of the Year" (*Time*, 1983).

In the last decade, the convergence of computers and telecommunications technology, dropping costs of computers, and availability of large public online services, initiated a rise in computer networks and the use of these networks for communication. LaQuey and Ryer (1993, p. 6) write of the exponential growth of these services. The Internet, the "mother of networks," spans the globe into 45 countries and all continents including Antarctica. No firm count has been established, but in 1992 LaQuey estimated

that 5 to 10 million people used the Internet. As of 1994, there were about 60,000 electronic bulletin boards (BBS) nationwide with 12 million Americans calling into a BBS daily.

Nationwide, Kurshan (1990) reported on the phenomenal growth of statewide telecommunication networks in public schools. Practically every state had a statewide network or was planning to install one for instruction or administrative use (Riel, 1991). In 1991 about 60 percent of the states operated a statewide telecommunications network (Eisenberg & Spitzer, 1991). A Princeton survey in 1993 reported that 35-39% of American educators had access to computer communication technology from their school buildings, and about 80% of the states were providing some level of Internet connection from the public schools (Princeton Survey Research Associates, 1993). The growth of computers and Internet access available in the public schools is documented by a survey done by The National Center for Education Statistics (NCES) (U.S. Department of Education Office of Educational Research and Improvement, 1999). It reported findings from a survey conducted in the spring of 1999. NCES found that 99 percent of full-time regular public school teachers reported they had access to the Internet and computers somewhere in their schools. Another report from NCES (1999), reported the increase of Internet access in public schools from 35 to 95 percent and classroom connections increase from 3 to 63 percent from 1994 to 1999. Sherman, (1993) predicted that "we will all be linked into increasingly coherent networks that connect all varieties of computers" (p. 70).

The data suggests that schools across the country are making significant progress in linking their educators and students to worldwide electronic sources. However, this

simple statistic obscures significant features of and differences between districts and schools. For example, these figures may be deceiving because a connection to the Internet does not necessarily mean availability and accessibility for all educators and students. Further, some schools may be connected, but it may be one Internet connection in the library or in an administrator's office.

The increased ownership of personal computers (PCS) has made Internet access feasible from home. A 1995 poll by the Office of Survey Research at the University of Texas at Austin revealed that 41 percent of all Texas households own a personal computer and of those 41 percent, 29 percent could get to the Internet through home computers. Approximately 1 in 10 of all Texas households was linked to the Internet (Cooper, 1995). Internet access from home may be an important issue for educators. Honey and Henriquez (1993) found support for this issue. Educators, especially classroom teachers, have a work pattern that extends to finishing the day's tasks at home. Wolpert and Lowney (1991) write:

> But the scholar works in many vineyards, especially in the home. It is at home that most teachers accomplish much of their professional, non teaching responsibilities, and it is at home where teachers have extended periods of quiet time and a dedicated phone line to have their computers interact with those of other professionals. This is the venue promising the greatest rewards. (p. 24)

Networks in Public Education

In spite of the seemingly optimistic statistics in the literature, access to computer-communication networks is a concern with some. For example in 1987 Blaschke stated:

> For a society so adept in developing technology, we have been remarkably inept in developing the political, social, and organizational innovations to create an environment conducive to the effective use of advancing technology. As computers and telecommunications technologies continue to converge, this is particularly the case with telecomputing and networking in education. (p. 29)

Eight years later the Information Infrastructure Task Force Committee on Application and Technology noted a similar observation in a report (U.S. Dept. of Commerce, Technology Administration, National Institute of Standards and Technology, 1994):

> U.S. schooling is a conservative institution, which adopts new practice and technology slowly. Highly regulated and financed from a limited revenue base, schools serve many educational and social purposes, subject to local consent. The uses of computer technology, with its demands on teacher professional development, physical space, time in the instructional day, and budget . . . has found a place in classroom practice and school organization slowly and tentatively. (p. 58)

Noteworthy is that "computer technology . . . has found a place in school organizations" (U.S. Dept. of Commerce, Technology Administration, National Institute of Standards and Technology, 1994, p. 58). Unfortunately, it is "slowly and tentatively" (p. 58).

The General Accounting Office of the United States Government (GOA) report (1995) surveyed 10,000 American schools. The report stated that: (a) most schools are

unprepared for the 21st century; (b) an inadequate infrastructure hampers at least three-quarters of schools that do have sufficient computers and televisions to use these technologies fully; (c) lack of networked computers limits the access to available electronic information in one-third of the schools that have sufficient computers.

Many public schools still lack an environment and infrastructure supportive to establishing electronic communities. Indeed, today many educators do not have what most professionals take for granted . . . a telephone on their desk. More than 60 percent of America's schools do not have telephone lines in instructional areas according to the GOA report (1995), nor do they have modems or phone lines for modems.

However bleak the technology infrastructure situation may be in America's schools, the enthusiasm of some educators in the public schools to get connected and get online has not diminished. As an illustration, when the Texas Education Agency (TEA) established the Texas Education Network (TENET), they predicted there would be, maximum, 3,000 users by the end of their first year of operation. The numbers were actually 13,000 participants (LaQuey and Ryer, 1993). One can also experience the interest of educators by scanning the many available professional interest groups on the TENET and other educational sites on the WWW. Eisenberg (1992) contends that "excitement and enthusiasm for networking is not wistful speculation based on theoretical possibilities — it's happening right now" (p. 1).

Blaschke (1987) and Kurshan (1990) are among those who have noted that networking in education contains a simultaneous top-down and bottom-up movement. The infrastructure for networking is being established in a traditional top-down hierarchical approach through statewide educational networks. This growth of statewide

telecommunications may suggest the belief of some leaders and visionaries that there is an urgency to develop an infrastructure for networking in the educational community.

On the other hand, QED has documented a grass roots movement. The firm reported that more than 60 percent of the computer purchases and purchasing decisions in schools were made by educators or computer advocates. They made personal purchases or most of the purchasing decisions with the help of parent-teacher organizations (Blaschke, 1987, p. 33).

CMC has a lure and fascination that has launched a bottoms-up or grass roots movement by innovative educators to use computer networks. Schools are inherently conservative and the schools' organizational resistance to change is well known to those in the field. Nevertheless, the use of networks by educators seems to keep growing. One illustration is the Free Educational Mail Network, FrEdMail. It is a network of school-based computer bulletin boards and is the largest and oldest educational network in the United States. FrEdMail has most participants in California, but there are BBS's throughout the United States, Puerto Rico, and Argentina (Eisenberg, 1992; Riel, 1989). FidoNet is a free network with BBS's in roughly 50 countries (Eisenberg, 1992).

According to Kurshan (1990), "the growth of networks for administrators, teachers, and students has been changing the way educators address the important issues of restructuring, site-based management, performance assessment, and practitioner isolation." (p. 1)

Educators can find information ranging from the latest legislative bills concerning education to online encyclopedias. They can become part of the move for action and reform participation in electronic conferences, voicing opinions on current issues through

electronic messages. A conference held by the Consortium for School Networking (CoSn) and Federation of American Research Networks, Inc. (FARNET) is an example. After a four-week on-line discussion in October 1993, these two advocacy groups had more than 70 educational decision-makers and practitioners come to Washington, D.C. to discuss ways to support and promote school networking (Federation of American Research Networks & Consortium for School Networking, 1994).

St. George (1992) succinctly addressed the needs of the educational professional that using computer-based networks could meet. These included:

- reduce isolation of professional educators and students by promoting collaboration in an electronic community
- provide equitable access to information and resources such as mentoring and expertise resources involving those of the curriculum developers, publishers, universities, industries, and communities
- support professional growth and development
- support communications between teachers, students, researchers, and other professionals
- enhance educational restructuring by changing communication behaviors in organizations and facilitating systemic change

With these points in mind, conceivably, CMC could provide a means for knowledge dissemination. The information on the utilization of research and its practical applications to educational practitioners is a method of supporting professional development. A study of educators that use CMC may show how CMC is used and whether it supports professional development.

Need for Research on Computer-mediated Communication

Networks are a new communication medium and as such have attracted the attention of researchers. For the specific electronic communities such as the scientific, scholarly, or education community, researchers criticize the lack of information on how individuals in these electronic communities use computer networks. The Panel on Information Technology and the Conduct of Research stated in 1990 that "there is almost no systematic information on the users and uses of information technology" (cited in McClure et al., 1991, p. 60). The National Research Council called for empirical investigations with the aim to describe communities of network users as to "their actual networking activities, skills, and anticipated networking needs" (cited in McClure et al., p. 61). There is a need for more studies on what problems users confront, what services they access, and the tasks they accomplish (McClure et al., p. 69). As emphasized by McClure and his colleagues, "there is a real danger of developing a network that has procedures, resources, and services that do not fit the perceived needs of the populations expected to use them" (McClure et al., p. 67).

Nowhere is the need for research on CMC more apparent than in the education community, particularly public schools. Research in this area is necessary because the major trend of networking within telecommunications has also affected education (Ely, 1992). There are calls for research to study the effectiveness of network activities on teacher development (Reil, 1991-92).

Steinfield (1986) in his review observed that there are notable gaps in the literature dealing with CMC research. These gaps are still apparent today. A quick

search on ERIC brought up Among several issues, Steinfield acknowledges . . . "the lack of attention to applications outside traditional office settings. Educators and home consumers are among the potential users of CMC who might benefit from further research on applications in nontraditional settings" (p. 190). Repeatedly, in the review of the literature done by McClure and associates (1991), are statements of the pressing need for empirical evidence about the ways in which existing electronic networks are being used by various communities, especially scientists, engineers, and educators (McClure et al., pp. 8, 34, 61, 67, 69). Further,

> although current and future networked information services and programs are intended, in theory, to meet specific needs of users, it is often unclear what specific needs these services have been designed to meet, the degree to which they are meeting the needs, or how they might better design services to meet such needs (p. 34).

Observations such as those reported above suggest a need for research about the uses of CMC by various electronic communities, including the educational community.

Texas is one state with an infrastructure for computer-based communication. When the Texas legislature passed the Technology in Education Act of 1989, TEA and the Texas public schools embarked on an ambitious project to link all schools in the state through TENET, a computer-based communication network. TENET became operational in August 1991 and by the end of 1997 had more than 60,000 subscribers (Stout, 1997). With 244,183 educational professionals and 31,208 educational aides, these figures showed that a little more than 20% of Texas educators had chosen to enroll.

This group was of interest because it gave insight how the TENET subscribers who made up a public school education electronic community used CMC.

As explained in more detail in Chapter 3, the sample population was selected from the TENET directory before TENET-Plus replaced the old TENET in December 1997. In a personal memo from Gene Titus (August 2000) he gives the current number of TENET subscribers as 6,000. In 1997, as mentioned above, the number of subscribers was 60,000. In 1998, it was 50,000. According to Gene Titus (August, 2000, see Appendix B) "1999 would be down to 10,000 as funding ran out. Also, in 1999, a subscriber was defined as a user who has checked his e-mail within the last six months. I deleted around 40,000 accounts that were not being used in February 1999."

The network's fundamental goal was to promote information exchange. It had three primary objectives: (a) to support electronic mail, (b) deliver technical assistance, and (c) to supplement instruction. (Texas Education Agency, 1991, p. 53).

TEA's financial support for TENET as a text-based network ceased in December 1997. TENET converted from a dial-up transport system to a web site. The switch gave TENET members a graphical interface and a more user-friendly system (Stout, 1997). TENET Plus had some areas that were open to anyone visiting the site. Other areas were restricted to Texas educators who subscribed to TENET Plus. TENET no longer has usage restriction. Anyone one can use the web-based resources (Titus, 2000).

Connie Stout, Director, Texas Education Network, sent TENET subscribers an e-mail (see Appendix B) which stated:

- Texas became the first state to launch an Internet-based network designed specifically for use by educators

- The Texas education community, along with TENET, has been at the forefront of telecommunications technology implementation and usage
- TENET has evolved from a dial-up transport system into a high-quality source for multiple resources and services that can serve the entire community of Texas educators.

TENET as a dial-up transport system ceased to exist by the end of 1998. A span of approximately six years has given all Texas educators an opportunity to become users of CMC. Those educators that registered to become members of an electronic community, TENET, had the opportunity to profit from the full spectrum of CMC — from simple e-mail to the WWW for professional development opportunities.

The change from a text-based to a graphical computer network site was an opportunity to research perceptions of educators to the awareness, commitment, and usefulness of a model network designed specifically for use by educators.

States are planning, designing and developing networks for education and are spending substantial sums of money based on general knowledge of a prototypical user. Research is needed in this area to have a better understanding of users and their needs (McClure et al., 1991; Riel, 1991; Kurshan, 1990; Blaschke, 1987; Steinfield, 1986).

Statement of the Problem

The problem identified for this study is the an exploration of difficulties users confront, what services they access, and the tasks they accomplish when using computer-mediated communication. Little is know what factors are effective in promoting this use.

Additionally, although anecdotal reports write of how CMC is being used for professional development, this is an area that is lacking data.

Purpose of the Study

The study used public school educators who were registered on TENET as of December 1997 as participants of a survey and had the following objectives:

- to identify and describe those educators who use CMC
- to determine factors for variation in time spent (depth) and number of features used (breadth) when using CMC
- to determine the whether CMC was being used by educators for professional development
- to find out what attributes of the innovation contribute of use of CMC

The study examined, in a public school environment, Rogers' (1995) perceived attributes of an innovation from his Diffusion of Innovation Theory. A goal was to determine the perception of CMC by participating educators and to learn whether Rogers attributes of relative advantage, compatibility, complexity, trialability, and observability were attributes that contributed to the use of CMC. These attributes will be discussed further in Chapter 2.

Research Questions

To accomplish the goals and objectives of this study, Texas educational practitioners who were registered TENET users as of December 1997 were used to investigate the questions that follow. At the end of 1998 enrollment figures were at a peak as inferred from Gene Titus in a personal e-mail (see Appendix B). There were

approximately 50,000 subscribers in 1998. In February 1999, those that had not used their e-mail accounts were deleted from the system. This number was 40,000. The research question are the following:

- Who are the CMC users among educators in selected public schools?
- What are the demographic and socioeconomic characteristics of these users?
- What factors contribute to use of CMC by educators in the public schools
- What are the differences in perception of network benefits among registered TENET users who use CMC?
- What use have educators made of CMC for professional development?

Significance of the Study

The National Information Infrastructure (NII) in the U.S. is developing facilities and services that will enable efficient creation and diffusion of useful information. As they develop NII, it is important to have information about the users of the various electronic communities that are being established. As observed previously, empirical data about the users and use of electronic networks in the public school environment was sparse and was an area that needed to profile users and their use of an educational network. Policy makers, system designers and school districts could use this information about users and uses of computer networks for decision-making. It could aid in developing strategies that would encourage the most beneficial and productive use of computer networks.

Electronic networking is rapidly becoming a common communication mode of this decade. Within a few years of their introduction, facsimile, electronic mail, and voice mail are mainstays of business, professional, scientific, and government communication (Paisley, 1993). CMC needs a validated knowledge base for at least two reasons:

- Information is needed to add to the developing research literature about users in various electronic communities, with a final goal of developing systems that accurately meet the users' needs and ease the exchange of information through timely and efficient communications.
- A user profile listing factors influencing use or nonuse of computer networks, and computer networks' impact, can be integrated into policy statements, design, implementation, and planning of services for the user.

Definition of Terms

These terms relate to the study and are defined as follows:

The terms *computer-based communication* and *computer-mediated communication (CMC)* refer to any exchange of information that involves the use of computers. Examples include the exchange of electronic mail (e-mail), news and conferences (BBS, listservs, and electronic conferencing), for communication between individuals, individuals and a machine, or two machines (Sproull & Kiesler, 1991; McClure et al., 1991). Other examples include Internet resources, or WWW locations that are sources of information or entertainment for individuals.

A *computer-based communication network* is a group of computers using some form of communication media to converse by some preagreed procedure called protocols (Quarterman, p. 6, 1990). The computers are interconnected and autonomous. They can exchange information and one computer cannot forcibly start, stop, or control another one (Tannenbaum, p. 2, 199).

Educational practitioners/professionals include classroom teachers and all other education professionals such as school librarians, counselors, districts and regional staff, and others who are close to the classroom (Federation of American Research Networks, Inc. & Consortium for School Networking, 1994, p.1)

An *electronic community* is a virtual community made up of people using computer-mediated communication. They have common interests and shared values though they may be geographically dispersed (Schatz, 1992).

The *Internet* is an interconnection of hundreds of separate computer networks spanning the world. A common telecommunications protocol suite, Transmission control Protocol/Internet Protocol (TCP/IP)can interconnect computer networks presently (La Quey & Ryer, 1993; Quarterman, 1990).

Internet Features are the following: (Available: <http://webopedia.internet.com>, 2000.)

(a) *Bookmarks* are features of Gopher and most Web browsers. Important links can be saved in the bookmark's file so they can be found immediately without having to look up the URL and type it in.

(b) Chat Forums are groups that have conversations online, by typing messages into a keyboard. It is a real-time electronic forum; a virtual room where visitors can meet others and share ideas on a particular subject. There are chat rooms on the Internet, BBSs, and other online services.

(c) *E-mail* or *email* stands for electronic mail. A service that instantaneously sends messages on computers via local or global networks.

(d) *Internet Resources* are repositories of information available on a networked computer via the Internet. Examples include encyclopedias, dictionaries, collections of lesson plans, lessons, educational games, and assessment instruments – almost anything that could be used in an educational environment.

(e) News and Announcements electronic mail message sent to a specific group.

(f) Search Engines are programs on the Internet that help users search for files and information. Examples are Infoseek, Yahoo, Lycos, Excite, and many more.

Professional development refers to activities to enhance professional career growth and professional competency (Houston, 1995).

Users are those individuals registered on the Texas Education Network.

World Wide Web is a multimedia hyperlinked database that spans the globe. The hyperlinked pages can be a combination of text, pictures, video, clipart, animation, etc. (Sharp, 1999)

Acronyms

BBS	Bulletin board service
CMC	Computer-mediated communication
ESC	Education Service Center
E-mail	Electronic mail
TEA	Texas Education Agency
TENET	Texas Education Network
WWW	World Wide Web

Assumptions for the Study

- Respondents' responses about their use of CMC are factual
- Answers to the survey are a valid measurement of the respondents' uses of a computer network.
- The random sample drawn from the list of individuals registered on TENET adequately represents all registered TENET users.

Limitations of the Study

The sample for this study was randomly selected from the Texas Education Network. Users were those registered as of December 1997. Therefore, the findings may not be generalizable beyond the subset of predominately Texas residents who were

affiliated with public education and were users of computer-mediated communication as of that date.

Summary

Computer networks have opened a new medium of communication, CMC, for organizations and individuals. Electronic communities are being formed and purportedly profiting from the use of information found through this form of electronic communication. Futurists such as Davis (1987) and Toffler (1980) have stressed the importance of information for the national well-being. Educators, because of their role as "typical information worker" (Rogers, 1986, p. 10) are an important electronic community meriting investigation. They will play a central role in the potential success of technology infusion efforts (Harris & Anderson, 1991). However, researchers have neglected the public school organizations and educational professionals in research studies, despite their importance for the national well-being (Ely, 1992; McClure et al., 1991; Rogers, 1996; Steinfield, 1986). Identification of public school educators CMC users, determining what motivates them to use CMC, and examining perceived benefits of CMC will enable the compilation of user information that can be used as a foundation by various groups setting up electronic networks.

CHAPTER 2

LITERATURE REVIEW

Introduction

The education electronic community is a group that has received little attention from researchers (Hunter, 1990; McClure et al., 1991; Rogers, 1995; Steinfield, 1986). Moving information to the educational practitioner group through CMC is a way of giving access, maintaining and extending their knowledge, and providing ample opportunities to interact with those who are dealing with the same situations (Wolpert & Lowney, 1991). CMC can provide information and professional development to a group that, because of the nature of their job, work in isolation and are often frustrated in their attempt to communicate with one another.

The goals of this research were to contribute to the knowledge and understanding of the use of CMC in the public schools by focusing on the following areas: (a) who the users are, (b) what use the educational professional has made of CMC, particularly for professional development and (c) what leads to variations in use. The study builds on research addressing the effects of previous new technologies, computers, on studies of CMC, and on the theory of diffusion of innovation.

This chapter will review the literature about users of computer networks and their uses of CMC. Conceptually, computers relate to the study of CMC through the sharing of technology. "Computers are a communication technology in that they are used to create, store, and transmit messages between individuals in a variety of ways, including

their use for electronic mail, bulletin boards, and teleconferencing" (Dutton, Rogers, & Jun, 1987, p. 220).

Not only is the literature on the users and uses of computers for CMC of interest, but also the literature on diffusion of innovation as it applies to the growth of CMC. In most public schools the diffusion process of CMC is not widespread. The diffusion/adoption process cycle is still observable as potential users become aware of the innovation, in this case, computer networks. Understanding acceptance or rejection of CMC and user characteristics can be enhanced by comparing them to studies of diffusion of innovation. Research determining characteristics of early adopters and how they judge the value of networks is necessary to help researchers and developers understand and improve use of the system. (Hamilton & Thompson, 1992).

There is only a nominal amount of empirical research on the use of CMC by educators. The research focuses more on the design of networked electronic communities and electronic conferencing. How individuals learn to participate in these new settings is of primary interest (Reil, 1989). Further, most of the attention in educational computer-mediated communication has centered on student learning, while collaboration and professional development for the educational practitioner has been a secondary issue (Hunter, 1990). As an illustration, Hunter, points to the 1989 study by the U.S. Congress Office of Technology Assessment. In this 182-page report, they devoted less than a page to electronic networks for linking teachers. "Harasim noted that in more than 300 citations addressing educational CMC, only half a dozen focused on teachers" (cited in Hunter, 1990). In education, the ultimate gatekeeper, the teacher, seems to receive the least attention (Rice and Williams, 1984, p. 76). Basic information

about the users and how these "information-age pioneers" (Riel, 1989) are exploiting networks merits investigation according to some researchers.

The Nature of Computer-mediated Communication

Braman (1995) has succinctly described the telecommunications system that has developed because of the convergence of computers and communication technologies. This system has contributed to the surge and development of e-mail, BBS, computer conferencing, special interest groups, online information resources, and many other branches that are components of CMC. The information infrastructure has four levels of use:

1. Voice communication or telephony: this is available to most of the population;
2. An account on a mainframe computer: this allows an individual to have digitized communication with the ability to send text using a computer with a modem;
3. The WWW: this allows an individual to transfer images and has hypertext capabilities;
4. Research institutions and Department of Defense: they have greater information processing power and access to faster lines.

This research will focus on educators using the second and third levels, CMC, which involves the use of computers for the exchange of information (Sproull & Kiesler, 1991; McClure, Bishop, Doty, & Rosenbaum, 1991).

McQuarrie (1985), in his research on computer usage wrote that, in his personal view, "computing represents the sort of innovation that only comes along once every few centuries" (p. 101). He felt one could equate the computer to the invention of the printing press. The printing press "allowed the mass distribution of information; the computer enables any individual to process and publish information" (p. 100). It is an aggregative technology (Paisley, 1993) . . . " because it aggregates the functions of the older technologies to itself" (p. 224). Paisley's opinion is that the personal computer is the most successful aggregative communication technology.

> The genius of the PC's design is that it is not dedicated to any function. It is only an intelligent host for software-driven applications. Desktop publishing, telecommunication, online and optical database searching, and multimedia presentations are interchangeable PC applications, along with scores of others. (p. 225)

Further, Paisley (1993) explained how e-mail has become very important in knowledge utilization. Information of all kinds — data, reports in preparation, memos, articles, and other similar, editable material — has been known to involve several transactions per day. It is reasonable to expect that in educational communities, professional development through knowledge exchange and use, would be an outcome of these long-distance collaborations.

Sproull and Kiesler (1991) suggested that the new communication technology has a two-level effect. First-level effects relate to the efficiency or productivity gains — the anticipated benefits of the technology. The second-level effects are those that are often unpredictable and unanticipated. These are the ones that have consequences for the

social system. If the technology is important enough, any small change will "cause other changes, build up a deviation, and cause the system to diverge permanently from its initial state" (Sproull & Kiesler, 1991, p. 2). This is the case in nature where some seed gains a foothold in a tiny crack in a rock and begins the process of changing rock to soil. Using historical experience with technologies as an analogy, the telephone, automobile, and railroad has caused an irrevocable change in society as documented by Sproull and Kiesler. Electronic mail's impact on society is still unknown, but what is definite is that it is becoming an essential component in uncountable work environments as evidenced by the profusion of articles on the subject in journals, magazines, and newspapers. In the public schools, CMC has the power to change the way teachers communicate with and relate to one another by altering patterns of social interaction (Bornholm, 1993).

CMC has some uniqueness that differentiates it from other communication technologies: (a) asynchronicity, (b) speed, (c) text-based, (d) multiple-receiver addressability, (e) built-in external memory, and (f) computer processablity (Sproull & Kiesler, 1991; Steinfield, 1983).

Unlike the telephone or face-to-face communication, CMC is asynchronous or time shifted. It eliminates scheduling problems because individuals do not have to be present simultaneously; geographical dispersion and time are no longer relevant or an inconvenience to communication. This attribute can lead to an increase in productivity according to Blair and Uhlig et al. (as cited in Steinfield, 1983, p. 4), because people can avoid the aggravation of "telephone tag" and can talk when they feel the need. Consequently, Johansen and DeGrasse (as cited in Steinfield, 1983, p. 4), theorize that it

will allow people to talk at times outside the normal workday, thus shifting work patterns.

Networks are attractive to many people because of their efficiency and fast communication. It takes only minutes to send a message around the world. The speed of sending and receiving information can support interactions such as decision making, and problem solving requiring exchange of ideas (Sproull & Kiesler, 1991, p. 182). Through accelerating information flow, organizations may increase efficiency (Sproull & Kiesler, 1991, p.23). On the other hand, Sproull and Kiesler (1991) also state in an article in *Scientific American* that "the real potential of network communication has less to do with such matters than with influencing the overall work environment and the capabilities of employees" (p. 84). Businesses, industry, education, libraries and other organizations are already using computer networks to speed the flow of information and forge relationships that were unthought of a few years ago. "The most important aspect of this new information technology environment is the capability it provides for communication and collaboration. . . . The most valuable of those interactions will be ones in which information is exchanged and ideas created" (Van Houweling, 1989, p. 14).

Electronic mail is a text-based method of communicating that helps people know, think, and learn. Since messages are in digitized text, they are computer-processable. People can copy, save, and edit any message or document received. They can also exchange and transmit information to one or hundreds of individuals. As CMC is text-based and computer processable, it seems to exploit a higher ability of cognitive and sensory channels for information processing. From the perspective of education, computer communication may become one of our preferable cognitive tools.

The function of generating distribution lists and having multiple-receiver addressability in sending messages can help in the formation of electronic communities of interest according to Wynn and Kiesler (as cited in Steinfield, 1983, p. 5). The external memory is useful to individuals coming later into the electronic communities because they can draw upon the group memory from messages accessible through the automatic archiving function of the network. Histories of group projects, issues and other interactions are available for viewing by other members (Sproull & Kiesler, 1991, pp. 32, 182).

CMC is a pervasive communication technology that continues to expand in all areas of society. "Research on the attributes of CMC systems, CMC acceptance and use, and CMC impacts defines the core of this emerging area" (Steinfield, 1986, p. 190).

Background of Computer-mediated Communication

Computer-mediated communication has been used since the late 1960's, but it was not until the 1980's that CMC became more widespread as computers began to show up in organizations on managers' and other professionals' desks (Hiltz & Johnson, 1990). The first successful network, Advanced Research Projects Agency Network (ARPANET), was funded in 1969 by the Defense Advance Research Project Agency (DARPA) of the Department of Defense (McClure, et al., 1991, p. 1). They intended this network to be used predominantly for linking organizations involved in government-sponsored networking and computing research to distant computer centers. ARPANET thus allowed researchers to share expensive hardware and software resources including remote databases and computers (LaQuey & Ryer, 1993, pp. 1, 3). One of

ARPANET's features, namely electronic mail, was merely intended as an additional feature, became a popular utility of the network. (Licklider & Vezza as cited in Sproull & Kiesler, 1991, p. 10).

> Turoff (1989) reports trying to obtain some data on the use of the ARPANET: In a rather frank discussion it was pointed out to me that they were very embarrassed that the single biggest application of the network then was message traffic. This sort of application was completely unintended and had no justification under their formal requests for funds to support ARPANET. (p. 114)

They did not see e-mail as a vital, legitimate use of computer time.

The impact CMC will have in society depends directly on how people use this communication medium. As Steinfield (1983) noted, someone who uses the system to occasionally send a greeting to a friend will not experience any radical changes in working patterns. On the other hand, the impact of CMC to society could be similar to the telephone's impact. The telephone extended people's social contacts, interactions, attention, and interdependencies beyond patterns determined by physical proximity. "Amplification occurred because communication networks have a mutually causal, spiraling relationship with information networks, close relationships, conformity, and cultural change" (Sproull & Kiesler, 1991, p. 7). Clearly then, the investigation of use in specific work and social settings is necessary.

Research on Computer-mediated Communication

Theoretical Development

The calls for research on CMC have followed the trend in information science of shifting from measurements of system performance and technical criteria to a focus on identifying user characteristics (Hewins, 1990). This paradigm shift has also been substantiated by Dervin and Nilan (1986) in their review of information needs and uses. Among three approaches to user studies that Hewins discusses is the "user-values approach" or judgment of utility and value of information systems as proposed by Taylor (1986a,b).

In Taylor's User-driven model (1986a, pp. 23-47), the information use environment must first be analyzed. Yet even before this is done, the groundwork and key to the model are the description of people, the organization, and problems. These data "can be organized in aggregate groups or along generalized dimensions" (p. 26). Taylor finds that different classes of professionals have different concerns and problems that are quite distinct from other classes of professionals. "However, we know very little about why we would design different systems or about the structure of problems in these different professions and their reflection in information requirements and information services and systems" (pp. 38-39). If electronic networks are an extension of computers and information systems and CMC is a means of gathering information, these ideas are applicable in researching CMC and its use by a distinct class of professionals — educators.

Research from a user approach should also consider the work environment, use patterns, and communication behavior of the potential user (McClure et al., 1991, p. 4).

Similarly, research in CMC has become more attentive to the variety of use outcomes in a multidimensional environment. Dutton, Kovaric, and Steinfield (1985) note that "while the scientific imperative for parsimony is understandable . . . it seems unduly optimistic to expect a simple, single-factor model to explain adequately either use or impacts" (p. 15).

Lessons learned from research about the impact of television in the home and computing in organizations, for example, were used by Dutton and colleagues (1985) and McQuarrie (1989) to study adoption and use of personal computing. Dutton noted how alike the forecasts for personal computers (PCs) were to those early forecasts for television. Similarly, early predictions for the influence of PCs (Dutton, et al., 1987) are reminiscent of the advantages claimed for using communication networks: learning and education (e.g., professional development, information-seeking on the Internet and the WWW), personal development (e.g., new skills acquired to access online sites, expanding social contacts), leisure activities (e.g., joining on-line chat groups and special interest groups, visiting Web sites), work from home (e.g., telecomputing), and policy issues such as privacy, civil liberties, and property rights (e.g., privacy invasion, system security, computer crime, intellectual property rights).

Research Framework

The framework used for this research used a multidimensional notion of acceptance and uses of CMC as proposed by Dutton et al. (1985) and McQuarrie (1989). With modifications, it was used in this research to investigate the acceptance and use of

CMC in public schools. The premise for the framework is Roger's Diffusion of Innovation Theory.

Everett Roger (1995), noted that the model of the diffusion of innovation has been the subject of more than 3,800 research publications for more than forty-five years. Education has about 9% of this research concentration. The model that has guided the research consists of the following main elements: "(a) an innovation, (b) that is communicated through certain channels, (c) over time, (d) among the members of a social system" (Rogers, p. 117, 1983).

As the theory matured, and was used in research on new communication technologies, the value of the innovation obviously increased with each new adoption. "Critical mass" was used to describe the ratio of individuals using the innovation to its usefulness (Rogers, 1986, 1995). Moreover, the degree of use or implementation was judged to be an important variable after users decided to adopt (Rogers, 1986).

Embodied in the adoption decision are five perceived attributes of the innovation. These attributes are either negatively or positively related to the rate of adoption according to Rogers (1995, pp. 204-251). Attributes of innovations as factors in diffusion are an influential consideration when communicating about new ideas according to Fliegel and Kivlin (1966). Information about new ideas could be substantially improved if there was some knowledge of the potential adopters' perceptions of the innovation. The following table delineates these attributes and how an individual may perceive them.

Table 1
Perceived Attributes of an Innovation by Members of a Social System

Attribute	Definition	Evaluation	Influence
Relative Advantage	Degree to which adopters perceive an innovation as better than the idea it supersedes.	May be measured in social prestige, convenience, satisfaction, or economic terms	Positively related
Compatibility	Degree to which adopters perceive an innovation agreeing with that individual's life situation.	May be measured against existing socialcultural values and beliefs, experiences, or needs for the innovation.	Positively related
Complexity	Degree to which users perceive an innovation as relatively difficult to understand.	Measured on the complexity-simplicity continuum.	Negatively related
Trialability	Degree to which users may experiment with an innovation on a limited basis.	Measured by a personal "trying-out"	Positively related
Observability	Degree to which the results of an innovation are visible to others.	Users can easily observe and/or communicated results to others.	Positively related

Rogers, 1995, p.204-251.

Rogers' (1983, 1986) diffusion of innovation theory was used by McQuarrie (1985, 1989) as the foundation for his study. McQuarrie also drew on the works of Danziger, Dutton et al., Gatignon and Robertson, Kling, and Venkatesh and Vitalari to

develop the framework adapted for this study (McQuarrie, 1985, 1989). Research on computing in the home (Dutton, Kovaric, & Steinfield, 1985) was used as the basis for the expected relationships.

Rogers (1986) addressed the dependent factors of light versus heavy use of microcomputers along with satisfaction or dissatisfaction with the adoption decision, and attitude toward computer technology. Rogers acknowledged, ". . . the impact of the technologies is moot until adoption has occurred" (p. 116). McQuarrie (1989) recognized acceptance or rejection as the most basic question in innovation. The result of nonadoption can lead to a conclusion that the innovation had a superficial or insignificant effect. On the other hand, "heavy, sustained usage, with a wide repertoire of applications, is a strong evidence for a deep and presumably positive impact" (McQuarrie, p. 228). *Depth* or time spent using CMC and *breadth* or the variety of online features used, will be the measure of usage in this study.

McQuarrie (1989) identified four categories as explanation for the usage of computers:

- Product strength: hardware and software owned, including manufacture support
- Adopter resources: the experience and knowledge of the individual
- Instrumental usage: predominance of work related usage
- Social Interaction: the degree to which the adopter participates in a community of other people who are involved with using CMC.

These four categories are used in this research with wording adjusted to correspond to the study of CMC.

McQuarrie (1989) defined product strength as the hardware and software owned including manufacturer support. Product strength, for CMC, may be seen as two-sided — organizational strength and system attributes. For CMC in public schools, manufacturer support can be equated to the school's support of technology in the form of providing computers in the work environment, technical support/training, and encouraging professional development through workshops, and other similar activities that may enhance the decision to use CMC. In this study, product strength will be termed *Organizational Vitality*.

The other consideration is the system's attributes. According to Rogers (1995) adoption of an innovation partially depends on how the individual perceives the innovation. As outlined in Table 1, the *System's Characteristics* or attributes are those that deal with relative advantage, compatibility, complexity, trialability, and observability. These attributes will also be used to describe product strength.

Adopter Resources, *Instrumentality*, and *Social Interaction* are used with the same definition that McQuarrie (1989) proposed. Social Interaction is a perspective coming from social information processing theory as put forward by Salancik and Pfeffer (as cited in Fulk, Steinfield, Schmitz, & Power, 1987) Adoption of an innovation can be subject, to a degree, by attitudes, statements, and behaviors of those around us — family, friends, peers, coworkers, supervisors and the like. McQuarrie (1985) considered three aspects of this variable: (a) social sharing as when CMC figures in conversation such being asked for an e-mail address or having friends and coworkers who use CMC; (b)

social exchange as when help is available from others, and (c) social standing as when people sense they reap prestige because of their involvement with CMC.

An additional factor, *Socioeconomic Status* was used by Dutton, et al. (1985) and Rogers (1995) because "socioeconomic status and innovativeness appear to go hand in hand" (Rogers, p. 269).

The following table lists the dependent and independent variables with their operational definition as used in this research.

Table 2
Operational Definition of Outcomes and Determinants

Variable	Definition
Outcome:	
1. Usage	Adoption versus nonadoption
Depth	Amount of time spent
Breadth	Number of features used
Determinants	
1. Organizational Vitality	The organizational culture in maintaining a climate conducive to use of electronic computer networks by providing for staff development, technical support, access to computers and similar activities
2. Adopter Resources	An individual's experience with computers including access at home and at work
3. Social Interaction	Extent of social interaction/ communication with individuals who are on computer networks
4. Instrumentality	Predominance of work-related communications and tasks
5. Socioeconomic Status	Age, position, education
6. System Characteristics	Perception of the innovation: (1) relative advantage (2) trialability (3) complexity (4) compatibility (5) observability

Adapted from Dutton et al., 1985, p. 10; McQuarrie, 1989, p. 229

Educators' Use of CMC

Rothenberg (1994) noted that in 1991 Dougherty purported that schools were still at the R&D stage in Internet use. By 1993, Honey and Henriquez (cited in Rothenberg) established that network use in schools had advanced beyond R&D and was being integrated by educators for professional development such as locating and using research and discussing concerns with colleagues. Internet services are used almost twice as often by educators for professional development as for student learning (Rothenberg, p. 286).

Anderson and Harris (1996) did a descriptive study of educators using TENET. They sent the survey via electronic mail to a random sample of 300 TENET registered users who had used the network at least once during a 2-week period before the survey mailing. This study described highly experienced and educated public school teachers, support staff, and administrators. The survey showed, among other findings, that they were experienced computer users. Sixty-six percent of the educators had been teaching for 10 years or more and 60% had a graduate degree. Educators had easy access to the hardware needed to use TENET.

The research confirmed the following points:

- About half the respondents taught themselves to use the system
- Nearly 40% had no continuing source of support for using the system
- Most worked with others who used TENET and were integrated with a community of network users
- E-mail was the network function that was most used

- The network was used for professional, social, and entertainment purposes
- TENET was not only useful for communicating with others, but also for accessing information.

Anderson and Harris pointed to the need for additional research to provide information about less active users. Up to the end of 1997 TENET had provided Texas educators with lowcost access (five dollars per year) to electronic networking and CMC. In spite of the lowcost incentive, less than 25% of the total educator population were subscribed users. Hiltz (1983, p. 30) has observed that "One of the most intriguing aspects of computer-mediated communication systems is the contrast between users who integrate this new form of communication and information exchange into their lives and those who do not use it at all, even if they have free access." The intriguing aspect of this is that the same system may range from being highly valued by some and completely rejected by others. The degree of disparity in the attitude toward the system may involve a positive correlation with the degree of value-added that makes the system useful for an individual (Hiltz, 1983).

Hack and Smey (1997) talk about the pressure schools are under to incorporate the new technology such as Internet use into the curriculum. One of the reasons is the federal initiative signed into law by President Clinton in 1994 setting a goal of connecting all U.S. classrooms and school library media centers to the information super highway. The realization that studies are needed in education is slowly being met by interested groups showing the state of schools concerning computer technology and Internet connections. Becker (cited by McKenziie, 1999) found that as at least seventy

percent of the teachers in American schools fall into the "reluctant" or "late adopter" categories when it comes to new technologies. He found that little support, few opportunities and marginal equipment were reasons teachers were not using new technologies.

Summary

CMC is an indispensable facet of the emerging information technology. Educators, who have been largely ignored in the research literature dealing with CMC, are an important group to study. Their knowledge, their professional development, and their links to information ultimately will have relevance to student achievement and indirectly, to the nation's well-being.

CMC is directly involved because it is an information technology. It involves the "full use of computer capabilities in education . . . to include the retrieval, manipulation, and exchange of information (McDaniel et al., cited in Rothenberg, p. 278).

To study the educational practitioner, their use, and variation in use, this research uses Rogers' (1983, 1995) diffusion of innovation theory. It builds on computer-use research done by Dutton, et al. (1985) and McQuarrie (1989). The research will investigate the effect of six independent variables, organizational vitality, adopter resources, social interaction, instrumentality, socioeconomic status, and system characteristics on usage of CMC by educational practitioners in Texas.

CHAPTER 3

METHODOLOGY

Hypotheses

Based on the research questions, this research proposed the following:

(a) Descriptive information about the sampled population was gathered to answer the research questions of who the CMC users are in the selected public schools and what their demographic and socioeconomic characteristics were.

(b) Four hypotheses were tested to answer the remaining three research questions of: (3) what factors contribute to different uses of CMC, (4) what are the differences in perception of network benefits among registered TENET users who use CMC, and (5) what use have educators made of CMC for professional development.

H_1 Socioeconomic status, as evidenced by education and position will influence the use of CMC.

H_2 There are significant differences between geographic locations and district size, and use or nonuse of CMC.

H_3 Breadth and depth of usage are positively influenced by:

a. Organizational vitality

b. Adopter resources

c. Instrumentality

H_4 Perception of network benefits is positively associated with:

a. Social Interaction

b. CM Characteristics

Research Setting and Design

TENET was used as the research setting. For the proposed study, the research design was a survey using a questionnaire as the survey instrument. A study such as this one, according to Sproull (1988), can be used measure subjects to assess the relationship between variables with results leading to conclusions about associations.

For this study, accessing and using electronic mail, news and conferences (BBS and listservs), Internet resources, and the World Wide Web are considered computer-mediated communications. Anyone with registered access to the network can theoretically communicate with anyone with an e-mail address anywhere in the world, participate in electronic discussions and conferences, and reach a wealth information resources.

The Sample

The sampling population was drawn from those educators who were registered on TENET as of December 1997. TENET is open to all public school personnel, school board members, and university faculty. Overall, any individual with a legitimate connection to education can apply for an account on TENET. These registered users on TENET formed the sampling frame for the research.

A stratified random sample based on geographic location in Texas was used to select the sample population. The procedure was as follows:

- The 1,046 Texas school districts were compiled into a list categorizing them into groups according to the 20 regional Education Service Centers (ESCs) that serve each district. "The 20 regional ESCs serve the school districts within defined geographic boundaries. Differences exist among the ESCs in terms of the number and characteristics of member districts" (Texas Education Agency, Department of School Support Services, 1994, p.3).
- The school districts were alphabetized and numbered.
- Using a random number table, 10 percent of the total number of school districts for each region was picked from the alphabetized and numbered list. An extra three districts in each ESC region were selected in case there were no registered users for a randomly picked district.

After the districts (a total of 109 districts with rounding up) had been selected, three individuals from each district were selected. They were selected through the TENET *Directory Assistance*. An individual can search for a registered TENET user by last name, first name, logon name, or county/district number (CDN). To select the sample population, the following steps were taken:

- The function *Directory Assistance* on TENET was used to find registered users for the randomly selected list of districts by using the CDN to search. This CDN number was obtained from *Snapshot '95*, a TEA publication of school district profiles.

2. The list of users was downloaded to a disk for each district selected.

- The list was printed and the sample population was randomly selected. A random sample will assure that respondents in various positions such as administration, classroom, library, counseling, and others positions were included in the sample. It was anticipated to send the questionnaire to approximately 300 educators.

For clarification, an example of a search in Directory Assistance by CDN is shown below:

Directory of Users

Texas Education Network

lastname :

firstname:

emailname:

cdn :220917041

Enter Command:

last name, first email cdn Matches: sorted by 220917041= Matches: Searching...Matches: 5

Urias-Barker, Zelina	*zelina*	*220917041*
Taylor, Edward	*elt*	*220917041*
Martin, Rebekah	*rebmart*	*220917041*
Crowley, Allen	*allencro*	*220917041*
Amaral-Whittenberg, Donna	*amaral*	*220917041*

The list provided an electronic mail address for each user. The "email" column is the login name of the person. Their e-mail address was simply *NAME@tenet.edu*. Behind each name was more information about the individual. For example, the following information appeared when one selected a name from the above list:

Donna Amaral-Whittenberg
Irma Marsh Middle School
415 Hagg
Fort Worth, TX 76114

Type: public school teacher/admin
Jobtitle: Special Education
District: castleberry isd
School: marsh middle
Grades: 6,7,8
Subjects:Reading, English

The information provided a mailing address. It also identified the individual's position.

Questionnaire Construction

A questionnaire was used as the survey instrument. Though the review of the literature did not identify a survey that would meet all the needs of this research, a questionnaire was developed using the following sources: (a) applicable studies in CMC, (b) items from the questionnaire used by McQuarrie (1989, Appendix A, p. 197) in his study of an individual's commitment to home computing, (c) items from the questionnaire used by Anderson (1992) on the factors associated with usage of a public telecomputing system, (d) Zaichkowsky's (1985) Modified Personal Involvement Inventory (MPII), a context free 16-item semantic differential scale that focuses on "a person's perceived relevance of the object based on inherent needs, values, and interests" (p. 342), and (e) interviews with current users of electronic networks.

McQuarrie (1989) used a scale akin to a Likert scale used in this research. The Likert scale obtains a person's "position" on issues. It measures opinion or attitude by stating the issue or opinion and obtaining the respondents' degree of agreement or disagreement (Alreck & Settle, 1985). The scale may resemble the following:

1=Strongly agree 2=Agree 3=Neutral 4=Disagree 5=Strongly disagree

McQuarrie's scale though, was more graphic in appearance. Respondents have a clearer choice and are less prone to confuse the scale by inverting the numbers. The scale looks like this:

YES! yes ??? no NO!

Individual interviews of educators in the Texas public schools were based on a convenience sampling with the full awareness of its limitations. Sproull (1988, p.117) defines convenience sampling as a "nonrandom sampling method in which the researcher uses some convenient group or individuals as the sample." She further states that "using a convenience sample except possibly for exploratory research is not defensible." It was precisely for exploring and probing in the construction of the questionnaire that the interviews will focus on. Individual interviews were done to help in constructing the questionnaire. Individuals were asked to comment on clarity of wording and item validity. Pretesting of the questionnaire was done through professional networks and contacts of individuals who use CMC and were known to the researcher. A class of 26 library students at the University of North Texas was used to test a rough draft of the questionnaire. Their remarks and suggestions were used to refine the instrument. Then through a period of about six months, the survey was given to different educators based

on availability and their knowledge use of the INTERNET. Various degrees of proficiency were sought. A total of 30 individuals was used.

Kerlinger (1986, p. 418) states the "content validation consists essentially in judgement. Alone or with others, one judges the representativeness of the items." The questionnaire was tested with a select group of educators. Suggestions, comments and recommendations by the group were used to refine the questionnaire. Content validity was attainable to the degree that the respondents understood the items on the questionnaire.

The survey consisted of 32 questions. The variables used to assess the relationships were organizational vitality, adopter resources, social interaction, instrumentality, social status, and system characteristics.

Data Gathering

Questionnaires were administered through postal mail. Postal mail was chosen since it was assumed that among the registered TENET users there would be varying degrees of usage, including non usage. The non users would be those individuals, who for one reason or another, registered, but decided that they had no use for TENET or CMC. Consequently, the postal service would reach all subjects, including those registered but who do not use e-mail. Subjects not responding received a telephone call at their working location to encourage participation.

Analyses

A survey design using a self-administered questionnaire was used to gather data to assess the relationship between or among variables (Sproull, 1985). Four sets of

independent variables from the literature review, were used for this research. The first set was formed by individual socioeconomic and demographic variables. These were used to categorize the respondents. The second group was composed of five components (a) adopter resources or an individual's computer experience and computer access (b) social interaction or connections to individuals using CMC, (c) organizational vitality or work environment factors, (d) instrumentality or task applications, and (e) CMC characteristics or an individual's perception of the innovation.

Additionally, selected data from the Anderson & Harris study (1996) of highly experienced and educated Texas pubic school teachers, support staff, and administrators who used TENET was compared with the groups generated in the present study.

Statistical analyses were managed with the Statistical Package for the Social Sciences (SPSS). The acceptance and use of CMC and the factors that influence usage was determined using a combination of qualitative and quantitative methods using SPSS. Qualitative methods were used with the demographic data to develop a profile of who the users were.

Measurements in descriptive statistics use calculations such as frequency counts, central tendency, percentages, and variability (Sproull, 1988) were used to describe and summarize data. Other statistics that were appropriate for the data such as regression analyses, correlations, and ANOVA were used to test the hypotheses.

Research Question 1 and 2

Descriptive information about the sampled population was gathered to answer the first two research questions:

(1) Who are the CMC users among educators in selected public schools?

(2) What are the demographic and socioeconomic characteristics of these users?

Demographic and socioeconomic characteristics were tabulated using frequencies, proportions, and percentages. *Gender, age, and education* were used to develop a profile of the users. Frequencies and percentages of selected survey questions were used to help visualize who the educator was. Such survey questions as *position, place of employment, years of experience* and the like were selected to build this picture. The following items from the survey were summarized:

A-1. Are you: **1.** female **2.** male

A-2. What is your age? _____

A-3. Which of these best describes your education?

1. high school graduate
2. some college
3. bachelor's degree
4. master's degree
5. post graduate work

B-4. Year last enrolled in an institute of higher education: **19**

B-5. How many non-mandatory workshops have you attended within the last year?

1. none
2. 1-2
3. 3-4
4. 5 or more

B-6. How many professional conferences have you attended within the last year?

1. none
2. 1-2
3. 3-4
4. 5 or more

B-7. How many professional journals do you read?

1. none
2. 1-2
3. 3-4
4. 5 or more

A-4. Position:

1. teacher
2. campus administrator
3. central administrator
4. educational aide
5. professional support
6. auxiliary staff
7. other (please specify)

A-5. Place of employment:

1. elementary school **3.** high school **5.** other
2. junior high/middle school **4.** administration (please specify)

B-2. How long have you been using computers?

1. don't use **4.** 2-3 years
2. less than 1 year **5.** 3-5 years
3. 1-2 years **6.** more than 5 years

B-3. My confidence level in using computers is:

1. very low **3.** moderate **4.** high
2. low **5.** very high

C-1 Do you use TENET?

1. yes **2.** no

C-2. Do you use other computer networks such as America OnLine, Southwestern Bell, Flashnet or other networks?

1. yes **2.** no

C-6. How long have you been using computer networks?

1. don't use **4.** 6 - 12 months
2. past user **5.** 13 - 24 months
3. less than 6 months **6.** more than 2 years

C-7. Indicate your confidence level at this point in using computer networks:

1. very low **3.** moderate **4.** high
2. low **5.** very high

A-6. My district is located in Education Service Center Region _____.

A-7. District enrollment:

1. more than 50,000 **6.** 1,600 to 2,999
2. 25,000 to 49,999 **7.** 1,000 to 1,599
3. 10,000 to 24,999 **8.** 500 to 999
4. 5,000 to 9,999 **9.** less than 500
5 3,000 to 4,999 **10** not applicable

If **NOT** known, please give a district name: _____

Research Question 3, 4, and 5

Hypotheses were developed for research questions three, four and five:

(3) What factors contribute to use of CMC by educators in the public schools?

(4) What are the differences in perception of network benefits among registered TENET users who use CMC?

(5) What use have educators made of CMC for professional development?

The first three hypotheses measured usage with eight factors: (1)education, (2) position, (3) place of employment, (4) geographic location, (5) district size, (6) organization vitality, (7) adopter resources, and (8) instrumentality. These factors were chosen from the literature as possible variables that could encourage the use or nonuse of CMC. These independent variables together with measurements of depth and breadth as discussed below sought answers to research question three, what are the factors that contribute to use of CMC.

The fourth hypothesis measured network benefits with the factors of social interaction and CMC characteristics. This hypothesis investigated the differences in perception of network benefits by the users. This was research question four, investigating what perceptions the sample of public school educators had of network benefits for CMC.

Research question five concerning the use educators have made of CMC for professional development was a product of hypothesis four, the perception of network benefits by the users.

The following section lists the hypotheses and the survey questions used to measure the hypotheses. For the first three hypotheses a measure of usage was needed. Three survey questions were developed to measure usage as defined in the research. Depth, or time and frequency of CMC usage was measured by survey questions C-11 and C-12:

C-11. On the average, over the past two weeks, about how frequently have you used networks?

1. less than once a week
2. 1-2 times a week
3. 3-4 times a week
4. 5-6 times a week
5. once a day
6. twice a day
7. more than twice a day

C-12. On the average, over the past two weeks, about how long have your CMC sessions lasted?

1. 10 minutes or less
2. 11-15 minutes
3. 15-30 minutes
4. 31-45 minutes
5. 45-60 minutes
6. more than 1 hour

Breadth, or the variety of use was measured by C-13:

C-13

Computer networks have many features. Please circle the selections you have used over the past two weeks and indicate on the following column the degree you are satisfied with the features. If you are neither satisfied nor dissatisfied, circle 3 (???).

Application	**Do you use?**		**If YES, are you satisfied?**				
	NO	**YES**	**NO!**	**no**	**???**	**yes**	**YES!**
1. E-Mail	**1.** 1	2	**1.** 1	2	3	4	5
2. News and Announcement (Electronic Bulletin Boards)	**2.** 1	2	**2.** 1	2	3	4	5
3. Search Engines	**3.** 1	2	**3.** 1	2	3	4	5
4. Chat Forums	**4.** 1	2	**4.** 1	2	3	4	5
5. Internet Resources	**5.** 1	2	**5.** 1	2	3	4	5
6. Bookmarks (Fast access to sites of interest)	**6.** 1	2	**6.** 1	2	3	4	5

The following three hypotheses were used with the above survey questions for measurements of depth and breadth to discover factors that contribute to use of CMC by educators.

Hypothesis one: Socioeconomic status, as evidenced by education and position will not influence the use of CMC.

The following items were used to gather data for testing this hypothesis.

Education:

A-3. Which of these best describes your education?

1. high school graduate
2. some college
3. bachelor's degree
4. master's degree
5. post graduate work

B-4. Year last enrolled in an institute of higher education: **19**

B-5. How many non-mandatory workshops have you attended the present school year?
1. none
2. 1-2
3. 3-4
4. 5 or more

B-6. How many professional conferences have you attended the present school year?
1. none
2. 1-2
3. 3-4
4. 5 or more

B-7. How many professional journals do you read regularly?
1. none
2. 1-2
3. 3-4
4. 5 or more

Position

A-4. Position:
1. teacher
2. campus administrator
3. central administrator
4. educational aide
5. professional support (please specify)
6. auxiliary staff
7. other

Hypothesis 2: There are significant differences in use and nonuse of CMC among place of employment, geographic location, and district size.

Place of employment and district size were questions that not only looked at factors of use, but in a sense, factors of equity. Would those individuals who worked in administration have better access to computers and the Internet? Would district size be a factor in usage? Do large districts have more funding than smaller districts? Geographic location was investigating Roger's theory that an innovation is more likely to be adopted if more of the individuals in a personal network have adopted previously. Being that TENET had its headquarters in Austin, Texas, it was possible the use of TENET would

be concentrated in the area. From personal experience even five years after TENET's inception, I would randomly ask educators if they were members of TENET and many would look puzzled and ask what TENET was. This seemed to indicate that members of TENET were those that were connected with similar individuals.

A-5. Place of employment:

1. elementary school	**3.** high school	**5.** other
2. junior high/middle school	**4.** administration	(please specify)

A-6. My district is located in Education Service Center Region _____.

A-7. District enrollment:

1. more than 50,000	**6.** 1,600 to 2,999
2. 25,000 to 49,999	**7.** 1,000 to 1,599
3. 10,000 to 24,999	**8.** 500 to 999
4. 5,000 to 9,999	**9.** less than 500
5. 3,000 to 4,999	**10.** not applicable

If **NOT** known, please give a district name: _____

Hypothesis 3: Breadth and depth of usage are positively associated with:
- a. Organizational Vitality
- b. Adopter Resources
- c. Instrumentality

Organizational vitality was defined previously as the organizational climate conducive to use of electronic computer networks in the work environment. This can be done by providing for staff development, technical support, access to computers and other similar activities. The next six survey questions were used for collecting data about Organizational Vitality:

C-3. Where I work, we have (circle all that apply):

1. local area network (within the bldg.)	**3.** Internet access
2. wide area network (outside the bldg.)	**4.** not applicable

C-8 The computer I use/could use MOST OFTEN for connecting to computer networks is:

1. at home
2. in the same room where I work
3. at work, but NOT in the same room
4. other (please specify) _____

C-9 The computer I use/could use for connecting to computer networks at work is:

1. in the same room where I work
2. at work, but NOT in the same room
3. other (please specify) _____

C-10. How do you feel about the location of equipment you use/could use to connect to networks?

Circle 3 (???) if you are unsure of your answer.

	NO!	no	???	yes	YES!
1. it is close	**1.** 1	2	3	4	5
2. it is convenient	**2.** 1	2	3	4	5
3. it is accessible	**3.** 1	2	3	4	5

C-5. Have you received formal training in the use of computer networks?

1. no training
2. self-taught
3. through friend/colleague
4. training by service center
5. training by district
6. training at college/university
7. other (please specify) _____

D-1. The following 10 items may be sources of problems for you when deciding to use a network.

On the yes/no scale, judge the items below as to how problematic they may be for you. Circle 3 (???) if you are unsure of your answer.

ARE THE FOLLOWING A PROBLEM FOR YOU?	NO!	no	???	yes	YES!
1. getting to a computer	**1.** 1	2	3	4	5
2. lack of phone lines	**2.** 1	2	3	4	5
3. learning to use a network	**3.** 1	2	3	4	5
4. network difficult to use	**4.** 1	2	3	4	5
5. time to devote to using the network	**5.** 1	2	3	4	5
6. relevance to my job	**6.** 1	2	3	4	5
7. technical or organizational support	**7.** 1	2	3	4	5
8. finances or resources	**8.** 1	2	3	4	5
9. clarity about the goals for networking in education	**9.** 1	2	3	4	5
10. information how to implement networking	**10.** 1	2	3	4	5

Adopter resources were defined in Table 2 as the individual's experience with computers including access at home and at work. Seven questions from the survey were used to measure Adopter Resources:

B-1. Do you use a computer at: (**circle all that apply**)

1. don't use
2. home
3. work
4. used a computer as a student

B-2. How long have you been using computers?

1. don't use
2. less than 1 year
3. 1-2 years
4. 2-3 years
5. 3-5 years
6. more than 5 years

B-3. My confidence level in using computers is:

1. very low
2. low
3. moderate
4. high
5. very high

C-1 Do you use TENET?

1. yes
2. no

C-2. Do you use other computer networks such as America OnLine, Southwestern Bell, Flashnet or other networks?

1. yes
2. no

C-6. How long have you been using computer networks?

1. don't use
2. past user
3. less than 6 months
4. 6 - 12 months
5. 13 - 24 months
6. more than 2 years

C-7. Indicate your confidence level at this point in using computer networks:

1. very low
2. low
3. moderate
4. high
5. very high

Instrumentality in this research was defined as predominance of work-related communications and tasks. The next questions were used to gather data on Instrumentality:

C-14

Please circle the number that applies:

Number of people using computer networks in my work environment

1. 1 - 5
2. 6 - 12
3. 13 - 20
4. more than 20
5. don't know

E-3

Use the following scale to describe the frequency of your computer communication professionally:
0 = No Contact 1 Monthly or Less = 2 = About Weekly 3 = About Daily

PROFESSIONALLY, DURING THE PAST 3 MONTHS, HOW OFTEN HAVE YOU USED CMC TO COMMUNICATE WITH:

	No Contact	Monthly	Weekly	Daily
1. people in other schools in your district	**1.** 0	1	2	3
2. people at higher levels in your district	**2.** 0	1	2	3
3. people at higher levels outside your district	**3.** 0	1	2	3
4. people in government	**4.** 0	1	2	3
5. experts or consultants	**5.** 0	1	2	3
6. peers	**6.** 0	1	2	3
7. sites in search of professional information	**7.** 0	1	2	3

F-1

Circle how you feel the importance of CMC and computer networks are to you. Circle 3 (???) if your answer is a maybe.

COMPUTER NETWORKS ARE IMPORTANT:	**NO!**	**no**	**???**	**yes**	**YES!**
1. in my job	**1.** 1	2	3	4	5
2. for information	**2.** 1	2	3	4	5
3. for professional development	**3.** 1	2	3	4	5
4. to ease my work load	**4.** 1	2	3	4	5

Please comment if networks are important in other areas:

Hypothesis 4: Perception of network benefits is positively associated with:

a. Social Interaction

b. CMC Characteristics

Social interaction is understood to be the extent of social interaction/ communication with individuals who are on computer networks.

Social Interaction:

C-4. How did you **first** become interested in using TENET or other computer networks?

1 friend/colleague
2 administration
3 Education Service Center
4 not applicable
5 other (please specify) _____

E-1.

What professional/personal interests persuade you/could persuade you to use networks? Circle 3 (???) if you neither agree nor disagree.

I USE/COULD USE NETWORKS:

	NO!	no	???	yes	YES!
1. for entertainment	**1.** 1	2	3	4	5
2. to get interesting things to talk about	**2.** 1	2	3	4	5
3. to keep up with current issues	**3.** 1	2	3	4	5
4. to pass the time	**4.** 1	2	3	4	5
5. to keep in touch with family and friends	**5.** 1	2	3	4	5
6. to find out about events I'm interested in	**6.** 1	2	3	4	5
7. to take a pleasant break from work	**7.** 1	2	3	4	5
8. to compare my ideas with what others think	**8.** 1	2	3	4	5
9. to exchange information or advice	**9.** 1	2	3	4	5
10. to meet people	**10.** 1	2	3	4	5
11. for sending messages in place of a phone call	**11.** 1	2	3	4	5

Are there any other reasons you enjoy using computer networks besides those mentioned above? Please comment.

E-4

Use the following scale to describe the frequency of your computer communication socially:
0 = No Contact 1 Monthly or Less = 2 = About Weekly 3 = About Daily

SOCIALLY, DURING THE PAST 3 MONTHS, HOW OFTEN HAVE YOU USED CMC TO COMMUNICATE WITH:

	No Contact	Monthly	Weekly	Daily
1. Friends and family	**1.** 0	1	2	3
2. Peers	**2.** 0	1	2	3
3. Web sites in search of personal information	**3.** 0	1	2	3
4. Web sites in search of entertainment	**4.** 0	1	2	3

CMC characteristics were developed from Roger's Theory of Innovation. These are the users' perception of the innovation dealing with relative advantage, trialability, complexity, compatibility, and observability. The next items were used to collect information for testing this hypothesis. The CMC characteristics were correlated with network benefits to discover the significant associations between the attributes of the innovation and the network benefits seeking to answer research question four.

F-2

What is your perception of computer-mediated communication? Circle 3 (???) If you are unsure.

		NO!	no	???	yes	YES!
1. By using CMC, I can communicate with people whom I would not otherwise have contacted	**1.**	1	2	3	4	5
2. By using CMC, I can look for information that I would not otherwise have sought	**2.**	1	2	3	4	5
3. CMC has made it easier for me to reach people with whom I need to communicate.	**3.**	1	2	3	4	5
4. Without CMC, it would be more difficult for me to acquire information that I want.	**4.**	1	2	3	4	5
5. I was able to explore using CMC before I decided to become a member.	**5.**	1	2	3	4	5
6. CMC is at times confusing	**6.**	1	2	3	4	5
7. I find using CMC complex	**7.**	1	2	3	4	5
8. It is easy to use CMC	**8.**	1	2	3	4	5
9. Using CMC helps me at work	**9.**	1	2	3	4	5
10. Using CMC helps me in my personal life	**10.**	1	2	3	4	5
11. There are other persons at work whom I have observed using CMC	**11.**	1	2	3	4	5
12. I have friends that use CMC	**12.**	1	2	3	4	5
13. Have you heard of or seen some of the benefits associated with using CMC?	**13.**	1	2	3	4	5

F-3

Work at fairly high speed. It is your first impressions and immediate feelings about the characteristics of computer mediated communication that is important. Mark on the scale closest to the adjective that best indicates your feelings.
Example: important __:__:__:__:_X_:__:__ unimportant

TO ME COMPUTER-BASED COMMUNICATION IS:

important	__:__:__:__:__:__:__	unimportant
boring	__:__:__:__:__:__:__	interesting
relevant	__:__:__:__:__:__:__	irrelevant
exciting	__:__:__:__:__:__:__	unexciting
means nothing	__:__:__:__:__:__:__	means a lot
appealing	__:__:__:__:__:__:__	unappealing
fascinating	__:__:__:__:__:__:__	mundane
worthless	__:__:__:__:__:__:__	valuable
involving	__:__:__:__:__:__:__	uninvolving
not needed	__:__:__:__:__:__:__	needed

Anticipated Results

A stratified, random sample of Texas educators who were registered to use TENET as of December 1997 served as the survey population for this research. The research gathered data to identify and describe educators in Texas who use CMC. Reasons for variations in use were the accompanying hypotheses that were tested using Rogers' Diffusion of Innovation Theory. Adoption of CMC should improve access to peers and resources thus affecting educators positively, especially in professional development. Education and position will affect the use of CMC significantly. There will be a significant difference among places of employment, geographic location, and district size and the use of CMC. The more CMC is used by educators, the more work-related communications will be observed. Further, adoption versus non adoption will be

influenced by the educator's positive or negative feeling toward CMC, and the belief that the use of CMC will contribute to professional or personal interest.

CHAPTER 4

PRESENTATION AND ANALYSIS OF THE DATA

This chapter presents the results of the survey of Texas educators' use of computer-mediated communication. Demographic and socioeconomic characteristics of educators who were registered TENET users as of December 1998 are described in the first part. The second part addresses the four research hypotheses.

Presentation of Data

The first part of the survey data was used to describe public school educators who responded to the survey. Educators were described using two characteristics of demographics – age and gender. They were also described by the socioeconomic characteristics of education and position. Education consisted of formal education plus ongoing learning activities such as workshops, professional conferences, and journal readings. Questions about the educator's place of employment (A-4), district enrollment (A-7), and the geographic areas as determined by the Texas ESC region their district belonged to (A-6), were also used to describe the educators. To supplement the user description, additional survey questions were used. These questions were about the respondents' experiences using computers and the Internet for CMC and their perceived confidence level. Since the survey deals with educators' use of the Internet and CMC, these questions were important to the description of the users. For the analyses, SPSS, "a comprehensive and flexible statistical analysis and data management system," was used as the statistical package for data analysis (Norusis, 1994).

The testing of the four hypotheses follows the description of users of CMC in Texas public schools. Quantitative analyses of the four hypotheses were interspersed with relevant examples of qualitative descriptions. Though all of the respondents were used in this first descriptive section, the testing of the hypotheses involved only professional educators, teachers, campus administrators, central administrators, and professional support. For the analyses of the hypotheses, the categories of "Educational Aide" (N=7), "Auxiliary" (N=3), and "Other" (N=1) were omitted due to small numbers of respondents in these categories. The total response rate for these three categories, as shown in Table 2 was 7.1%. Some persons described themselves further. The category "Other" was a school board trustee. Respondents for "Auxiliary" did not add additional identification. Three of seven of the "Educational Aide" category listed their jobs as campus tech, interpreter supervisor, and library assistant.

Response Rate

Three hundred sixty nine surveys were sent. Addresses were checked for those persons that the TENET directory identified as campus or central administrators through the TEA list of schools and administrators (http://www.tea.state.tx.us). Of the 369 surveys, ten questionnaires were returned as undeliverable because the post office did not have a forward order on file. Calls were made to districts in an attempt to find the persons. Because of confidentiality issues, most districts could not or would not give a forwarding address. Some stated that they did not know where the person had moved.

To increase the response rate, after two weeks, a random selection of thirty names was selected from the original list and telephone calls were made to the schools.

Messages were left for the people. Two additional people responded. No further efforts were made to increase the number of returned surveys since sixty respondents were the minimum number agreed upon for the research.

Thus the response rate was calculated on the number of surveys not returned by the postal service, 359. The number of educators who participated in this study totaled 141. The response rate calculated was 39%.

Lacking a prior basis for predicting the relative importance of variables and having many dependent variables, statistical tests have a potential for capitalizing on chance. Therefore, the analyses in this research should be considered exploratory. They are more observational in nature and tentative rather than firm conclusions.

Demographic and Socioeconomic Characteristics

All frequency tables that follow show the valid percentages based on the number of respondents. Table 3 shows that educators ranged in age from 23 to 62 years. The mean age was almost 47 years. A frequency count done separately from Table 3 on the real age of the educators showed that 51% were between the ages of 47 and 55 years of age.

Table 3
Descriptive Statistics for Age

N	Minimum	Maximum	Mean
137	23	62	46.89

Age Group

	Frequency	Valid Percent
20's	7	5.1
30's	18	13.1
40's	52	38
50's	56	40.9
60's	4	2.9
Total	137 (97.2%)	100
Missing	4 (2.8%)	

As shown in Table 3, educators who were in their 20's and 30's made up 18.2% of the sample. The majority (78.9%) as, noted previously, were in their 40's and 50's. About 3 percent of the sampled population were sixty years or above. Four respondents did not list their age.

Respondents that answered and gave their age, 95 (69.3%) were females and 42 (30.7%) males as shown in Table 4. One respondent did not identify his/her gender and as noted in Table 4, four respondents did not give their age. Female respondents (69.3%) were more than double the males (30.7%). Age group cohorts for those that gave an age are also shown in Table 4.

A percentage description of ages of male and female is given in Table 4. Table 4 shows the female participants who were in their 40's and 50's made up 77.8% of the total females while males made up 80.9% of the total male group. In the 20's and 30's age group females were 18.9% of their group and males were 16.6% for their group.

Table 4
Crosstabulations for Gender and Age Group

		AGE GROUP					
		20's	30's	40's	50's	60's	Total
Female	Count	4	14	37	37	3	95
	% of Total	4.2%	14.7%	38.9%	38.9%	3.2%	69.3% (Column
Male	Count	3	4	15	19	1	42
	% of Total	7.1%	9.5%	35.7%	45.2%	2.4%	30.7% (Column
Total	Count	7	18	52	56	4	137
	% of Total	5.1%	13.1%	38.0%	40.9%	2.9	

Approximately 51% in the position's category were teachers and 23% campus and central office administrators shown in Table 5. High school educators were the topmost responding group (30.5%) for place of employment. Elementary personnel were second with 28.4% and middle schools and administration followed each other with 17% and almost 15.6% respectively.

Table 5
Frequencies Responses for Work Demographics

	Frequency	Valid %	Place of Employment	Frequency	Valid %
Teacher	72	51.1	High School	43	30.5
Prof. Support	26	18.4	Elementary	40	28.4
Central Admin	18	12.8	Middle School	24	17.0
Campus	15	10.6	Administration	22	15.6
Edu Aide	7	5	Other	12	8.5
Auxiliary	2	1.4			
Other	1	.7			
Total	141	100	Total	141	100

Educators from all twenty ESC regions responded. As shown in Table 6, three regions had just one respondent, one region had four respondents, and six regions had

only five respondents.. The greatest concentrations of respondents were from the areas surrounding the cities of Dallas (ESC 10, n=23), Austin (ESC 13, n=13), and El Paso (ESC 19, n=11). The distribution of respondents is geographically displayed in Figure 1.

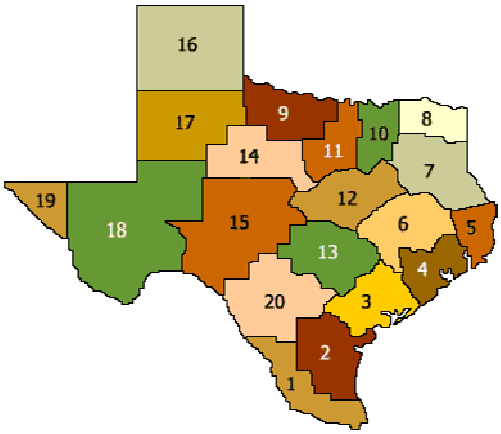

Figure 1

Location of the 20 ESC regions in Texas

Table 6
Frequency Responses from Education Service Center

ESC	Frequency	Valid %	ESC	Frequency	Valid %
1	1	0.8	11	9	7
2	5	3.9	12	9	7
3	2	1.6	13	13	10.2
4	4	3.1	14	5	3.9
5	8	6.3	15	1	0.8
6	8	6.3	16	2	1.6
7	6	4.7	17	5	3.9
8	1	0.8	18	5	3.9
9	5	3.9	19	11	8.6
10	23	18	20	5	3.9

Missing 13 (9.2%) Valid 128 (90.8%) Total 141

School district size as measured by district enrollment was well represented by the respondents. The districts are divided by TEA into nine school population categories,

as shown in Table 7. Interestingly, the districts with fewer than 500 pupils were the third highest in response rates. These districts were third after the largest district (greater than 50,000 and following the districts that had enrollment between 10,000-24,999). These three enrollment sizes had a total response rate of 54.4 percent.

Table 7
Frequency Responses by District Enrollment

District Size	Frequency	Percentage
> 50,000	29	21.3
25,000 - 49,999	11	8.1
10,000 - 24,999	24	17.6
5,000 - 9,999	11	8.1
3,000 - 4,999	8	5.9
1,600 - 2,999	15	11
1,000 - 1,599	3	2.2
500 - 999	12	8.8
< 500	21	15.4
NA	2	1.5
Total	136	96.5
Missing	5	3.5
Total	141	100

Education

Table 8 shows that subjects were well educated with 58.2% holding a Master's degree and a slightly more than 7% had a Ph.D. Those with high school or some college education also totaled about 7%. Those with college education, meaning those completing a first degree in an institution of higher education, totaled almost 28%. Together, those with a higher education degree totaled 93%, suggesting that these respondents as a group were well educated.

Table 8
Frequency Responses for Education Level

	Frequency	Valid Percent
High School	3	2.1
Some College	7	5.0
College	39	27.7
Master's	82	58.2
Ph.D.	10	7.1
Total	141	100

Lifelong learning is an essential part of education in today's information world. The surveyed group had continued with their education by attending workshops, professional conferences, and reading professional journals. As shown in Table 9 about 84% of the respondents participated in workshops with 34% of the educators attending three to four workshops per year. Close to 68% of the surveyed attended professional conferences. About the same total percentage of the educators attended workshops (83.5) and read professional journals (82.9). Educators that did not attend conferences accounted for 32% of the sample. The percentages for those not attending workshops or reading professional journals were similar with only 0.7% difference between the groups.

Table 9
Percentages Responses for Continuing Education

	Workshop Attendance	Professional Conferences	Professional Journals
None	16.4%	32.1%	17.1%
1-2	31.3%	48.6%	52.9%
3-4	34.3%	14.3%	20.7%
5 or more	17.9%	5.0%	9.3%
Response	N 134 (95%)	N 140 (99.3%)	N 140 (99.3%)

As shown in Table 10, 82.7% had more than five years of computer experience and 11.5% had at least three to five years of experience. About 23% considered themselves highly confident in using computers. Another 75% rated themselves as moderate to high in their computer confidence level. Only 2% felt their skill were low to very low.

Table 10
Frequency Responses for Years of Computer Use and Confidence

Years of Computer Use (N 137)			Confidence (N 141)		
	Frequency	Valid %		Frequency	Valid %
< Than 1 Year	1	.7	Very Low	1	.7
1-2 Years	2	1.4	Low	2	1.4
2-3 Years	5	3.6	Moderate	53	37.6
3-5 Years	16	11.5	High	53	37.6
> than 5 Years	115	82.7	Very High	32	22.7
Response: 139 (98.6%) Missing: 2 (1.4%)			Response: 141 (100%)		

Nearly 39% of the educators used TENET while 61.2% stated they did not use TENET. As shown in Table 11, educators (7%) marked that they did not use any other networks. Respondents primarily used America Online, Southwestern Bell, Flashnet, and other networks (90.1% total).

Table 11
Frequency Responses for Network Use

Tenet Use (N=139)			Other Networks (N=138)		
	Frequency	Valid %		Frequency	Valid %
Yes	54	38.8	Yes	128	90.1
No	85	61.2	No	10	7.0
Response: 139 (98.6%) Missing: 2 (1.4%)			Response: 138 (97.9%) Missing: 3 (2.1%)		

Analysis for Hypothesis One

Education and Position

The first hypothesis tested was:

Socioeconomic status as evidenced by education and position will influence the use of CMC.

The dependent variables were survey questions C-11, C-12 (frequency and length of online sessions), and C-13 (features used) were used as indicators of CMC use. Questions C-11 asked respondents how frequently they used the Internet, ranging from less than once a week to more than twice a day. Question C-12 asked how long the online sessions lasted, ranging from 10 minutes or less to more than 60 minutes. C-11 and C12 also gave respondents the opportunity to choose from "don't use." Question C-13 asked respondents whether they used e-mail, news and announcements, search engines, chat forums, Internet resources and bookmarks.

Questions A-3 (Which best describes your education), B-5 (How many non-mandatory workshops have you attended within the last year?), B-6 (How many professional conferences have you attended within the last year?), and B-7 (How many professional journals do you read?) were the four independent variables describing education. Question A-4 asked respondents about their position: teacher, campus administrator, central administrator, educational aide, professional support, auxiliary staff, or other.

Education

Education was a socioeconomic status variable hypothesized to influence the use of CMC. Regression analysis measurements were used with the variables of formal and continuing education and the usage of CMC, frequency, time, and Internet features.

Table 12, shows the regression of frequency of CMC based on four independent variables. Three variables for education were found significant predictors of frequency of CMC use. Table 12 shows formal education, ($t=2.802$, $p<.006$), workshop attendance, ($t=2.339$, $p<.021$), and reading professional journals, ($t=3.036$, $p<.003$) as significant predictors. More education resulted in higheer use of CMC in each case..

Table 12
Regression Analysis for Education and Frequency of Internet Usage

	Unstandardized Coefficients		Standardized Coefficients				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.544	1.165		1.326	.187	240	.057
Education Level	0.854	0.305	.240	2.802	.006**		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	3.637	.516		7.055	.000	.207	.043
Workshop Attendance	0.438	.187	0.207	2.339	.021**		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	4.043	.463		8.728	.000	.147	.022
Professional Conference	0.366	0.218	0.147	1.681	0.095		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	3.333	0.499		6.679	.000	.259	.067
Professional Journals	0.63	.208	.259	3.036	.003**		

Time

For the dependent variable of time as noted in Table 13, only workshop attendance ($t=2.739$, $p<.007$) was a significant predictor of whether or not a person stayed online for a long time each session. The prediction was in the direction of workshop attendees tending to stay online for extended sessions.

Table 13
Regression Analysis for Education and Time

	Unstandardized Coefficients		Standardized Coefficients				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	3.695	1.105		3.343	.001	.023	.001
Education Level	-0.077	0.289	-0.023	-0.265	0.791		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	2.185	.469		4.660	.000	0.241	0.058
Workshop Attendance	0.466	0.17	0.241	2.739	0.007		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	3.129	0.431		7.256	.000	.060	.004
Professional Conferences	0.138	0.203	0.06	0.681	0.497		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	3.288	0.471		6.974	.000	0.018	.000
Professional Journals	0.0393	0.196	0.018	0.2	0.842		

Features that the Internet provides (e-mail, news, and announcements, search engines, chat forums, Internet resources, and bookmarks) are used at a variety of formal levels for CMC. Six tables with regression measurements of Internet feature usage and the four independent variables of education follow. Table 14 shows the regression results for the first Internet features, e-mail. Neither the level of formal education, nor

workshop attendance, nor conference attendance, nor professional journal readership show any influence on the use of e-mail for CMC shown on Table 14.

Table 14
Regression Analysis for Education and E-mail Usage

	Unstandardized Coefficients		Standardized Coefficients				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.101	.224		4.903	.000	.043	.002
Education Level	-0.02868	0.059	-0.043	-0.488	0.626		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	0.889	.098		9.106	.000	.109	.012
Workshop Attendance	0.04303	0.035	0.109	1.215	0.227		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.880	.087		10.095	.000	.122	0.015
Professional Conference	0.05716	0.041	0.122	1.393	0.166		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.011	.097		10.396	.000	.018	.000
Professional Journals	-0.008	0.04	-0.018	-0.204	0.839		

Table 15 was the regression measurement for news and announcement usage. Level of education did not appear to have any significant influence on the use of news and announcement.

Table 15
Regression Analysis for Education and News and Announcement Usage

	Unstandardized Coefficients		Standardized Coefficients				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.907	.548		1.655	.100	.039	.002
Education Level	-6.436E-02	.143	-.039	-.449	.654		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.537	.243		2.211	.029	.062	.004
Workshop Attendance	6.080E-02	.088	.062	.690	.491		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.684	.214		3.195	.002	.007	.000
Professional Conference	-7.532E-03	.101	-.007	-.075	.941		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.682	.237		2.874	.005	.008	.000
Professional Journals	-9.167E-03	.099	-.008	-.093	.926		

As shown in Table 16, the use of search engines could not be well predicted from level of education. The regression of coefficients for extent of search engine usage was non significant for any of the predictors of formal education, workshop attendance, professional conference attendance, and professional journal readership. Table16 summarizes these findings.

Table 16
Regression Analysis for Education and Search Engine Usage

	Unstandardized		Standardized				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.959	.272		3.524	.001	.003	.000
Education Level	2.689E-03	.071	.003	.038	.970		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.027	.122		8.414	.000	.047	.002
Workshop Attendance	-2.304E-02	.044	-.047	-.520	.604		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.995	.106		9.354	.000	.023	.001
Professional Conference	-1.329E-02	.050	-.023	-.265	.791		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.994	.118		8.435	.000	.020	.000
Professional Journals	-1.086E-02	.049	-.020	-.222	.825		

As shown in Table 17, Chat Forum Usage could not be well predicted from any of the four measures of education.

Table 17
Regression Analysis for Education and Chat Forum Usage

	Unstandardized Coefficients		Standardized Coefficients				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	0.574	0.598		0.96	0.339	0.014	0
Education Level	-0.02474	0.157	-0.014	-0.158	0.875		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	0.167	.265		.630	.530	.121	0.015
Workshop Attendance	.129	0.096	0.121	1.343	0.182		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	0.475	.234		2.032	0.044	0.004	.000
Professional Conference	4.874E-03	0.11	0.004	0.044	0.965		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	0.385	0.259		1.488	.139	.036	0.001
Professional Journals	0.04422	0.108	0.036	0.411	0.682		

Similarly, as shown in Table 18 the education measures employed were found good predictors of breadth of Internet resource usage.

Table 18
Regression Analysis for Education and Internet Resources Usage

	Unstandardized Coefficients		Standardized Coefficients				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.053	.368		2.861	.005	.007	.000
Education Level	-0.0079	0.096	-0.007	-0.082	0.935		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.085	.165		6.572	.000	.036	.001
Workshop Attendance	-0.0236	.060	-.036	-.394	.694		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.007	0.138		7.286	.000	0.001	.000
Professional Conference	4.431E-04	0.065	0.001	0.007	0.995		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	0.967	.159		6.078	.000	.033	.001
Professional Journals	0.0247	0.066	0.033	0.373	0.71		

The relationship between education and bookmark usage in Table 19 does not show any significance. Neither the level of formal education, nor workshop attendance, nor conference attendance, nor extent of professional journal readership was a strong predictor of whether or not an educator made extensive use of bookmarks. Bookmark usage could not be predicted from the education of the educators. Table 19 shows no significance for these variables.

Table 19
Regression Analysis for Education and Bookmarks Usage

	Unstandardized Coefficients		Standardized Coefficients				
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	1.067	.333		3.209	.002	.045	.002
Education Level	-4.410E-02	.087	-.045	-.507	.613		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.837	.148		5.665	.000	.043	.002
Workshop Attendance	2.554E-02	.054	.043	.476	0.635		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.821	.130		6.317	.000	.058	.003
Professional Conference	4.032E-02	.061	.058	.659	.511		
	B	Std. Error	Beta	t	Sig.	Model R	R Square
(Constant)	.917	.144		6.366	.000	.011	.000
Professional Journals	-7.724E-03	.060	-.011	-.129	.898		

Independent samples T-test performed on pairs of means revealed that many Internet features were significantly different in frequency of use from each other. For example, chat mean = 1.11) frequency of use had a mean rating of use significantly lower than news and announcements ($f=2.64$, $p< .01$) and all other Internet features. However, despite a wide range of usage of Internet features, none of the independent variables of formal education, workshop attendance, professional conference attendance, or the reading of professional journals showed any signs of predictive value for usage of Internet features for CMC, no matter whether they were relatively popular or unpopular among the participants in this study.

Table 20
Mean for Internet Feature Usage

	N	Mean	SD
E-mail Usage	138	1.94	.23
Search Engine Usage	137	1.90	.30
Internet Resources Usage	130	1.88	.32
Bookmarks Usage	135	1.83	.38
News and Announcement Usage	126	1.37	.49
Chat Forums Usage	122	1.11	.31

Shown in Table 20, the users were highly homogeneous in their use of the Internet for CMC. They were most alike in their use of e-mail (SD = .23) and least alike in their use of news and announcements (SD = .49). News and announcements and chat forums had the lowest means and the least number of respondents.

Position and CMC Usage

How often educators used the Internet (Frequency of Use), was measured in a crosstabulation with Professional Position as the independent variable. A partial overview of the logon habits of educators is presented in Table 21. The scale went from less than once a week to more than twice a day. Four teachers did not logon.

Table 21
Crosstabulation Measurements for Position and Frequency of Internet Usage

Teacher: Depth of Internet Usage – Frequency (N=131)		0	< Once A Week	1-2 Times A Week	3-4 Times A Week	5-6 Times A Week	Once A Day	Twice A Day	> Twice A Day	Total	Mean Score	T	Sig
Other	Count			7	7	4	12	7	22	59	5.20 (SD 1.80)		
% within Teacher				11.9%	11.9%	6.8%	20.3%	11.9%	37.3%	100.0%			
Teacher	Count	3	4	11	8	8	9	12	17	72	4.42 (SD 2.17)	-2.156	.031*
% within Teacher		4.2%	5.6%	15.3%	11.1%	11.1%	12.5%	16.7%	23.6%	100.0%			
Campus Administrator: Depth of Internet Usage - Frequency (N=131)													
		0	< Once A Week	1-2 Times A Week	3-4 Times A Week	5-6 Times A Week	Once A Day	Twice A Day	> Twice A Day	Total	Mean Score	T	Sig
Other	Count	3	4	16	13	10	15	19	36	116	4.79 (SD 2.09)		
% within Camp. Admin.		2.6%	3.4%	13.8%	11.2%	8.6%	12.9%	16.4%	31.0%	100.0%			
Camp. Ad.	Count			2	2	2	6		3	15	4.60 (SD 1.64)	-.717	.473
% within Camp. Ad.				13.3%	13.3%	13.3%	40.0%		20.0%	100.0%			

* Significant at $p < .05$ ** Significant at $p < .01$

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Table 21
Crosstabulation Measurements for Position and Frequency of Internet Usage

Central Administrator: Depth of Internet Usage - Frequency (N=131)													
		0	< Once A Week	1-2 Times A Week	3-4 Times A Week	5-6 Times A Week	Once A Day	Twice A Day	> Twice A Day	Total	Mean Score	T	Sig
Other	Count	3	4	15	12	11	18	15	35	113	4.77 (SD 2.07)		
% within Cent. Ad.		2.7%	3.5%	13.3%	10.6%	9.7%	15.9%	13.3%	31.0%	100.0%			
Cent. Ad.	Count			3	3	1	3	4	4	18	4.78 (SD 1.86)	-.177	.860
% within Cent. Ad.				16.7%	16.7%	5.6%	16.7%	22.2%	22.2%	100.0%			
Professional Support: Depth of Internet Usage - Frequency (N=131)													
		0	< Once A Week	1-2 Times A Week	3-4 Times A Week	5-6 Times A Week	Once A Day	Twice A Day	> Twice A Day	Total	Mean Score	T	Sig
Other	Count	3	4	16	13	11	18	16	24	105	4.50 (SD 2.04)		
% within Pro. Supp.		2.9%	3.8%	15.2%	12.4%	10.5%	17.1%	15.2%	22.9%	100.0%			
Pro Support	Count			2	2	1	3	3	15	26	5.85 (SD 1.69)	3.272	.001
% within Pro. Supp.				7.7%	7.7%	3.8%	11.5%	11.5%	57.7%	100.0%			

* Significant at $p < .05$ ** Significant at $p < .01$

As shown in Table 21, Professional Support (57.7%) was the most frequent user group of the Internet, using the Internet more than twice a day. Participants in this group typically accessed the Internet more than twice a day. All groups used the Internet at least once to twice a week. Central Administration's most frequent category use as a group (44.4%) was clustered around twice to more than twice a day. The most common category for campus administrators (40%) was use of the Internet once a day. Except for the low and high-end scores, teachers were the only ones divided relatively evenly across the spectrum. The largest cluster for teachers was 23.6% at more than twice a day.

The frequency of Internet usage can be summarized by looking at the group means and the standard deviation for each. Respondents could choose from a scale of 1 – 7, with 7 indicating the highest score (see Table 21 for choices). Teachers had the highest deviation (2.14) which was consistent with their range of frequency being across the scale, including the choice "Don't Use." Campus administrators had the lowest standard deviation, 1.64. Table 22 shows the range of the means in descending order.

Table 22
Means for Frequency of Internet Usage

Professional Position	Mean	N	Std. Deviation
Professional Support	5.85	26	1.69
Central Admin	4.78	18	1.86
Campus Admin	4.60	15	1.64
Teacher	4.53	72	2.14
Total	4.83	131	2.02

Professional support, shown in Table 22, was the group that used the online feature most often (mean=5.85, SD 1.69), almost twice a day. Central administrators

(mean = 4.78, SD 1.86), logged on almost once a day. Teachers had a mean of 4.53 (SD = 2.14) and their frequency of getting online was more similar to campus administrators than any other professional group. Campus administrators' mean was equal to 4.60 (SD = 1.64).

The dependent variable of time online was another measure of whether the respondents' position could predict time spent using the Internet for CMC. Table 23 shows each professional group has its own pattern of use how long their online sessions lasted.

Time online was significant for campus administrators ($t=2.752$, $p<.006$. Sessions were between 21 and 40 minutes for the largest group with another group (20%) between 51-60 minutes. Professional support ($t=-2.377$, $p<.018$) was significant in the time factor. They mostly (34.6%) went on line for short periods of time minutes. These results establish that position did have different patterns of usage

A summary of the length of time each educator group spent online can be seen in Table 23 where the means are arranged in descending order.

Table 23
Mean for Depth of Internet Usage

Professional Position	Mean	N	Std. Deviation
Campus Admin	4.53	15	1.60
Teacher	3.60	72	1.93
Professional Support	2.73	26	1.54
Central Admin	2.67	18	1.85
Total	3.40	131	1.88

Campus administrators was the group with the highest mean shown in Table 23. Their mean of 4.53 (SD = 1.60) suggests the length of their online sessions were more

than 40 minutes. Teachers had a mean of 3.60 (SD = 1.93) implying their online sessions lasted about 31 minutes. This group had four respondents that answered "Don't Use" on the survey. Professional support had sessions that lasted around 21 minutes (mean=2.73, SD 1.54). They had the second lowest standard deviation after campus administrators. They had the lowest standard deviation after campus administrators. The group with the lowest mean was central administrator (mean=2.67, SD=1.85). Their online sessions, like professional support, were about 21 minutes in length.

Position and Internet Usage

Crosstabs with Kendall's tau-b nonparametric correlations were used to assess each of the Internet features and position. The prompt asked them whether they had used the Internet over the past two weeks. Their choice was "1" for no and "2" for yes. Teachers and campus administrators were most alike in use of e-mail as shown in Table 24. Significant users were the administrators and the professional support. For the use of e-mail, the null version of hypothesis one was rejected. Position did make a difference.

Table 24
Crosstabulation Measurements for Position and Time

Teacher: Depth of Internet Usage – Time (N=131)

		0	10 Min. & <	11-20 Min.	21-30 Min.	31-40 Min.	41-50 Min.	51-60 Min.	> 60 Min.	Total	Mean Score	T	Sig
Other	Count		11	15	12	8	4	5	4	59	3.17 (SD 1.81)		
% within Teacher			18.6%	25.4%	20.3%	13.6%	6.8%	8.5%	6.8%	100.0%			
Teacher	Count	4	6	11	14	17	7	5	8	72	3.60 (SD 1.93)	1.561	.119
% within Teacher		5.6%	8.3%	15.3%	19.4%	23.6%	9.7%	6.9%	11.1%	100.0%			

Campus Administrator: Depth of Internet Usage - Time (N=131)

		0	10 Min. & <	11-20 Min.	21-30 Min.	31-40 Min.	41-50 Min.	51-60 Min.	> 60 Min.	Total	Mean Score	T	Sig
Other	Count	4	17	25	22	22	9	7	10	116	3.26 (SD 1.87)		
% within Camp. A.		3.4%	14.7%	21.6%	19.0%	19.0%	7.8%	6.0%	8.6%	100.0%			
Camp. Ad.	Count			1	4	3	2	3	2	15	4.53 (SD 1.60)	2.752	.006*
% within Camp. Ad.				6.7%	26.7%	20.0%	13.3%	20.0%	13.3%	100.0%			

* Significant at $p < .05$ ** Significant at $p < .01$

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Table 24
Crosstabulation Measurements for Position and Time

Central Administrator: Depth of Internet Usage - Time (N=131)

		0	10 Min. & <	11-20 Min.	21-30 Min.	31-40 Min.	41-50 Min.	51-60 Min.	> 60 Min.	Total	Mean Score	T	Sig
Other	Count	4	11	21	24	23	10	9	11	113	3.52 (SD 1.87)		
% within Cent. Ad.		3.5%	9.7%	18.6%	21.2%	20.4%	8.8%	8.0%	9.7%	100.0%			
Cent. Ad.	Count		6	5	2	2	1	1	1	18	2.67 (SD 1.85)	-1.923	.054
% within Cent. Ad.			33.3%	27.8%	11.1%	11.1%	5.6%	5.6%	5.6%	100.0%			

Professional Support: Depth of Internet Usage - Time (N=131)

		0	10 Min. & <	11-20 Min.	21-30 Min.	31-40 Min.	41-50 Min.	51-60 Min.	> 60 Min.	Total	Mean Score	T	Sig
Other	Count	4	12	17	20	22	10	9	11	105	3.57 (SD 1.93)		
% within Pro. Supp.		3.8%	11.4%	16.2%	19.0%	21.0%	9.5%	8.6%	10.5%	100.0%			
Pro Support	Count		5	9	6	3	1	1	1	26	2.73 (SD 1.54)	-2.366	.018*
% within Pro. Supp.			19.2%	34.6%	23.1%	11.5%	3.8%	3.8%	3.8%	100.0%			

* Significant at $p < .05$ ** Significant at $p < .01$

Six tables follow to summarize the findings of Internet Feature Usage. Table 25 contains the finding for position by e-mail usage.

Two professional groups were significantly different from the others in e-mail usage when all others were combined to form the comparison group. Table 25 shows that central administrators and professional support personnel were high e-mail users. Both groups had a mean of 2.00 (SD=.00) indicating that 100% of the respondents in those groups used e-mail. Teachers (91.5%) were lowest in e-mail usage but campus administrators (92.9%) were slightly higher. For the use of e-mail, hypothesis one was accepted. Position did make a difference.

Table 25
Crosstabulation Measurements for Position and E-mail Usage

				Total	Mean	T	Sig
Teacher: E-mail Usage (N128)							
		No	Yes				
Other	Count	1	56	57	1.98 (SD=.13)		
	Row %	1.8%	98.2%	100.0%			
Teacher	Count	6	65	71	1.92 (SD= (.28)	-.1.794	.073
	Row %	8.5%	91.5%	100.0%			
Campus Administrator: E-mail Usage (N 128)							
		No	Yes				
Other	Count	6	108	114	1.95 (SD =.22)		
	Row %	5.3%	94.7%	100.0%			
Campus	Count	1	13	14	1.93 (SD=.27)	-.261	.794
	Row %	7.1%	92.9%	100.0%			
Central Administrator: E-mail Usage (N 128)							
		No	Yes				
Other	Count	7	103	110	1.94 (SD=.25)		
	Row %	6.4%	93.6%	100.0%			
Central	Count		18	18	2.00 (SD=.00)	2.446	.014 *
	Row %		100.0%	100.0%			
Professional Support: E-mail Usage (N 128)							
		No	Yes				
Other	Count	7	96	103	1.93 (SD=.25)		
	Row %	6.8%	93.2%	100.0%			
Pro Support	Count		25	25	2.00 (SD=.00)	2.568	.010 **
	Row %		100.0%	100.0%			

* Significant at $p < .05$ ** Significant at $p < .01$

Central Administrators ($t=2.010$, $p <.05$) was the only group that was significantly different from the others in using news and announcements. As shown in Table 26, they used news and announcements (mean =1.61, SD=.50) more compared

with the others who had a combined mean of 1.34 (SD =.48). Use of news and announcements on the Internet was generally low, ranging from 27.3% for campus administrators to 63.6 % for professional support. The low users shown in Table 26 were campus administrators (27.3%) and teachers (34.8%). For the use of the Internet feature News and Announcement, hypothesis one was accepted. Position did make a difference.

Table 26
Crosstabulation Measurements for Position and News and Announcement Usage

Teacher / News and Announcement Usage (N 117)								
			News and Announcement Usage		Total	Mean Score	T	Sig
			No	Yes				
Teacher	Other	Count	29	22	51	1.43 (SD=.50)		
		Row %	56.9%	43.1%	100.0%			
	Teacher	Count	43	23	66	1.35 (SD=48)	-.912	.362
		Row %	65.2%	34.8%	100.0%			
Campus Administrators / News and Announcement Usage (N 117)								
			News and Announcement Usage		Total	Mean Score	T	Sig
			No	Yes				
Campus Admin	Other	Count	64	42	106	1.40 (SD=.49)		
		Row %	60.4%	39.6%	100.0%			
	Campus Admin	Count	8	3	11	1.27 (SD=.47)	-.846	.397
		Row %	72.7%	27.3%	100.0%			
Central Administrator / News and Announcement Usage (N 117)								
			News and Announcement Usage		Total	Mean Score	T	Sig
			No	Yes				
Central Admin	Other	Count	65	34	99	1.34 (SD=.48)		
		Row %	65.7%	34.3%	100.0%			
	Central Admin	Count	7	11	18	1.61 (SD=.50)	2.010	.044*
		Row %	38.9%	61.1%	100.0%			
Professional Support / News and Announcement Usage (N 117)								
			News and Announcement Usage		Total	Mean Score	T	Sig
			No	Yes				
Prof Support	Other	Count	58	37	95	1.39 (SD=.49)		
		Row %	61.1%	38.9%	100.0%			
	Professional Support	Count	14	8	22	1.36 (SD=.49)	-.226	.821
		Row %	63.6%	36.4%	100.0%			

* Significant at $p < .05$

Use of search engines was homogeneous in nature as it ranged from 88.2 % for professional support and central administrators to 88.7 % for teachers as shown in Table 27. Professional support personnel ($t=3.300$, $p<.01$) was the only group that was

significantly different from the others. Their mean score was 2.00 (SD=.00) indicating that all of them used search engines in comparison with the others who had a mean score of 1.88 (SD=.32). For Search Engine Usage hypothesis one was accepted. There was a difference in position and usage of search engines.

Table 27
Crosstabulation Measurements for Position and Search Engine Usage

Teacher * Search Engine Usage (N 127)								
			Search Engine Usage		Total	Mean Score	T	Sig
			No	Yes				
Teacher	Other	Count	4	52	56	1.93 (SD=.26)		
		Row %	7.1%	92.9%	100.0%			
	Teacher	Count	8	63	71	1.89 (SD=.32)	-.810	.418
		Row %	11.3%	88.7%	100.0%			
Campus Admin * Search Engine Usage (N 127)								
			Search Engine Usage		Total	Mean Score	T	Sig
			No	Yes				
Campus Admin	Other	Count	10	103	113	1.91 (SD=.29)		
		Row %	8.8%	91.2%	100.0%			
	Campus Admin	Count	2	12	14	1.86 (SD=.36)	-.555	.579
		Row %	14.3%	85.7%	100%			
Central Admin * Search Engine Usage (N 127)								
			Search Engine Usage		Total	Mean Score	T	Sig
			No	Yes				
Central Admin	Other	Count	10	100	110	1.91 (SD=.29)		
		Row %	9.1%	90.9%	100%			
	Central Admin	Count	2	15	17	1.88 (SD=.33)	.-322	.747
		Row %	11.8%	88.2%	100%			
Prof Support * Search Engine Usage (N 127)								
			Search Engine Usage		Total	Mean Score	T	Sig
			No	Yes				
Prof Support	Other	Count	12	90	102	1.88 (SD=.32)		.
		Row %	11.8%	88.2%	100.0%			
	Prof Support	Count		25	25	2.00 (SD=.00)	3.300	.001**
		Row %		100.0%	100.0%			

**Significant at $p < .01$

Chat forum usage was the Internet feature that received the least responses, 114 out of a possible 131 respondents as shown in Table 28. The means ranged from 1.05 for professional support to 1.10 for campus administrators indicating it was not used as much as the other features. Standard deviations were small, .22 to .34. No groups showed any significant usage. For Chat Forum Usage, hypothesis one was rejected. Position did not make a difference when it came to using chat forums.

Table 28
Crosstabulation Measurements for Position and Chat Forums Usage

			Chat Forums Usage		Total	Mean	T	Sig
Teacher / Chat Forums Usage (N=114)								
			No	Yes				
Teacher	Other	Count	43	3	46	1.07 (SD=.25)		
		Row %	93.5%	6.5%	100.0%			
	Teacher	Count	59	9	68	1.13 (SD=.34)	1.222	.222
		Row %	86.8%	13.2%	100.0%			
Campus Administrator/ Chat Forums Usage (N=114)								
			Chat Forums Usage		Total	Mean	T	Sig
			No	Yes				
Campus	Other	Count	93	11	104	1.11 (SD=.31)		
		Row %	89.4%	10.6%	100%			
	Campus	Count	9	1	10	1.10 (SD=.32)	-.058	.954
		Row %	90.0%	10.0%	100%			
Central Administrators / Chat Forums Usage (N=114)								
			Chat Forums Usage		Total	Mean	T	Sig
			No	Yes				
Central	Other	Count	88	11	99	1.11 (SD=.32)		
		Row %	88.9%	11.1%	100.0%			
	Central	Count	14	1	15	1.07 (SD=.26)	-.615	.539
		Row %	93.3%	6.7%	100.0%			
Professional Support * Chat Forums Usage (N=114)								
			Chat Forums Usage		Total	Mean	T	Sigi
			No	Yes				
Prof	Other	Count	82	11	93	1.12 (SD=.32)		
		Row %	88.2%	11.8%	100.0%			
	Prof	Count	20	1	21	1.05 (SD=.22)	.-1.212	.225
		Row %	95.2%	4.8%	100.0%			

Table 29 shows a significant difference for teachers and campus administrators. Teachers ($t= -2.66$, $p<.05$) used Internet resources less than the other groups. Others

used the Internet resources 94.4% of the time while teachers used it 82.4% of the time according to Table 29. Campus administrators ($T=3.082$, $p<.01$) used Internet resources 100% of the time versus the others who used it 86.1% of the time. Thus, there is a tendency that campus administrators make more use of Internet resources than any other group. Professional educators did differ significantly in their use of Internet Resources. Therefore, for Internet Resources the hypothesis one was accepted.

Table 29
Crosstabulation Measurements for Position and Internet Resources Usage

			Internet Resources		Total	Mean	T	Sig
Teacher * Internet Resources Usage (N=122)								
			No	Yes				
Teacher	Other	Count	3	51	54	1.94 (SD=.23)		
		Row %	5.6%	94.4%	100.0%			
	Teacher	Count	12	56	68	1.82 (SD=.38)	-2.166	.030*
		Row %	17.6%	82.4%	100.0%			
Campus Administrators * Internet Resources Usage (N=122)								
			Internet Resources		Total	Mean	T	Sig
			No	Yes				
Campus	Other	Count	15	93	108	1.86 (SD=.35)		
		Row %	13.9%	86.1%	100.0%			
	Campus	Count		14	14	2.00 (SD=.00)	3.082	.002**
		Row %		100.0%	100.0%			
Central Administrator / Internet Resources Usage (N=122)								
			Internet Resources		Total	Mean	T	Sig
			No	Yes				
Central	Other	Count	13	94	107	1.88 (SD=.33)		
		Row %	12.1%	87.9%	100.0%			
	Central	Count	2	13	15	1.87 (SD=.35)	-.127	.899
		Row %	13.3%	86.7%	100.0%			
Professional Support * Internet Resources Usage (N=122)								
			Internet Resources		Total	Mean	T	Sig
			No	Yes				
Prof	Other	Count	14	83	97	1.86 (SD=.35)		
		Row %	14.4%	85.6%	100.0%			
	Prof	Count	1	24	25	1.96 (SD=.20)	1.905	.057
		Row %	4.0%	96.0%	100.0%			

* Significant at $p < .05$ ** Significant at $p < .01$

As shown in Table 30, there was no evidence that position makes a difference when using bookmarks. Professional educators did not differ significantly in their bookmark usage. Therefore, hypothesis one was rejected for this measure.

Table 30
Crosstabulation Measurements for Position and Bookmark Usage

Teacher / Bookmark Usage (N=126)								
			Bookmark Usage		Total	Mean Score	t	Sig
			No	Yes				
Teacher	Other	Count	9	47	56	1.84 (SD=.37)		
		Row %	16.1%	83.9%	100.0%			
	Teacher	Count	14	56	70	1.80 (SD=.40)	-.573	.566
		Row %	20.0%	80.0%	100.0%			
Campus Administrators / Bookmarks Usage (N=126)								
			Bookmarks Usage		Total	Mean Score	t	Sig
			No	Yes				
Campus Admin	Other	Count	19	93	112	1.83 (SD=.38)		
		Row %	17.0%	83.0%	100.0%			
	Campus Admin	Count	4	10	14	1.71 (SD=.47)	-.904	.366
		Row %	28.6%	71.4%	100.0%			
Central Administrators / Bookmarks Usage (N=126)								
			Bookmarks Usage		Total	Mean Score	t	Sig
			No	Yes				
Central Admin	Other	Count	21	88	109	1.81 (SD=.40)		
		Row %	19.3%	80.7%	100.0%			
	Central Admin	Count	2	15	17	1.88 (SD=.33)	.853	.394
		Row %	11.8%	88.2%	100.0%			
Professional Support / Bookmarks Usage (N=126)								
			Bookmarks Usage		Total	Mean Score	t	Sig
			No	Yes				
Prof Support	Other	Count	20	81	101	1.80 (SD=.40)		
		Row %	19.8%	80.2%	100.0%			
	Prof Support	Count	3	22	25	1.88 (SD=.33)	1.015	.310
		Row %	12.0%	88.0%	100.0%			

Analysis for Hypothesis Two

Place of employment, geographic location, and district size were used as variables to test whether these three items had influence on use of CMC. Place of employment was selected with personal knowledge that campus and central administrators and professional support have easier access and funds to invest in CMC technology, beginning with the purchase of the hardware to having a telephone line in the room. District size was chosen to test whether larger or smaller districts had the organizational climate such as support, finances, personnel, and the like to encourage use of CMC. Geographic location was a variable partly based on Rogers (1995) Diffusion of Innovation Theory and social learning theory. According to Rogers (1995), "the social learning approach looks outside the individual at specific type of information exchanges with others to explain how behavior changes"(p.330). Rogers believes communications with other individuals and network links are explanations of how individuals alter their behavior. These patterned flows of information from the individual's network links aide in the adoption of innovations. Knowing that TENET's headquarters were in Austin, Texas, the though that knowledge of this service would be localized and then slowly spread through the state, through those individuals that had connections to people associated to TENET was brought to mind by Rogers theory. Additionally, there was a question whether the sample would be geographically diverse.

Hypothesis two was as follows:

There are significant differences in use and nonuse of CMC among places of employment, geographic location, and district size.

Use versus nonuse of CMC was measured by C-11, C-12 (Frequency and Time) and C-13 (Internet Features). Survey question A-5, employment, A-6, Education Service Center Region membership, and A-7, district enrollment, were used as measures of employment, geographic location, and district size.

Three tests were carried out to test for significance. Correlations were computed between place of employment and measures of frequency, time and Internet Features. Geographic location and district size were tested with a one way ANOVA partitioning each of these variables into two categories, to increase cell size. No significant associations were found for employment, and only one significant relationship, geographic location. News and Announcement Usage was significantly different ($F=4.737$, ax117 df, $p<.03$) for major urban areas versus other geographic locations. Based on these findings, the null hypothesis version of hypothesis tow could not be rejected. There is little evidence that employment, geographic location, or district size made a difference in CMC usage.

Analysis for Hypothesis Three

Organizational vitality, adopter resources, and instrumentality were defined through the literature review as positively influencing the use of CMC. Would this also be true of educators working in the public schools? Hypothesis number three was developed to investigate this question:

H 3 Breadth and depth of usage are positively influenced by:

a. Organization vitality
b. Adopter resources
c. Instrumentality

Measurements of frequency (C-11) and time (C-12) measured depth, measurements of Internet features usage (C-13) measured breadth. Multiplying time by frequency formed a new variable, Sum Depth.

To test for organizational vitality, survey questions C-3, C-8, and C-9 were correlated with each variable named above. Question C-3 asked about the availability of networks – LANs, WANs, and Internet availability in the workplace. The availability of networks was indexed by counting the number of LANs, WANs, and Internet connections reported at work. C-8 asked the location of the computer used most often to connect to the Internet and C-9 asked about the location of the computer at work.

To test the strength of Adopter Resources, questions B-1, B-2, B-3, C-1, C-2, C-6, and C-7 were correlated with the depth and breadth variables. B-1 asked whether the respondents used a computer. B-2 asked how long they had been using computers and B-3 asked how confident they were with computers. C-1 determined whether respondents used TENET and C-2 asked whether they used other networks. Respondents were asked how long they had been using the Internet in question C-6 and how confident they were in using the Internet in question in question C-7.

Survey question C-14, E-3, and F-1 were the questions used to measure Instrumentality. These were correlated with the measurements of usage ¾ frequency, time, and Internet features usage. C-14 asked how many people used the Internet at work. Professional communications were the subject for E-3 and F-1 asked about the importance of the Internet, professionally, to the respondent.

Organization Vitality

Organization Vitality was measured with survey questions asking educators about conditions for network use in the workplace. Out eleven variables, five were significantly correlated with frequency of accessing the Internet as shown in Table 31. The highest correlation addressed whether the connections that individuals had at work were in the same room or not. Internet Connection at Work (Kendall's tau, =-.402, p <.000), was significantly correlated with Frequency, suggesting that if the computer was in the same room at work, the frequency of use increased. Sum Networks (Kendall's tau = .209, p<.004), was significantly associated with the frequency of getting online. Those respondents whose organizations had more networks more frequently accessed the Internet. Additionally, a significant correlation with Frequency was found among respondents in organizations that had computers that were close (Kendall's tau =.205, p<.006), convenient (Kendall's tau, =.248, p<.001), and accessible (Kendall's tau =.224, p<.004).

Table 31
Correlation Measurements for Organization Vitality and Frequency / Time

	Kendall's Tau_b	Depth of Internet Usage - Frequency	Depth of Internet Usage - Time	Sum Depth
Networks	Corr. Coef.	.209**		
	Sig.	.004		
	N	131		
Computer Used Most Often to Connect to Internet	Corr. Coef.			
	Sig.			
	N			
Internet Connection at Work	Corr. Coef	-.402**		-.235**
	Sig.	.000		.001
	N	129		129
Close	Corr. Coef.	.205**		
	Sig.	.006		
	N	126		
Convenience	Corr. Coef.	.248**		.139*
	Sig.	.001		.049
	N	125		125
Accessibility	Corr. Coef.	.224**		
	Sig.	.004		
	N	124		
Self-Taught	Corr. Coef.		.227**	.214**
	Sig.		.003	.003
	N		131	131
Friend Taught	Corr. Coef.			
	Sig.			
	N			
ESC Training	Corr. Coef.			
	Sig.			
	N			
District Training	Corr. Coef.			
	Sig.			
	N			
University Training	Corr. Coef.			
	Sig.			
	N			

* Correlation is significant at the .05 level (2-tailed).
** Correlation is significant at the .01 level (2-tailed).

Who taught respondents to use networks was not significantly related to frequency of usage. Teaching yourself (Kendall's tau, =.227, p<.003) to navigate the Internet correlated strongly with Time but not with Frequency suggesting that self-

taught individuals spent more time on the Internet. No other variable was significantly correlated with Time.

Sum Depth correlated substantially with Internet Connection at Work (Kendall's tau = -.235 p<.001) and with Self-Taught (Kendall's tau =.214, p<.003) as shown in Table 31. It also was associated with Convenience (Kendall's tau =.139, p<.049). Having convenient Internet connections at work and being among those who had taught themselves were positively associated with extent of online usage (frequency of access multiplied by length of time per session).

The hypothesis that depth of Internet usage is positively associated with organizational vitality is partially supported. Frequency correlated significantly with Organization Vitality, whereas Time did not associate as strongly.

Only three measures of Organization Vitality were significantly correlated with use of Internet features. As shown in the Table 32, Internet Feature News and Announcements was associated with (1) District Training (Kendall's tau =-.199, p<.019), (2) Internet Connection at Work was correlated with Internet Resources (Kendall's tau =-.179, p<.36), and (3) Bookmarks (Kendall's tau =-.175, p<.42). These correlations indicated that when the organization provided training, and connections to the Internet, these features would be used. No other associations were found between Organization Vitality and breadth of CMC.

Table 32
Crosstabulation Measurements for Organization Vitality and Internet Features

Networks	Kendall's tau_b	E-mail	News and Announce	Search Engine	Chat Forums	Internet Resources	Book-marks
Most Used Computer for Internet Connect	Corr. Coef						
	Sig.						
	N						
Internet Connection at Work	Corr. Coef.					-.179*	-.175*
	Sig.					.036	.042
	N					129	129
Close	Corr. Coef.						
	Sig.						
	N						
Convenience	Corr. Coef.						
	Sig.						
	N						
Accessibility	Corr. Coef.						
	Sig.						
	N						
Self-Taught	Corr. Coef.						
	Sig.						
	N						
Friend Taught	Corr. Coef.						
	Sig.						
	N						
ESC Training	Corr. Coef.						
	Sig.						
	N						
District Training	Corr. Coef.		-.199*				
	Sig.		.019				
	N		131				
University Training	Corr. Coef.						
	Sig.						
	N						

*Correlation is significant at the .05 level (2-tailed). **Correlation is significant at the .01 level (2-tailed).

Question D-1 asked the respondents about ten items that could be organization sources of problems for them when using networks. Table 33 shows Organization Network Vitality and its relationship with Depth of CMC usage.

Table 33
Correlation Measurements for Organization Network Vitality and Frequency / Time

	- Kendall's tau	Depth of Internet Usage - Frequency	Depth of Internet Usage - Time
Getting to A Computer	Corr. Coef.		
	Sig.		
	N		
Lack of Phone Lines	Corr. Coef.		
	Sig.		
	N		
Lack of Knowledge	Corr. Coef.		
	Sig.		
	N		
Network Difficult to Use	Corr. Coef.	-.155*	
	Sig.	.035	
	N	129	
Lack of Time	Corr. Coef.	-.193**	-.137*
	Sig.	.006	.049
	N	130	130
Relevance to Job	Corr. Coef.	-.164*	
	Sig.	.023	
	N	129	
Lack of Support	Corr. Coef.	-.153*	
	Sig.	.031	
	N	128	
Lack of Financial Resources	Corr. Coef.		
	Sig.		
	N		
Clarity About Goals for Networking in Education	Corr. Coef.		
	Sig.		
	N		
Information How to Implement Networking	Corr. Coef.		
	Sig.		
	N		

** Correlation is significant at the .01 level (2-tailed).
*Correlation is significant at the .05 level (2-tailed).

Four items in Table 33 for Organization Network Vitality were correlated with frequency of use: (1) Network Difficult to Use (Kendall's tau = -.155, p<.035), (2) Lack of time (Kendall's tau = -.193 p<.006), (3) Relevance to Job (Kendall's tau =-.164, p<.023) and (4) Lack of Support (Kendall's tau =-.153 p<.031). The respondents

showed that these items were indeed problematic. The positive interpretation of this finding may be more relevant to the education profession, if CMC is easy to use, educators have time available to use it, CMC is perceived as relevant to the educator's job, and support is provided. Then educators tended to use it. Time as a measure of depth was associated with Lack of Time as a problem (Kendall's tau =-.137, $p<.049$) but not significantly correlated with any other variable. This reemphasizes the crucial component of having time to use CMC.

Very few significant associations were found between measures of Organization Network Vitality and Breadth of CMC Usage. Only the variable Network Difficult to Use was associated with News and Announcement Usage (Kendall's tau = -.172, $p<.032$) underscoring the importance of having a network that is easy to use. All other correlations were non significant.

The first part of hypothesis three, that Organization Vitality is positively associated with depth of CMC usage, is partially supported. Time did not have strong associations with Organization Vitality variables. Frequency, though, had five significantly associations out of eleven. These were for the availability of networks and ease of access to computers. In areas educators believed were Network Vitality problems, again Frequency had more correlations. These problems did not indicate hardware problems, but rather problems in leadership and support.

Adopter Resources

The second part of hypothesis three was to test whether the educator's experiences with computers and access to those computers influenced the use of CMC. Table 34 shows the results of correlation measurements for depth of use.

Table 34
Correlation Measurements for Adopter Resources and Frequency / Time

		Years of Computer Use	Computer Confidence	Yrs Using Internet	Internet Confidence	Tenet Use	Other Networks
Depth of Internet Usage – Frequency	Kendall's tau_b	.252**	.220**	.334**	.312**	.197*	
	Sig.	.001	.002	.000	.000	.012	
	N	129	131	131	131	129	
Depth of Internet Usage – Time	Kendall's tau_b				.320**	.172*	
	Sig.				.000	.026	
	N				131	129	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Adopter Resources have strong correlations with five of the six variables used as indicators of Frequency of Use. Strong associations for Frequency were years of computer use (Kendall's tau =.252; p<.001), computer confidence (Kendall's tau =.220. p<.002**),** Years of Using Internet (Kendall's tau = .334, p<.000), and Internet Confidence (Kendall's tau = .312, p<.000). Those educators experienced and confident were also frequent users.

Time per session on the Internet was associated with two variables, Internet Confidence (Kendall's tau = .226 p<.002), and Tenet use (Kendall's tau =.172, p<.026). For Time, as in Frequency, those educators who were experienced and confident in using the Internet used it for longer periods.

Adopter Resources were generally correlated with use of Internet Features. Years using the Internet were associated with (1) E-mail usage (Kendall's tau .356= p<.000), Search Engine Usage (Kendall's tau = .476, p<.000), and Bookmark Usage (Kendall's tau = .465, p<.000) as seen in Table 35.

A rich indicator of Internet features usage was an educator's confidence in using the Internet. Table 35 shows confident educators use more of the Internet utilities. Confidence using the Internet had the most items (four) associated with it: e-mail, search engine, Internet resources, and bookmark usage.

Users that used other networks such as AOL, had usage that correlated with e-mail, search engines and Internet resources. Tenet users, on the other hand, used bookmarks more and had a lower correlation with e-mail usage.

Table 35
Correlation Measurements for Adopter Resources and Internet Features Usage

		Years of Computer Use	Confidence	Yrs Using Internet	Conf Using Internet	Tenet Use	Other Networks
E-mail Usage	Pearson Correlation					.207*	.299**
	Sig.					.020	.000
	N					126	126
News and Announ Usage	Pearson Correlation						
	Sig.						
	N						
Search Engine Usage	Pearson Correlation			.236**			.318**
	Sig.			.004			.000
	N			131			129
Chat Forums Usage	Pearson Correlation						
	Sig.						
	N						
Internet Resources Usage	Pearson Correlation				.226*		.181*
	Sig.				.012		.037
	N				122		129
Bookmark Usage	Pearson Correlation	.222*	.231*	.465**	.358**	.231**	
	Sig.	.013	.009	.000	.000	.008	
	N	124	126	126	126	129	
Features Sum	Pearson Correlation			.272*	.228**		
	Sig.			.001	.005		
	N			131	131		

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Adopter Resources correlated well with the use of Internet Features. Most of the correlations were with the features that educators would be using professionally.

Instrumentality

Instrumentality was the third dependent variable for hypothesis three, testing depth and breadth of CMC Usage. C-14, E-3, and F-1 were the survey questions used as dependent variables. Question C-14 asked how many people used computers at work. E-3 wanted to know with whom the respondents communicated professionally and how often. Choices for frequency were no contact, monthly, weekly, and daily. F-1 asked about the importance of CMC. The choices were NO! no ??? yes YES!

Twelve dependent variables were correlated with measures of Depth. Table 36 shows frequency correlated with eleven variables. It did not correlated with the number of people using CMC in the work environment. Time correlated with the Internet being important for professional development ($r = .160$, $p < .025$) and with the easing the educator's workload. Time did not associate with any of the other variables.

Table 36
Correlation Measurements for Instrumentality and Frequency / Time

	Kendall's tau_b	Depth of Internet Usage – Frequency	Depth of Internet Usage - Time
People Using Internet at Work	Corr. Coeff.		
	Sig.		
	N		
Professionally Contacted:			
People in Other School in the District	Corr. Coeff.	.293**	
	Sig.	.000	
	N	128	
People at Higher Levels in District	Corr. Coeff.	.248**	
	Sig.	.001	
	N	129	
People at Higher Levels Outside District	Corr. Coeff.	.334**	
	Sig.	.000	
	N	127	
People in Government	Corr. Coeff.	.170*	
	Sig.	.028	
	N	128	
Experts	Corr. Coeff.	.328**	
	Sig.	.000	
	N	128	
Peers	Corr. Coeff.	.388**	
	Sig.	.000	
	N	127	
Professionally Searched Sites for Professional Information	Corr. Coeff.	.351**	
	Sig.	.000	
	N	129	
Internet Is Important:			
In My Job	Corr. Coeff.	.292**	
	Sig.	.000	
	N	130	
For Information	Corr. Coeff.	.244**	
	Sig.	.001	
	N	131	
Professional Development	Corr. Coeff.	.234**	.160*
	Sig.	.001	.025
	N	130	130
Internet Is Important to Ease My Work Load	Corr. Coeff.	.197**	.137*
	Sig.	.005	.048
	N	129	129

** Correlation is significant at the .01 level (2-tailed).
* Correlation is significant at the .05 level (2-tailed).

Internet Features that contribute to job efficiency were significant with instrumentality as shown in Table 37. Using e-mail and news and announcement did

contribute to professional development. Additionally, these two features eased the workload of those that used it. Educators talked with people in other schools in the district, with people at higher levels outside the district and with peers. News and announcements got them in touch with experts, people in government and with those at higher levels outside the district.

Table 37
Correlation Measurements for Instrumentality and Internet Features

	Kendall's tau_b	E-mail Usage	News and Announce Usage	Search Engine Usage	Chat Forums Usage	Internet Resources Usage	Bookmarks Usage
People Using Internet at Work	Correlation Coefficient						
	Sig.						
	N						
Professionally contacted:							
People in Other School in the District	Correlation Coefficient	.200*		.203*			
	Sig.	.016		.014			
	N	125		125			
People at Higher Levels in District	Correlation Coefficient						
	Sig.						
	N						
People at Higher Levels Outside District	Correlation Coefficient	.202*	.267**				
	Sig.	.017	.003				
	N	124	113				
People in Government	Correlation Coefficient		.187*				
	Sig.		.043				
	N		114				
Experts	Correlation Coefficient		.203*				
	Sig.		.024*				
	N		114				
Peers	Correlation Coefficient	.310*		.271**			
	Sig.	.000		.001			
	N	124		124			
Searched Sites for Professional Information	Correlation Coefficient	.315**		.260**			
	Sig.	.000		.002			
	N	126		125			

Continued on next page

	Kendall's tau_b	E-mail Usage	News and Announce Usage	Search Engine Usage	Chat Forums Usage	Internet Resources Usage	Bookmarks Usage
Internet Is Important:							
In My Job	Correlation Coefficient	.216**	.226**				
	Sig.	.010	.009				
	N	127	116				
For Information	Correlation Coefficient		.201*	.213*			
	Sig.		.028	.015			
	N		117	127			
For Professional Development	Correlation Coefficient	.171*	.252**				
	Sig.	.037	.003				
	N	127	116				
To Ease My Work Load	Correlation Coefficient	.167*	.168*		.184*		
	Sig.	.037	.046		.029		
	N	126	115		113		

** Correlation is significant at the .01 level (2-tailed).
* Correlation is significant at the .05 level (2-tailed).

The third part of hypothesis three, Instrumentality, has correlations that are significantly related to using CMC at and for work. In view of this, hypothesis three is supported for Instrumentality.

Organizational vitality, adopter resources, and instrumentality positively influenced the depth and breadth of Internet usage by educators. In particular, observing the associations of Breadth and Depth with the predominance of work-related variables for professional development is notable. Hypothesis three was accepted.

Analysis for Hypothesis Four

The fourth hypothesis was as follows:

Hypothesis four:

Perception of network benefits is positively associated with:

a. Social interaction

b. CMC characteristics

A correlation table was developed to assess the association of Social Interaction with network benefits. Survey questions C-4, E-3 were used as measures of social interaction. Question C-4 asked the respondent how they first became interested in using Internet services. This question asked respondents about the social group that may have influenced their decision to use networks such as friends or colleagues. Question E-3 asked about their social communications on the Internet, such as friends or peers. Benefits of using networks were measured by question E-1. Examples of benefits are "Using networks for entertainment" or "Sending messages in place of phone calls." CMC characteristics were based on Roger's Theory of Innovation. An innovation possesses qualities that make it worthwhile to investigate and make an adoption decision based on its merit to the user. These qualities are relative advantage, compatibility complexity, trialability and observability and are further explained in Table XX in Chapter 2. A correlation measure was completed between benefits (E-1) and CMC characteristics (F-2).

Social Interaction

The correlation between each eleven measures of network benefits and the eight measures of social interactions are shown in Table 38. Socially Searched the Web for Personal Information and Socially Searched Web Sites for Entertainment were two network benefit variables that seemed to measure the same items, though the latter had eight associations while the former had six. The two variables that did not relate to

personal information were variables that were more directly related to entertainment, Interesting Things to Talk About and Pass the Time. Find Out about Events I'm Interested In ($r = .197$, $p < .025$), and Exchange Information and Advice ($r = .270$, $p < .002$) were slightly higher when educators were searching the web for personal information than when they were searching for entertainment. Searching the Web for Entertainment associated with those items usually considered entertainment (Use of Networks for Entertainment ($r = .282$ $p < .001$), Use of Networks for Interesting Things to Talk ($r = .197$, $p < .025$), Take a Pleasant Break From Work ($r = .333$, $p < .000$), and Meet People ($r = .306$, $p < .000$).

Sending messages in place of telephone calls correlated with contacting friends, family, and peers. Socially Contacted Friends and Family had a stronger correlation than Socially Contacted Peers as shown in Table 38. These associations were significant at $p < .01$ level.

Self Interest was the only variable as a source of first becoming interested in using CMC that correlated with one other variable, Keep in Touch With Family and Friends ($r = .222$, $p < .011$). Surprisingly, the variable Friends as a source of first becoming interested in using CMC did not correlate with any of the benefits. Also, no correlations were found with work requirement or the ESC, which was a source of training for the first TENET users and now has Internet training for educators.

Correlation for Social Integration revealed many positive associations, especially for using the Web to search for personal information and entertainment. The association of CMC benefits for keeping in touch with family and friends and staying informed about events of interest was positive for the social integration variables of contacting

friends, family and peers. Sending messages in place of telephone calls as a network benefit also was positive for person contacts. All except one network benefit associated with social integration. This variable was Keep Up With Current Issues. All other network benefits associated with the social component at least once. Hypothesis four, that network benefits are positively associated with social interaction, was accepted.

Table 38
Correlation Measurements for Network Benefits with Social Interaction Measures

Network Benefits	Pearson Corr	Self-Interest	Friend	Work Requirement	ESC	Socially Contacted Friends And Family	Socially Contacted Peers	Socially Searched Web Sites for Personal Information	Socially Searched Web Sites For Entertainment
Use Of Networks For Entertainment	R							.180*	.282**
	Sig.							.042*	.001
	N							128*	127
Use of Networks For Interesting Things To Talk About	R								.204*
	Sig.								.022
	N								127
Keep Up With Current Issues	R								
	Sig.								
	N								
Pass The Time	R								.189*
	Sig.								.033
	N								127
Keep In Touch With Family & Friends	R	.222*				.605**	.300**		
	Sig.	.011				.000	.001		
	N	129				129	129		
Find Out About Events I'm Interested In	R					.237**	.189*	.197*	.186*
	Sig.					.007	.032	.025	.036
	N					130	130	130	128
To Take A Pleasant Break From Work	R							.211*	.333**
	Sig.							.017	.000
	N							127	126

Continued on next page

Network Benefits	Pearson Corr	Self-Interest	Friend	Work Requirement	ESC	Socially Contacted Friends And Family	Socially Contacted Peers	Socially Searched Web Sites for Personal Information	Socially Searched Web Sites For Entertainment
Compare Ideas With Others	R							.210*	.190*
	Sig.							.017	.032
	N							128	127
Exchange Information/Advise	R							.270**	.248**
	Sig.							.002	.005
	N							129	127
Meet People	R							.209*	.306**
	Sig.							.018	.000
	N							128	127
Sending Messages In Place Of Phone Call	R					.527**	.426**		
	Sig.					.000	.000		
	N					130	130		

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Network Benefits and CMC Characteristics

CMC characteristics help a person decide whether to adopt an innovation. Because nonusers did not respond to the survey, comparisons could not be made between users and nonusers. Table 39 shows the results of the measurements. The correlations between the eleven measures of network benefits and the fourteen measures of CMC characteristics were correlated. The characteristic of networks allowing educators to expand their communication networks, as shown in Table 39 was positive for comparing ideas and exchanging information or advice and to a lesser degree for keeping up with current issues and meeting people.

The correlation table of CMC characteristics and network benefits revealed some blocks of associations. Compare Ideas With Other and Exchange Information and Advice correlated with fourteen CMC characteristics. Comparing ideas had three others additional CMC characteristics that exchanging information did not have. It correlated with trying out CMC before adopting it, observing people using it and having friends that used CMC.

An essential characteristic of CMC is that adopters can explore the innovation before deciding whether to adopt it. As mentioned above, this characteristic correlated positively with using the networks for interesting things to talk about ($r = .187$, $p<.038$), comparing ideas with other people ($r = .252$, $p<.005$), and with meeting people ($r = .178$, $p<.049$).

The CMC characteristic of being helpful personally for educators was a variable that correlated with all the network benefits. It is interesting that out of the eleven variables, nine were significant at the <.01 level. What is also noteworthy is that no

associations were found between network benefits and the potentially negative CMC characteristics, CMC being confusing and complex. On the other hand, neither did CMC is Easier to Use correlate with network benefits. Except the ones mentioned previously, CMC characteristics correlated with all the CMC benefits at least twice. The second part of hypothesis four is accepted

Table 39 shows that perception of network benefits is positively associated with social interaction. Perception of network benefits also shows a positive association with CMC characteristics. Based on these positive associations Hypothesis four was accepted.

Table 39
Correlated CMC Characteristic for Network Benefits Measures

Pearson Correlation		Use Of Networks For Entertain-ment	Use of Networks For Interesting Things To Talk About	Keep Up With Current Issues	Pass The Time	Keep In Touch With Family & Friends	Find Out About Events I'm Interested In	To Take A Pleasant Break From Work	Compare Ideas With Others	Exchange Information /Advise	Meet People	Sending Messages In Place Of Phone Call
Expanded Communication With People	r			.180*					.372**	.278**	.220*	
	Sig.			.043					.000	.002	.013	
	N			127					127	127	127	
Expanded Possibilities To Search For Information	r							.233**	.276**	.193*		
	Sig.							.009	.002	.029		
	N							126	127	128		
Easier To Reach People	r			.327**		.335**	.259**		.349**	.328**		.445**
	Sig.			.000		.000	.003		.000	.000		.000
	N			127		127	128		127	127		128
Without CMC Finding Information Would Be More Difficult	r	.180*					.188*	.183*	.246**	.221*		
	Sig.	.042					.033	.041	.005	.012		
	N	127					129	126	127	128		
Could Explore Using CMC Before Becoming A Member	r		.187*						.252**		.178*	
	Sig.		.038						.005		.049	
	N		123						123		123	
CMC Is At Times Confusing	r											
	Sig.											
	N											

Continued on next page

Pearson Correlation		Use Of Networks For Entertain-ment	Use of Networks For Interesting Things To Talk About	Keep Up With Current Issues	Pass The Time	Keep In Touch With Family & Friends	Find Out About Events I'm Interested In	To Take A Pleasant Break From Work	Compare Ideas With Others	Exchange Information /Advise	Meet People	Sending Messages In Place Of Phone Call
Using CMC Is	r											
	Sig.											
	N											
CMC Is Easy To	r											
	Sig.											
	N											
CMC Helps Me At	r						.218*		.355**	.232**		.310**
	Sig.						.013		.000	.009		.000
	N						128		127	127		128
CMC Helps Me In	r	.329**	.201*	.338**	.256**	.342**	.337**	.387**	.411**	.258**	.182*	.291**
	Sig.	.000	.025	.000	.004	.000	.000	.000	.000	.004	.043	.001
	N	124	124	125	124	124	125	123	124	124	124	125
Have Observed	r								.221*			.189*
	Sig.								.012			.033
	N								127			128
Have Friends That	r					.241**	.240**		.230**	.221*		.229**
	Sig.					.006	.007		.010	.013		.010
	N					126	127		126	126		127
Knew of Benefits	r											
	Sig.											
	N											

Analysis for Hypothesis Four

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Hypothesis four:

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Table 39 shows that perception of network benefits is positively associated with social interaction. Perception of network benefits also shows a positive association with CMC characteristics. Based on these positive associations Hypothesis four was accepted.

CHAPTER 5

SUMMARY, DISCUSSION AND CONCLUSIONS

The current research sought to identify and describe public school educators who used CMC. The research tested whether variables selected from the literature were applicable to revealing association of what persuades and supports uses of CMC as evidenced by the frequency and amount of time a user spends online and by the variety of use. It also wanted to determine whether educators were using CMC for professional development.

This research started with the intention of comparing users and nonusers of CMC. Nonusers are important because organizations are setting up expensive networks with little empirical knowledge of the user. The research literature had also stated the importance of investigating nonusers. However, nonusers were not included because the ones in the database selected chose not to respond.

Registered TENET users as of December 1998 formed the research sampling frame. The registered individuals were chosen because TENET had a directory of registered educators that included their physical work addresses, e-mail addresses and work positions, indicating whether they were teachers, campus administrators, central administrators or support personnel. From personal experience, I knew there were users and nonusers in the directory list. A personal e-mail from Gene Titus (see Appendix B), stating that he deleted about 40,000 accounts in February 1999 belonging to individuals who had not used their e-mail within the last six months, confirmed my supposition. As

previously mentioned, none of the nonusers responded despite a verbal follow-up contact. Most insisted the information they had to offer was not relevant since they did not use CMC.

Research Hypotheses

Descriptive statistics such as frequencies, percentages, means, and crosstabulations were utilized to characterize the respondents of the survey. After describing the public school educators, the following hypotheses were analyzed:

Hypothesis One:

Socioeconomic status as evidenced by education and position will influence the use of CMC.

Hypothesis Two:

Significant differences exists in the use and nonuse of CMC among places of employment, geographic location, and district size

Hypothesis Three:

Breadth and depth of usage are positively associated with:

a. Organizational Vitality

b. Adopter Resources

c. Instrumentality

Hypothesis Four:

Perception of network benefits is positively associated with:

a. Social Interaction

b. CMC characteristics

Discussion

Demographics of CMC Users

Table 40 is a comparison of Anderson and Harris's (1996) survey of 190 educators and the present survey of 131 educators. The percentages are useful in providing a profile of the average respondent. In both studies, the respondents were similar, although in the present study female respondents increased by 15%. This difference is probably attributable to the 14% increase in teacher respondents in the present survey and the fact that public education remains a female-dominated profession. Therefore, the higher number of female respondents was not unusual.

Table 40
Demographic Comparison Between Anderson & Harris and Urias-Barker Study

	Anderson & Harris	Urias-Barker
Gender	53% Female	68% Female
Age	44 Years Median Age	47 Years Median Age
Education	60% Graduate Degree	93% Graduate Degree
Position	37% Teachers	51% Teachers
Computer Experience	87% Five or More Years	83% Five or More Years

The respondents were well educated and had five or more years of computer experience as seen in Table 40. Similar studies found comparable results. Anderson and Harris (1996) citing Honey & Henríquez and Boulware reported 79% and 68% of the respondents, respectively, holding graduate degrees. This is an expected confirmation of Rogers' theory (1986) that a high level of education is a factor in adoption and use of new communication technologies. Of additional importance to this

study of CMC usage, 69% of the respondents had been using the Internet more than two years.

Research Findings

Four hypotheses were tested. These hypotheses were developed based on work done by

(1) Steinfield (1983), who researched task and social factors in communications by e-mail in a business organization,

(2) McQuarrie (1985) who studied commitment to home computing and

(3) Dutton, Rogers, & Jun (1987) who also investigated home computing.

In turn, they based their work on Rogers' (1983) Diffusion of Innovation Theory. The dimensions used in their study, such as depth and breadth, social interaction, and similar dimensions, are generally applicable for the study of CMC. Research finding are compared to the results of other studies and to Rogers diffusion of innovation. At times, these comparisons are indirect because no other studies have been done using all of the variables.

Although computers are no longer a novelty in most organizations, for many schools investing in technology, they are a novelty and an innovation. Additionally, the use of online networks to communicate, supplement the curriculum, and even for entertainment is still very new to many educators. In schools, we can still study technology under the diffusion paradigm.

In the analyses that follow, the first three hypotheses were examined for variables that influence usage of CMC. Each of the independent variables had three

indicators of usage to test for associations. Frequency and time, a measure of depth or amount of time spent using CMC were one form of measurement. Breadth, or the number of different Internet features used, was measured by Internet Feature Usage. This consisted of e-mail, news and announcements, search engines, chat forums, Internet resources, and bookmarks. These terms, in regards to this study, are defined in Chapter One.

Throughout the study, the frequency measurement provided a more relevant indicator of depth than time. However, anecdotal reports have shown time as being more the issue. Perhaps the results point to the notion that time is actually not the big barrier for educators to use CMC, rather their frequency and ability of getting online. This in turn would be a function of availability ¾ closeness, convenience, and accessibility.

Hypothesis one stated that education and position's socioeconomic variables would influence the use of CMC. Rogers (1995) investigated many areas that could affect adoption of innovations. Among the areas investigated were the socioeconomic characteristics of the adopter such as years of formal education, occupation, income, class, and the like. Education and position were two socioeconomic variables selected for this study. Regression analyses were used with the independent variable of education and crosstabulations were used with position.

Early adopters have more years of formal education and higher social status. Among other social status indicators, occupational prestige plays a role. This research examined position as a correlation of usage. As in any organization, there are

hierarchies of occupational status, education being no different. From personal knowledge, some educators start a teaching career but their goal is "to move up" to campus administrator and then to central administrator.

Education, the independent variable, was used in a regression analysis with time and frequency as dependent variables. Frequency and time and the variety of use are traits of the medium itself, and were utilized by Dutton et al. (1985) in their research of home computing. Dutton et al. used frequency and time as a variable called depth and used breadth as a measure of how many computer applications were used. This study used the same variables only breadth was a measure of the variety of Internet features used.

Education affects the frequency of going online. The results revealed significance for formal education, workshop attendance, and professional journal readership. Continuing education, in the form of workshops and professional journal readership, may reflect the practical direction of the educators becoming aware of sites to visit, corresponding with people they have met, or looking up information for workshops or products encountered in their professional journals and the like. This matches Rogers (1986) contention that adopters are more oriented outside the social system, exposed to mass media channels, and more highly interconnected through network links to the system. They are also more directly in communication with scientific and technical sources. In the educator's case, their professional reading and workshop attendance enables them to be more connected with new knowledge. Rogers

and Dutton, et al., (1987) also describe “innovators” or “early adopters” as being more elite in occupational prestige, years of formal education, and income.

Education showed no association with the use of Internet Features after a regression analysis was done. Although there was variety of use of Internet Features, none of the variables of education, ¾ formal education level, workshop and conference attendance, and professional journal readership ¾ made a significant difference. This finding was in contrast to Rogers (1995) where the elements of socioeconomic status, including education, are variables to observe and measure in diffusion studies because generally, they do make a difference.

Anderson (1992) did find education a strong predictor of usage of the Cleveland Free Net system. Those that completed less education tended to use Free-Net more, contradicting what had been found in other studies. The population of the current study was professional and well educated, therefore the education variable in this research may not predict as well as it would in a more heterogeneous situation.

Position was a variable used to test for usage with frequency and time and Internet Features usage. Educators were divided into four positions, teachers, campus administrators, central administrators, and professional support. Frequency of usage was highest for professional support with a mean use of 5.85 (SD 1.69) and teachers were the lowest with a mean of 4.53 (SD 2.14). Other research was not found that compares teacher usage with others in the organization. An important finding, perhaps not surprising, this research has found that teachers sometimes differ significantly from others, but in a negative sense, meaning they spend less time online and use fewer

features than their colleagues. The implications for administrators and policy-makers are to find creative solutions for remedying this significant finding. Even a state agency such as the Texas Education Agency could conduct a state-wide study to identify districts where this situation exits and offer aide and practical solutions to the districts.

Central administrators and professional support reported higher usage of e-mail than did any other group. Since the sample included librarians, it is understandable that there would be significant differences. As an information specialist, their job requires them to have manual and electronic search skills. Additionally, central administrators and professional support may have more discretionary time to use e-mail. Central administrators differed significantly from others in the news and announcements usage, probably due to the mandate from TEA where they are required to go online for important announcements and postings. Teachers on the other hand differed significantly in Internet resource usage. They used it less than any other group.

Hypothesis one stated that education and position's socioeconomic variables would influence the use of CMC. The body of evidence gathered lead to acceptance of this hypothesis. Hypothesis one strengthened the assumption that continuing education, such as workshop and conference attendance and professional journal readership are necessary and important to professional development. The association of workshop attendance and professional journal readership with frequency of online usage attests to the influence of lifelong learning and continuing education. Although attendance at professional conferences did not show associations, such a finding may be related to the

number of educators who were teachers (51%). This group has the least funds for such activities.

These findings confirm a previous study by Hack and Smey (1997) who found that educators who had little or no previous experience in using the Internet but who participated in professional development training such as workshops often found creative solutions to barriers of lack of training, time, access, and budget.

An unexpected finding, but a very important one, was the significant associations for the position variable of teacher and frequency of CMC usage and Internet Resources usage. The association was significant because teachers were less frequent users of CMC than campus and central administrators and professional support. Further, teachers used Internet Resources less than their colleagues did. Although this result was not anticipated, it is understandable since equality of resources, financial or otherwise, may not be present among the different positions studied. Administrators and support personnel, for example, commonly have offices with a telephone and a computer on their desk. They may also have discretionary funds they control allowing them to purchase items such as computers. Neither teachers much less students are empowered in this manner, thus there exits an inequity of access to networks. As Rogers (1995) observed, it is the system's (social) structure that largely determines who adopts and who cannot. Because of this, gap-narrowing strategies need to be implemented by both campus and central administration levels because the bottom line is the students and the teachers who are the closest to them. They need to be able to

integrate this technology into their teaching. What these strategies should be is an area for future investigations.

Hypothesis two stated there would be differences in use and nonuse of CMC among place of employment, geographic location, and district size. Little evidence was found that this was true, and therefore, hypothesis two was not accepted.

Hypothesis three investigated the organization as to its strength for supporting CMC (Organization Vitality), the adopters and their resources for successfully using CMC (Adopter Resources), and the use of CMC for the profession (Instrumentality). Correlations with frequency and time and use of Internet features were used as statistical measures of the strength of this relationship. An additional variable, Sum Depth - the product of frequency and time, was added. Although it correlated with three variables measuring Organization Vitality, Frequency also associated with these same variables at a more significant level. Frequency was a stronger measure of Depth than either Time or Sum Depth.

An important correlation for Organization Vitality by Frequency was having computers near at hand for educators. A public school that desires technology relevant to educators, needs to have computers and networks that are close, convenient, and accessible. Teachers, who need networks the most to reduce professional isolation and prepare students for the twenty-first century, had lower means than the other professionals in frequency of Internet use. As discussed previously, one can speculate that central and campus administrators and professional support have better access to

computers because of their position, and easier access to the Internet because of telephone connections in their offices.

Hypothesis three stated that organization vitality, adopter resources, and instrumentality positively influenced depth and breadth of usage. The evidence examined led to acceptance of this hypothesis.

This hypothesis made a strong case for the importance of the variables significantly associated with organization vitality, adopter resources, and instrumentality in promoting the use of CMC. As observed previously, for the organization this finding emphasizes having networks that are close, convenient, and accessible. Having a network connection in the library or teachers' workroom is certainly better than having none, but it is not enough. It does not meet the principal of least effort. Neither does it meet the criteria of convenience and for some, depending on their perspective, closeness and accessibility might be questioned. Hack and Smey (1997) noted that even though Internet connections were available in the library and in computer labs, teachers rarely used the Internet in this situation, and only one-third of the teachers knew where computers with Internet access were located within their school. Steinfield (1983) observed that "task related usage is significantly reduced when people do not have their own terminals" (p.149).

A solitary, significant association for organization vitality by time was that individuals who were self-taught spent more time online. Honey and Henriquez, as cited in Schrum (1995), also found that technologically proficient individuals were mostly self-taught and felt highly motivated to learn and use telecommunication

technology. Schrum advised that it was important to understand the processes by which individuals embrace the innovations and to determine ways to support and encourage others to reach that goal.

Though not directly pertaining to organization vitality, the institution can develop adopter resources. Adopter resources were those experiences and skills respondents brought to the situation. Frequency of use was associated with five of the six measures of Adopter Resources. Experience with computers and confidence in using computers were significant for frequency of online usage. Not surprisingly, the most significant correlations were the number of years using the Internet and the confidence associated with it. Both were significant at $p<.01$. One could safely assume that using computers and becoming confident using them came before the years of experience using the Internet and the confidence using the Internet. Internet Confidence associated with both Frequency and Time online. The inference was that those who were confident went online more often and spent more time online.

Rogers (1995) pointed to efficacy and experience as being positively related to adoption. Honey and Henriquez (1993) and Schrum (1995) also found that experienced and mature educators were devoted users of telecommunications. These meaningful associations are very useful to organizations. These finding may not be surprising, but they do stress the point. The information can be used to improve the acceptance and use of CMC by nonusers or less frequent users. On going training of computers and Internet usage, for example could help those with little confidence and experience become more comfortable and proficient with the technology. Those educators already possessing the

skills and confidence could receive additional training and serve as network consultants to novices or those with less skills.

Frequency correlated significantly and almost completely with the twelve measurements of Instrumentality or work related usage (see Table 41). Steinfield (1983) in a study of electronic mail patterns found thirty-two different purposes of e-mail clustering around task and social use dimensions, some of which were similar to this research. Instrumentality did not correlate with the number of people using the Internet at work in this study whereas Steinfield's research did. Though communication with individuals in the same building through e-mail is common in the business world, educators may not consider this necessary and find face-to-face communication better and easier. The findings on using CMC in the work environment gave substance to anecdotal reports of the usefulness of CMC in education. Frequent users benefited from eleven of the twelve measurements of work-related benefits as detailed in Table 41. Besides expanding their professional communications, frequency of use correlated with importance for the job, easing the workload, information seeking or receiving tasks, and for professional development.

Instrumentality provided a powerful message. It gave substance for much of the anecdotal evidence of how educators were using CMC. It showed clearly that CMC was important for professional communications from contacting peers to contacting individuals in government positions. The results also verified that educators were using CMC for professional development, for unearthing professional information, and for increasing job productivity. These individuals need to serve as models, provide

messages, demonstrations, and assist those individuals that are reluctant to try communication technologies.

Correlations between frequency and time and the perception of network vitality concerning network issues also showed associations. Four measures were significant, indicating that these items were viewed as problems. Two measures of these measures addressed technical areas where a campus leader probably has little control. These measures were lack of support and having a network that was difficult to use. Rogers (1995) used complexity as one of the attributes of an innovation that can be negatively related to its rate of adoption. Two other measures, time and relevance, seemed to be the responsibility of campus leaders. Providing time and shaping a culture that makes networks relevant to education will increase frequency of use.

Two tables that follow, Tables 41 and 42, summarize the finding on depth and breadth with hypothesis one, two, and three. Table 41 clearly shows the limited significance that Time had on usage of CMC. Out of the fifty variables that were examined, Time had eight or 16% that were significant. Frequency had thirty or 60% that were significant. This finding deserves further investigation since anecdotal reports point to time as a limiting factor in using CMC.

Table 41

Summary Results for Frequency and Time of Significant / Nonsignificant Findings for H1, H2, and H3

	SIGNIFICANT ASSOCIATIONS	NONSIGNIFICANT ASSOCIATIONS
EDUCATION by		
Frequency	1. Education Level	1 Variable [1]
	2. Workshop Attendance	
	3. Professional Journal Readership	
Time		All [1]
POSITION by		
Frequency	4. Teacher	2 Variables [2]
	5. Professional Support	
Time	1. Campus Administrator	2 Variables [2]
	2. Professional Support	
EMPLOYMENT		All [7]
Geographic Location		All [7]
DISTRICT SIZE		All [7]
ORGANIZATION VITALITY by		
Frequency	3. Networks	6 Variables [3]
	4. Internet Connection At Work	
	5. Close	
	6. Convenient	
	7. Accessible	
	8.	
Time	9. Self-Taught	10 Variables [3]
ORGANIZATION NETWORK VITALITY by		
Frequency	10. Network Difficult to Use	6 Variables [4]
	11. Lack of time	
	12. Relevance to Job	
	13. Lack of Support	
Time	14. Lack of Time	9 Variables [4]

Continued on next page

	SIGNIFICANT ASSOCIATIONS	NONSIGNIFICANT ASSOCIATIONS
ADOPTER RESOURCES by		
Frequency	15. Years of Computer Use	1 Variable [5]
	16. Computer Confidence	
	17. Years Using Internet	
	18. Internet Confidence	
	19. Tenet Use	
Time	20. Internet Confidence	4 Variables [5]
	21. Tenet Use	
INSTRUMENTALITY by		
Frequency	*Professionally Contacted People:*	1 Variable [6]
	22. In other Schools in District	
	23. At Higher Levels in District	
	24. At Higher Levels Outside District	
	25. In Government	
	26. Contacted Experts	
	27. Contacted Peers	
	28. Searched Sites for Professional Info	
	Internet Is Important:	
	1. In My Job	
	2. For Information	
	3. For Professional Development	
	4. Ease My Work Load	
Time	*Internet is Important for:*	10 Variables [6]
	5. Professional Development	
	6. Ease My Work Load	

[1] Education: Formal Education; Workshop Attendance; Professional Conference; Professional Journal Readership.

[2] Position: Teacher; Campus Administrator; Central Administrator; Professional Support.

[3] Organization Vitality: Networks; Most Oft Used Computer for Internet; Internet Connection at Work; Close; Convenient; Accessible; Self-Taught; Friend Taught; Esc Training; District Training; University Training.

[4] Organization Network Vitality: Getting To A Computer; Lack of Phone Lines; Learning to Use A Network; Network Difficult to Use; Time to Devote to using the Network; Relevance to My Job; Technical or Organizational Support; Finances or Resources; Clarity about the Goals for Networking In Education; Information How to Implement Networking.

[5] Adopter Resources: Yrs of Computer Use; Confidence Using Computers; Yrs Using Internet; Confidence Using Internet; Tenet Use; Other Networks.

[6] Instrumentality: People Using Internet at Work; (*Professionally Contacted:)* People In Other Schools in District; People At Higher Levels in District; People at Higher Levels Outside District; People In Govt.; Experts; Peers; Professionally Searched Sites for Information; *(Internet is Important:)* In my Job; For Information; for Professional Development; To Ease My workload.

[7] Frequency and Time.

Table 42 shows the results for CMC usage and using a variety of Internet features. Table 42's interesting findings concern Adopter Resources and Instrumentality, or the use of CMC for work related situations. Adopter resources may help districts identify those individuals that would be good local support for implementing technology. Those individuals with years of computer and Internet use could become the experts. It also gives evidence of the importance of CMC for job-related instances. Educators are using CMC for professional development, for communications, for finding information, and to alleviate their workload. CMC is an important tool for educators.

Table 42

Summary Results for Internet Usage of Significant / Nonsignificant Findings for H1, H2, and H3

	Significant Associations	Nonsignificant Associations
Education		All [1]
Position by		
E-mail	7. Central Administrator 8. Professional Support	2 Variables [2]
News and Announcement	9. Central Administrator	3 Variables [2]
Search Engines	10. Professional Support	3 Variables [2]
Chat Forums		All [2]
Internet Resources	11. Teacher 12. Campus Administrator	2 Variables [2]
Bookmarks		All [2]
Employment		All [7]
Geographic Location	13. News and Announcement	5 Variables [7]
District Size		All [7]
Organization Vitality by		
E-mail		All [3]
News and Announcement	14. District Training	5 Variables [3]
Search Engines		All [3]
Chat Forums		All [3]
Internet Resources	15. Internet Connection at Work	5 Variables [3]
Bookmarks	16. Internet Connection at Work	5 Variables [3]

Continued on next page

	SIGNIFICANT ASSOCIATIONS	NONSIGNIFICANT ASSOCIATIONS
ORGANIZATION NETWORK VITALITY by		
E-mail		All [4]
News and Announcement	17. Network Difficult to Use	9 Variables [4]
Search Engines		All [4]
Chat Forums		All [4]
Internet Resources		All [4]
Bookmarks		All [4]
ADOPTER RESOURCES by		
E-mail	18. Tenet Use 19. Other Networks	4 Variables [5]
News and Announcement		All [5]
Search Engines	1. Years Using Internet 2. Other Networks	4 Variables [5]
Chat Forums		All [5]
Internet Resources	1. Confidence Using 2. Other Networks	4 Variables [5]
Bookmark	1. Years of Computer Use 2. Confidence Using Computers, 3. Years Using Internet, 4. Confidence Using Internet, 5. Tenet Use	1 Variable [5]
INSTRUMENTALITY by		
E-mail	*Professionally Contacted:* 1. People In Other Schools in District 2. People at Higher Levels Outside District 3. Peers 4. Searched for Prof. Info *Internet is Important:* 5. In My Job 6. For Professional Develop. 7. Ease My Work Load	5 Variables [6]

Continued on next page

	SIGNIFICANT ASSOCIATIONS	NONSIGNIFICANT ASSOCIATIONS
News and Announcement	*Professionally Contacted:* 8. People at Higher Levels Outside District 9. People in Government 10. Experts *Internet is Important:* 11. In My Job 12. For Information 13. For Professional Develop. 14. Ease My Work Load	5 Variables [6]
Search Engine	15. Prof Contacted People in Other Schools in District 16. Peers 17. Searched Sites for Prof Info 18. Internet is Impt for Information	8 Variables [6]
Chat Forums	19. To Ease My Work Load	11 Variables [6]
Internet Resources		All [6]
Bookmarks		All [6]

[1] Education: Formal Education; Workshops; Professional Conferences; Professional Journal Readership

[2] Position: Teacher; Campus Administrator; Central Administrator; Professional Support

[3] Organization Vitality: Networks; Most Oft Used Computer for Internet; Internet Connection at Work; Close; Convenient; Accessible; Self-Taught; Friend Taught; Esc Training; District Training; University Training

[4] Organization Network Vitality: Getting To A Computer; Lack of Phone Lines; Learning to Use A Network; Network Difficult to Use; Time to Devote to using the Network; Relevance to My Job; Technical or Organizational Support; Finances or Resources; Clarity about the Goals for Networking In Education; Information How to Implement Networking.

[5] Adopter Resources: Yrs of Computer Use; Confidence Using Computers; Yrs Using Internet; Confidence Using Internet; Tenet Use; Other Networks.

[6] Instrumentality: People Using Internet at Work; (Professionally Contacted): People In Other Schools in District; People At Higher Levels in District; People at Higher Levels Outside District; People In Govt.; Experts; Peers; Professionally Searched Sites for Information; (Internet is Important): In my Job; For Information; For Professional Development; To Ease My workload

[7] Internet Features: E-mail; News and Announcement; Search Engines; Chat Forums; Internet Resources; Bookmarks

Hypothesis four stated that perception of network benefits was positively associated with social interaction and CMC characteristics. The evidence suggested significant correlations that led to acceptance of this hypothesis. Network benefits were measured with an eleven-item survey question as shown in Table 43. Correlations were made with Social Interaction and Network Benefits. Social Interaction looked at the social group that may have influenced the adoption and use of CMC. According to Rogers' (1995), this is a process of modeling and imitation by potential adopters of their proximate peers. The correlations for Social Interaction indicated an association with self-interest and keeping in touch with family and friends. Neither friends, nor work requirement, nor ESC's influence showed significance with Social Interaction. This was contrary to Rogers' theory of modeling and imitation as an influence to adopting an innovation.

An interesting block was revealed for Social Interaction, that of information seeking for personal use and that of entertainment. This was similar to Anderson (1992) in her Free-Net study and Steinfield (1983) who found social uses of e-mail (learning of interesting things or events, taking a break from work, keeping in touch, games or entertaining discussions) at work. Social Interaction brought out the entertainment use of CMC. It is my belief that this aspect of CMC an important component in "hooking" individuals to the benefits of CMC. Being able to keep in touch with family and friends, finding out about events of interest, taking a pleasant break from work, searching the web for personal information, and other similar social activities can result in gaining experience and confidence for the individual and this confidence and experience may later translate into competent task usage.

Two of the CMC characteristics based on Rogers' model of innovation attributes were strikingly exemplified in the correlation analysis of network benefits and CMC characteristics. CMC Helps Me In My Personal Life was a measure of compatibility (the perception that the innovation is consistent with the needs of the potential adopter) and relative advantage (the perception that the innovation is better than the idea it supersedes) (Rogers, 1995). The variable CMC Helps Me in My Personal Life correlated with all the items for network benefits. Since nine of eleven items were significant at $p<.01$ and two were significant at $p<.05$, one can infer that these respondents strongly believed that CMC was advantageous and compatible with their life style. Anderson (1992), citing Dutton et al. noted that some variables that are linked to usage and outcomes, (of computing) and are considered conceptually independent, are likely intertwined and operate together. This may well apply to CMC attributes of the innovation as proposed by Rogers.

Network Benefits correlated with the perceived attributes of CMC and demonstrated that Rogers' (1995) list of perceived attributes of an innovation can successfully be used to show those attributes of the innovation that are significant for CMC usage.

The current research provides evidence that, indeed, educators are using CMC for professional development. Further proof was a frequency count of the question (E-2) asking whether CMC had provided at least one instance of professional contacts, job information, conference information, lesson plans, lesson information or other. The percentages for this job related question showed a range of 42% to 53% of agreement

that the Internet had provided at least one instance of information related to the respondent's profession. For these choices, respondents used the Internet for professional contacts (52.7 %), for job information (47.3%), for finding lesson plans (45.8%) and for conference information (41.2%). Again, we see the importance of professional communications.

Summary of Findings

This research had as underpinnings Rogers' (1995) Diffusion of Innovation Theory, in particular the attributes of an innovation. These attributes partially control whether an innovation diffuses to widespread use and at what speed. Rogers admits that much of the diffusion research literature focused on individual characteristics of innovativeness, with relatively little effort devoted to analyzing "innovation" differences. "This latter type of research can be of great value in predicting people's reactions to an innovation" (p. 204) and even establishing where the barriers are.

This study of the attributes of an innovation for CMC usage, tentatively pointed to those attributes that had significant associations for the adoption of CMC in public schools. Although inferences are constrained by the limitations of the study, it is a beginning. Relative advantage, compatibility, trialability, and observability were the significant associations. Because the subjects seemed to be power users, the attribute of complexity did not seem to make a difference. The attribute of CMC Helps Me In My Personal Life correlated with all eleven network benefits. This a was a *Compatibility* attribute. Easier to Reach People had six correlations with network benefits. This was a *Relative Advantage* attribute. Have Friends That Uses CMC had five correlations with

network benefits. This was an *Observability* attribute. Without CMC Finding Information Would Be More Difficult And CMC Helps Me At Work, attributes of *Compatibility* each had four network benefit correlations. The findings are significant because they support Rogers' (1995) diffusion theory and help establish that it is a viable theory for measuring the attributes of CMC usage.

The research repeatedly supported the finding that frequency, not time, is the more important component of usage. An implication could be drawn from this finding. Those that have computers that are handy, use them frequentlyto get online without the constraints of time. The analysis pointed in this direction and supported the concept that close, convenient, and accessible hardware encourages use. Although this finding is not surprising, one could conclude that this finding makes it a mandate for districts to have a computer on every teacher's and other educators' desk along with an Internet connection, if they want to succeed in their technology efforts. This recommendation parallels the findings that teachers are the low users of CMC technology and, in my opinion, steps should be taken to reverse this result.

The significant associations in Hypothesis three and Hypothesis four underscored CMC's value for communication, information seeking, work productivity, and professional development in the educators' professional position.

The following two tables, Tables 43 and 44 summarize the findings for Hypothesis four. Social Interaction had two variables that mirrored each other in association. One was Socially Contacted Friends and Family and the other was Socially Contacted Peers as shown in Table 43. Searching the Web for Personal Information and

Searching the Web for Entertainment showed six similarities. Two additional variables that correlated with the variable Entertainment included Using the Network for Entertainment and Finding Interesting Things to Talk About. These two may be variables that could be divided into two dimensions, that of human interactions and social use interactions.

Using CMC for entertainment may have its function in the work place. Those new to the system can learn from exploration and self-interest. Since task use did not seem to be affected, restrictive usage policies may slow the acceptance of CMC as a work tool.

Table 43

Summary Results for Social Interaction and Network Benefits of Significant / Nonsignificant Findings for H4

	Significant Associations	Nonsignificant Associations
SOCIAL INTERACTION by		
Self- Interest	20. Keep in Touch With Family and Friends	11 Variables [1]
Friend		All [1]
Work Requirement		All [1]
ESC		All [1]
Socially Contacted: Friends and Family	21. Keep in Touch With Family and Friends	9 Variables [1]
	22. Find Out About Events I'm Interested In	
	23. Sending Messages in Place of Phone Calls	
Contacted Peers	24. Keep in Touch With Family and Friends	9 Variables [1]
	25. Find Out About Events I'm Interested In	
	26. Sending Messages in Place of Phone Calls	
Searched Web for Personal Info	27. Use of Networks for Entertainment	7 Variables [1]
	28. Find Out About Events I'm Interested In	
	1. Take a Pleasant Break from Work	
	2. Compare Ideas With Others	
	3. Exchange Info / Advise	
	4. Meet People	
Searched Web for Entertainment	5. Use of Networks for Entertainment	4 Variables [1]
	6. Interesting Things to Talk About	
	7. Pass the Time	
	1. Find Out About Events I'm Interested In	
	2. Take a Pleasant Break from Work	
	3. Compare Ideas with Others	
	4. Exchange Info / Advise	
	5. Meet People	

[1] Network Benefits: Use of Networks for Entertainment; Use of Networks for Interesting Things to Talk About; Keep Up With Current Issues; Pass the Time; Keep in touch With Family & Friends; Find Out About Events I'm Interested In; Take a Pleasant Break from Work; Compare Ideas with Others; Exchange Info / Advise; Meet People; Send Messages in Place of Phone Calls.

CMC characteristics were significant and compatible to Network Benefits as can be seen in Table 44. This research did not show associations with CMC being confusing, complex but neither did it indicate that CMC was easy to use. The perceived attribute of Observability or knowing of the benefits before trying CMC, did not show any significance, although a frequency count showed that 63.8% saw or heard (observability) of some benefits of using CMC.

Table 44

Summary Results for CMC Characteristics and Network Benefits of Significant / Nonsignificant Findings for H4

CMC Characteristics by	Significant Associations	Nonsignificant Associations
Expanded Communication With People	1. Keep Up With Current Issues 2. Compare Ideas With Others 3. Exchange Info / Advice 4. Meet People	9 Variables [1]
Expanded Possibilities to Search for Information	1. Take A Pleasant Break From Work 2. Compare Ideas With Others 3. Exchange Info / Advice	10 Variables [1]
Easier to Reach People	1. Keep Up With Current Issues 2. Keep In Touch With Family and Friends 3. Find Out About Events I'm Interested In 4. Compare Ideas With Other 5. Exchange Info / Advice 6. Sending Messages In Place of Phone Call	7 Variables [1]
Without CMC Finding Information Would Be More Difficult	1. Use of Networks for Entertainment 2. Find Out About Events I'm Interested In 3. Take A Pleasant Break From Work 4. Find Out About Events I'm Interested In 5. Take A Pleasant Break From Work 6. Compare Ideas With Others 7. Exchange Info / Advice	6 Variables [1]
Could Explore Using CMC Before Becoming A Member	1. Use Netwks For Interesting Things To Talk About 2. Compare Ideas With Other 3. Meet People	10 Variables [1]
CMC Is At Times Confusing		All [1]
Using CMC Is Complex		All [1]
CMC Is Easy To Use		All [1]

Continued on next page

	Significant Associations	Nonsignificant Associations
CMC Helps Me At Work	4. Find Out About Events I'm Interested In 1. Compare Ideas With Others 2. Exchange Info / Advice 3. Sending Messages In Place of Phone Call	9 Variables [1]
CMC Helps Me In My Personal Life	All [1]	None [1]
Have Observed People At Work Using CMC	4. Compare Ideas With Others 5. Sending Messages In Place of Phone Call	11 Variables [1]
Have Friends That Use CMC	6. Keep In Touch With Family and Friends 7. Find Out About Events I'm Interested In 8. Compare Ideas with Others 9. Exchange Info / Advise 10. Sending Messages In Place of Phone Call	8 Variables [1]
Knew of Benefits Before I Tried CMC		All [1]

[1] Network Benefits: Use of Networks for Entertainment; Use of Networks for Interesting Things to Talk About; Keep Up With Current Issues; Pass the Time; Keep in touch With Family & Friends; Find Out About Events I'm Interested In; Take a Pleasant Break from Work; Compare Ideas with Others; Exchange Info / Advise; Meet People; Send Messages in Place of Phone Calls.

Conclusions

A limiting factor of this research is that the population was selected from a directory of Texas public school network users. The random sample only allows generalization to this group. The other issue is that non-users did not respond. Both factors need to be addressed in future research, especially regarding the elusive non-users. Further, this research was partially based on Rogers' (1995) diffusion theory. He cautions on using some of the theory of diffusion because behavior of early adopters of communication technology could differ due to the technology's evolving nature (Rogers, 1986).

The results of this study show that frequency of usage has many associations.

Time seemed not to operate with frequency on a regular basis to predict amount of use, but other studies may discover whether there are underlying influences. In this study, education was not a predictor of use of Internet features, but was significant with continuing learning activities and level of education. Again, these results may be situational, especially when the education level of the respondents is considered.

The usage indicators, when correlated with the independent variables, showed some pattern and gave indications as to what educators were doing with CMC. Further research may lead to conclusive statements, but in this research public school educators, as information workers, were heavy users of task-related communications and were job-related information seekers. They were using CMC for professional development and for job efficiency. The entertainment factor was also present as has been found in other studies (Anderson, (1992), Steinfield, (1983).

The information the survey revealed is important because it has implications for administrators in several areas. Crosstabs with Kendall's tau, a non-parametric measure showed significance for frequency and time usage for teachers, professional support and campus administrators. For teachers, the results indicated they were less frequent users hence an observation that is important to administrators.

This is one finding, I believe, was of great significance ¾ the lower usage of CMC by teachers as compared to others in the school organization. The reason behind the finding of low CMC usage by teachers is speculative and will vary from school to school. Are administrators being supportive and encouraging to teachers to integrate this tool in the classroom and in their professional tasks? Are teachers being trained, thus promoting the use of CMC and motivating teachers to try it? Are they being given the

time to practice? Another important finding was the clear indication that educators are serious about their CMC use, and use it in ways that strengthens their professionalism.

Future Research

The current research advanced our understanding of factors that promote the use of CMC. A more refined, parsimonious questionnaire assessing whether some items may be measuring the same variable and a factoring of usage correlations would develop an integrated model by isolating in each category the variables that are most significant and contribute to the predictive power of CMC usage. Empirically identifying the infrastructure that must be in place to successfully implement networks in an low-tech organization would not only attract the attention of public schools, but could also be used as the basis for successful grant applications.

The current research investigated perceptions of network benefits. Attitude toward networking and technology in general are important and require further refinement and identification. Strategies to foster positive attitudes require thought and leadership from the organization.

Further research is needed that studies impact of CMC for educators and for students. A beginning has been established by this research by examining uses of CMC. Study of use is necessary to effectively study impact of such use. Policy is an important outcome of this research, if only with regard to issues of equity of access to technology.

Although more interest is being shown in research involving educators, the aforementioned areas are fertile for additional research. As technology evolves in leading the knowledge explosion, longitudinal studies can be extremely useful in

documenting and explaining the changes that occur.

An ancient Chinese curse "may you live in interesting times", is certainly applicable in technology today. When the first automobile went on the road, nobody could have predicted the urban sprawl and pollution consequences of this innovation. We know how television has affected families and in particular children. Studies are now being published on the effects of computers and isolation of individuals and a pulling away from family life. What will be the real impacts of CMC in education? Can we foresee negative outcomes? Not to know the extent of technological change and how it effects society will doom future generations to repeat the mistakes of the present and past generations.

APPENDIX A

SURVEY INSTRUMENT

Dear Colleague,

I am requesting your participation in a research study for my doctoral dissertation in information science at the University of North Texas. In research studies, public school organizations and educational professionals have been largely neglected. Your knowledge, your professional development, and your links to information ultimately will have relevance to student achievement and indirectly, to the nation's well-being.

The use of computer networks for computer-mediated communication (CMC) by educational practitioners and others who are close to the classroom is the focus of the study. The study will seek to establish factors that lead to use or nonuse of computer networks and assess what professional development benefits may result from this use. This study is important to policymakers and those planning and setting up networks in the education field.

Your name was drawn from a random sample of registered users of TENET as of December 1997. If you are not a user of networks, your opinion is still valuable and desired. There is an interest in understanding the conditions under which you would use a network available to you.

Your participation will involve filling out a survey that will take about ten minutes of your time. As a participant, no personal risk or discomfort is involved with this research and your cooperation is voluntary. I will use numbers on the front of the questionnaire to keep the mailing lists straight. All information is confidential and all links between survey and individual will be destroyed when the survey is aggregated. I would appreciate receiving your survey by April 1, 1999. I will be happy to answer any questions you may have. You can e-mail me at **zelina@tenet.edu** or you can also call me at 817-252-2275.

In anticipation of your response, I really thank you.

Sincerely,

Zelina Urias-Barker
Media Specialist,
Castleberry ISD,
Ft. Worth, TX

This project has been review by the University of North Texas Committee
For the protection of Human Subjects
(940-565-3940)

SURVEY OF TEXAS EDUCATORS' USE OF COMPUTER-MEDIATED COMMUNICATION

Part A: Who Are You?

Please circle the number that applies:

A-1. Are you: **1.** female **2.** male

A-2. What is your age? _____

A-3. Which of these best describes your education?

1. high school graduate
2. some college
3. college graduate
4. master's degree
5. doctoral degree

A-4. Position:

1. teacher
2. campus administrator
3. central administrator
4. educational aide
5. professional support
6. auxiliary staff
7. other_____

A-5. Place of employment:

1. elementary school
2. junior high/middle school
3. high school
4. administration
5. other _____

A-6. My district is located in Education Service Center Region _____.

A-7. District enrollment:

1. more than 50,000
2. 25,000 to 49,999
3. 10,000 to 24,999
4. 5,000 to 9,999
5. 3,000 to 4,999
6. 1,600 to 2,999
7. 1,000 to 1,599
8. 500 to 999
9. less than 500
10. not applicable

If **NOT** known, please give district name: _____

Part B: Your Experience

Please circle the number that applies:

B-1. Do you use a computer at? (**circle all that apply**)

1. don't use
2. home
3. work
4. used a computer as a student

B-2. How long have you been using computers?

1. don't use
2. less than 1 year
3. 1-2 years
4. 2-3 years
5. 3-5 years
6. more than 5 years

B-3. My confidence level in using computers is:

1. very low
2. low
3. moderate
4. high
5. very high

B-4. Year last enrolled in an institute of higher education: **19**____

B-5. How many non-mandatory workshops have you attended the present school year?

1. none
2. 1-2
3. 3-4
4. 5 or more

B-6. How many professional conferences have you attended the present school year?

1. none
2. 1-2
3. 3-4
4. 5 or more

B-7. How many professional journals do you read regularly?

1. none
2. 1-2
3. 3-4
4. 5 or more

Part C: Using Computer Networks

Please circle the number that applies:

C-1. Do you use TENET?

1. yes
2. no

C-2. Do you use other computer networks such as America OnLine, Southwestern Bell, Flashnet or other networks?

1. yes
2. no

CMC is used as an acronym for computer-mediated communication. CMC includes all INTERNET usage, such as email, chat groups, electronic bulletin boards, world-wide-wed (WWW) and other computer network online services.

C-3. Where I work we have (circle all that apply):

1. local area network (within the bldg.)
2. wide area network (outside the bldg.)
3. Internet access
4. not applicable

C-4. I **first** become interested in using TENET or other computer network?

1. self-interest
2. friend/colleague
3. Work requirement
4. Education Service Center
5. not applicable
6. other_____

C-5. Have you received formal training in the use of the Internet?

1. don't use
2. self-taught
3. through friend/colleague
4. training by service center
5. training by district
6. training at college/university
7. other _____

C-6. How long have you been using Internet?

1. don't use
2. past user
3. less than 6 months
4. 6 - 12 months
5. 13 - 24 months
6. more than 2 years

C-7. Indicate your confidence level at this point in using computer networks:

1. very low
2. low
3. moderate
4. high
5. very high

C-8. The computer I use/could use MOST OFTEN for connecting to computer networks is:

1. at home
2. in the same room where I work
3. at work, but NOT in the same room
4. other (please specify) _____

C-9. The computer I use/could use for connecting to computer networks **AT WORK** is:

1. in the same room where I work
2. at work, but NOT in the same room
3. other (please specify)_____

C-10. How do you feel about the location of equipment you use/could use to connect to networks?

Circle 3 (???) if you are unsure of your answer.

		NO!	**no**	**???**	**yes**	**YES!**
1. it is close	**1.**	1	2	3	4	5
2. it is convenient	**2.**	1	2	3	4	5
3. it is accessible	**3.**	1	2	3	4	5

C-11. On the average, over the past two weeks, how frequently have you used Internet?

1. less than once a week
2. 1 - 2 times a week
3. 3 - 4 times a week
4. 5 - 6 times a week
5. once a day
6. twice a day
7. more than twice a day
8. don't use

C-12. On the average, over the past two weeks, about how long have your online sessions lasted?

1. 10 minutes or less
2. 11-20 minutes
3. 21-30 minutes
4. 31-40 minutes
5. 41-50 minutes
6. 51-60 minutes
7. More than 60 minutes
8. don't use

C-13.

***The Internet** has many features. Please circle the selections you have used over the past two weeks and indicate on the following column the degree you are satisfied with the features. If you are neither satisfied nor dissatisfied, circle 3 (???).*

Application	**Do you use?**		**If YES, are you satisfied?**				
	NO	**YES**	**NO!**	**no**	**???**	**yes**	**YES!**
1. Email	**1.** 1	2	**1.** 1	2	3	4	5
2. News and Announcement (Electronic Bulletin Boards)	**2.** 1	2	**2.** 1	2	3	4	5
3. Search Engines	**3.** 1	2	**3.** 1	2	3	4	5
4. Chat Forums	**4.** 1	2	**4.** 1	2	3	4	5
5. Internet Resources	**5.** 1	2	**5.** 1	2	3	4	5
6. Bookmarks (Fast access to sites of interest)	**6.** 1	2	**6.** 1	2	3	4	5

Are you using other applications with which you are satisfied? If so, please comment:

C-14.

Please circle the number that applies:

Number of people using computer networks in my work environment

1. 1 - 5
2. 6 - 12
3. 13 - 20
4. more than 20
5. don't know

Part D: Problems Using Networks

D-1. The following 10 items may be sources of problems for you when deciding to use a network.

On the yes/no scale, judge the items below as to how problematic they may be for you. Circle 3 (???) if you are unsure of your answer.

ARE THE FOLLOWING A PROBLEM FOR YOU?

	NO!	**no**	**???**	**yes**	**YES!**
1. getting to a computer	**1.** 1	2	3	4	5
2. lack of phone lines	**2.** 1	2	3	4	5
3. learning to use a network	**3.** 1	2	3	4	5
4. network difficult to use	**4.** 1	2	3	4	5

Part E: Why You Might Use Networks

E-1.

What professional/personal interests persuade you/could persuade you to use networks? Circle 3 (???) if you neither agree or disagree.

I USE/COULD USE NETWORKS:

		NO!	no	???	yes	YES!
1.	for entertainment	**1.** 1	2	3	4	5
2.	to get interesting things to talk about	**2.** 1	2	3	4	5
3.	to keep up with current issues	**3.** 1	2	3	4	5
4.	to pass the time	**4.** 1	2	3	4	5
5.	to keep in touch with family and friends	**5.** 1	2	3	4	5
6.	to find out about events I'm interested in	**6.** 1	2	3	4	5
7.	to take a pleasant break from work	**7.** 1	2	3	4	5
8.	to compare my ideas with what others think	**8.** 1	2	3	4	5
9.	to exchange information or advise	**9.** 1	2	3	4	5
10.	to meet people	**10.** 1	2	3	4	5
11.	for sending messages in place of a phone call	**11.** 1	2	3	4	5

Are there any other reasons you enjoy using computer networks besides those mentioned above? Please comment:

E-2

Circle all that apply

Use of the Internet has provided me with at least one instance of the following:

1. professional contacts
2. job information
3. conference information
4. lesson plans
5. lesson information
6. other _____
7. don't use

E-3.

Use the following scale to describe the frequency of your computer communications professionally:
0 = No Contact 1 = Monthly or Less 2 = About Weekly 3 =About Daily

PROFESSIONALLY, DURING THE PAST 3 MONTHS, HOW FREQUENTLY HAVE YOU USED CMC TO COMMUNICATE WITH:

		No Contact	Monthly or Less	Weekly	Daily
1.	people in other schools in your district	**1.** 0	1	2	3
2.	people at higher levels in your district	**2.** 0	1	2	3
3.	people at higher levels outside your district	**3.** 0	1	2	3
4.	people in government	**4.** 0	1	2	3
5.	experts or consultants	**5.** 0	1	2	3
6.	peers	**6.** 0	1	2	3
7.	sites in search of professional information	**7.** 0	1	2	3

E-4.

Use the following scale to describe the frequency of your computer communication socially:
0 = No Contact 1 = Monthly or Less 2 = About Weekly 3 =About Daily

SOCIALLY, DURING THE PAST 3 MONTHS, HOW OFTEN HAVE YOU USED THE INTERNET TO COMMUNICATE WITH:

		No Contact	Monthly or Less	Weekly	Daily
1. Friends and family	**1.**	0	1	2	3
2. Peers	**2.**	0	1	2	3
3. Web sites in search of personal information	**3.**	0	1	2	3
4. Web sites in search of entertainment	**4.**	0	1	2	3

Part F: Your Feelings About Computer Networks

F-1.

How important are the uses of CMC and the Internet to you? Circle 3 (???) if your answer is a maybe.

COMPUTER NETWORKS ARE IMPORTANT:

		NO!	no	???	yes	YES!
1. in my job	**1.**	1	2	3	4	5
2. for information	**2.**	1	2	3	4	5
3. for professional development	**3.**	1	2	3	4	5
4. ease my work load	**4.**	1	2	3	4	5

F-2.

What is your perception of computer-mediated communication? ***Circle 3 (???) If you are unsure of your answer.***

		NO!	no	???	yes	YES!
1. By using CMC, I often communicate with people whom I would not otherwise have contacted	**1.**	1	2	3	4	5
2. By using CMC, I often look for information that I would not otherwise have sought	**2.**	1	2	3	4	5
3. CMC has made it easier for me to reach people with whom I need to communicate.	**3.**	1	2	3	4	5
4. Without CMC, it would be more difficult for me to acquire information that I want.	**4.**	1	2	3	4	5
5. I was able to explore using CMC before I decided to become a member.	**5.**	1	2	3	4	5
6. CMC is at times confusing	**6.**	1	2	3	4	5
7. I find using CMC complex	**7.**	1	2	3	4	5
8. CMC is easy to use	**8.**	1	2	3	4	5
9. Using CMC helps me at work	**9.**	1	2	3	4	5
10. Using CMC helps me in my personal life	**10.**	1	2	3	4	5
11. There are other persons at work whom I have observed using CMC	**11.**	1	2	3	4	5
12. I have friends that use CMC	**12.**	1	2	3	4	5
13. I heard of or saw some of the benefits associated with using CMC?	**13.**	1	2	3	4	5

F-3.

Work at fairly high speed. It is your first impressions and immediate feelings about computer networks that is important. Judge each item as to your feelings toward computer networks by marking on the scale closest to the adjective that best indicates how you feel.

Example: important __:__:__:__:_X_:__:__ unimportant

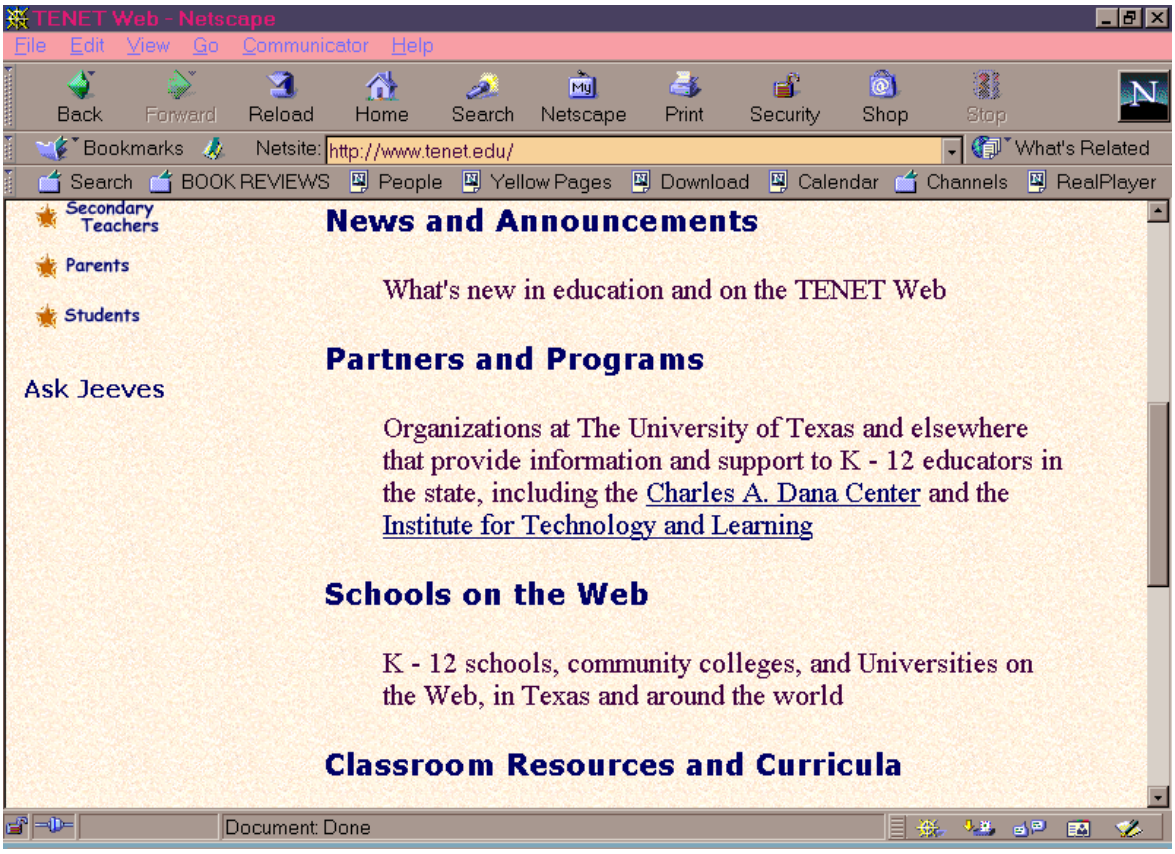
TO ME COMPUTER-BASED COMMUNICATION IS:

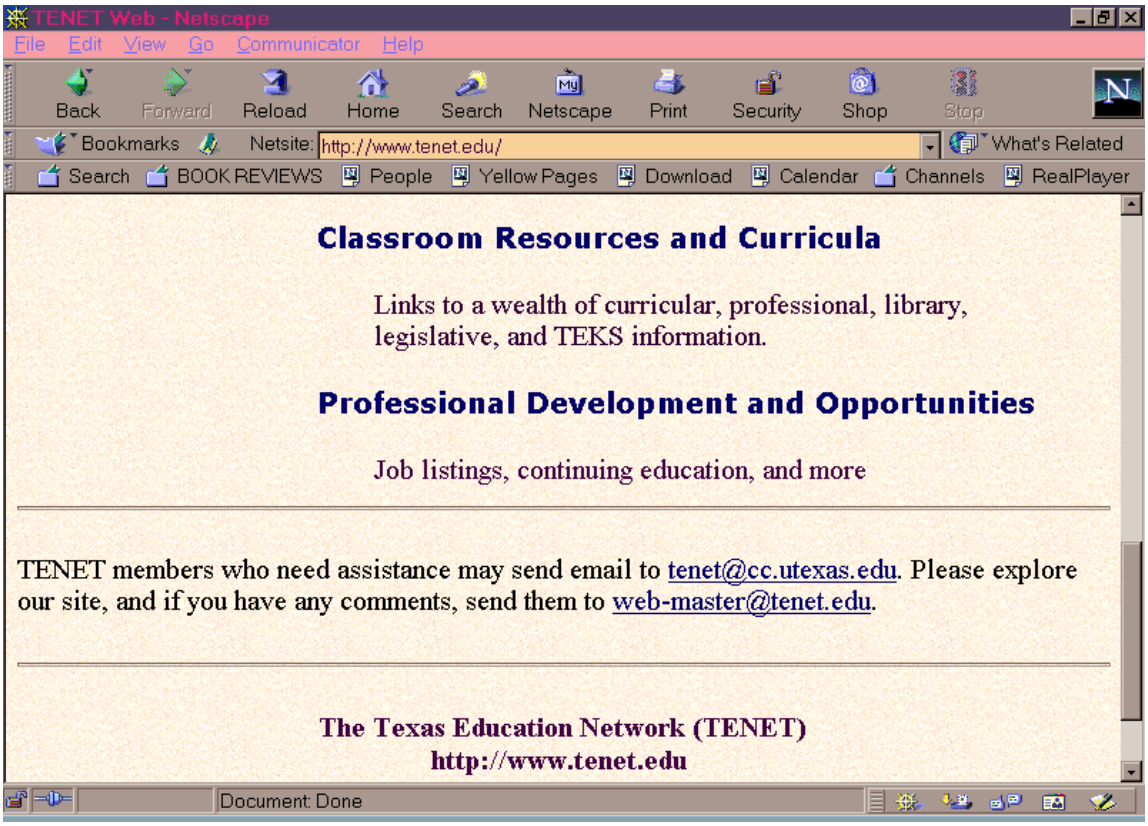
important	__:__:__:__:__:__:__	unimportant
boring	__:__:__:__:__:__:__	interesting
relevant	__:__:__:__:__:__:__	irrelevant
exciting	__:__:__:__:__:__:__	unexciting
means nothing	__:__:__:__:__:__:__	means a lot
appealing	__:__:__:__:__:__:__	unappealing
fascinating	__:__:__:__:__:__:__	mundane
worthless	__:__:__:__:__:__:__	valuable
involving	__:__:__:__:__:__:__	uninvolving
not needed	__:__:__:__:__:__:__	needed

APPENDIX B

TENET SCREEN CAPTURES


TENET Web - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Netsite: http://www.tenet.edu/ What's Related
Search BOOK REVIEWS People Yellow Pages Download Calendar Channels RealPlayer
The University of Texas at Austin
The Texas Education Network
TENET
Welcome to the TENET Web. Our purpose is to provide useful, up-to-date resources for the education community, including teachers, administrators, parents and students.
Important Changes
Jumpstarts for
Administrators
Elementary Teachers
Secondary Teachers
Services and Support
Services available to TENET members including electronic mail, listservs, support, and more
News and Announcements
Document: Done


TENET Web - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Netsite: http://www.tenet.edu/ What's Related
Search BOOK REVIEWS People Yellow Pages Download Calendar Channels RealPlayer
Secondary Teachers
Parents
Students
Ask Jeeves
News and Announcements
What's new in education and on the TENET Web
Partners and Programs
Organizations at The University of Texas and elsewhere that provide information and support to K - 12 educators in the state, including the Charles A. Dana Center and the Institute for Technology and Learning
Schools on the Web
K - 12 schools, community colleges, and Universities on the Web, in Texas and around the world
Classroom Resources and Curricula
Document: Done


TENET Web - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Netsite: http://www.tenet.edu/ What's Related
Search BOOK REVIEWS People Yellow Pages Download Calendar Channels RealPlayer
Classroom Resources and Curricula
Links to a wealth of curricular, professional, library, legislative, and TEKS information.
Professional Development and Opportunities
Job listings, continuing education, and more
TENET members who need assistance may send email to tenet@cc.utexas.edu. Please explore our site, and if you have any comments, send them to web-master@tenet.edu.
The Texas Education Network (TENET)
http://www.tenet.edu
Document: Done

APPENDIX C

LETTERS TO TENET COMMUNITY

Received: (from root@localhost) by formby.tenet.edu (8.8.6/8.7.1) id SAA01906 for users.bx@tenet.edu; Fri, 12 Sep 1997 18:28:29 -0500 (CDT)
From: cstout@tenet.edu
Message-Id: <199709122328.SAA01906@formby.tenet.edu>
To: all.tenet.users@tenet.edu
Date: Fri, 12 Sep 1997 13:56:41 -0500
Subject: An Open Letter to the TENET Community
Status: O
X-PMFLAGS: 33554560 0

An Open Letter to the TENET Community

When TENET was established in August 1991, Texas became the first state to launch an Internet-based network designed specifically for use by educators. The Texas educational community, along with TENET, has been at the forefront of telecommunications technology implementation and usage. During this time TENET received support from our partners at the Texas Education Agency, the regional Education Service Centers and professional associations, as well as from educators across the state. TENET has evolved from a dialup transport system into a high-quality source for multiple resources and services capable of serving the entire community of Texas educators.

Currently, TENET services enable Texas educators to participate in discussion forums with other educators, access web resources that are correlated to the new Texas Essential Knowledge and Skills documents, and apply for educator job openings across the state. Through TENET resources, Texas educators can access newsgroups, databases, on-line libraries, sophisticated search engines, and encyclopedias. In addition, TENET maintains an email system which identifies the user as a member of the Texas education community. Also the email system is portable-that is, its users can keep the same email address during their entire professional careers, making it easier to stay in contact with colleagues.

To assist educators in utilizing TENET's resources and services, TENET provides a Master Training Program for educators to participate in a Trainer of Trainers model. Educators learn to support and train their peers in exploring the Internet and integrating the use of Internet resources in their curriculum. Also, TENET maintains a customer support center that is staffed six days a week by professionals with experience with K-12 education. Throughout TENET's evolution, our goal has been to provide an information service specifically tailored to the needs of Texas administrators, teachers, and their students.

Since October 1995, TENET has been part of the Charles A. Dana Center at the University of Texas at Austin. The Dana Center's mission is to strengthen education by working with and supporting innovative efforts of Texas educators. Over the next few weeks, staff at the Dana Center and the Texas Education Agency will work together to

formulate plans to preserve important services that TENET staff and you, the community of Texas educators, have created. We will share these plans with you as they are developed. As TENET moves into the next phase of its evolution, I deeply appreciate the support you show to the Texas Education Agency, the Charles A. Dana Center, and the TENET staff.

Sincerely,

Connie Stout

Connie Stout
10100 Burnet Road, PRC. CMS 1.154
Austin, TX 78758
http://www.tenet.edu/

Director, Texas Education Network
University of Texas Austin
512-475-9440 voice
512-475-9445 fax

Received: (from root@localhost) by formby.tenet.edu (8.8.6/8.7.1) id AAA10618 for users.aq@tenet.edu; Fri, 10 Oct 1997 00:51:44 -0500 (CDT)
Message-Id: <199710100551.AAA10618@formby.tenet.edu>
To: All TENET users <all.tenet.users@tenet.edu>
Date: Thu, 9 Oct 1997 18:01:24 -0500
From: "Connie Stout" <cstout@tenet.edu>
Subject: A Letter to the TENET Community
Status:
X-PMFLAGS: 33554560 0

Dear TENET Colleague,

In my last letter we explained that we were working with Texas Education Agency to make plans for the next generation of educational telecommunications. These discussions were productive and on Monday, October 6th, Commissioner of Education Mike Moses announced an agreement between The University of Texas at Austin's Charles A. Dana Center and the Texas Education Agency. TEA will phase out funding to TENET by December 31, 1997, and TENET will operate as an Internet educational training, content, and resource provider with funding from grants and fees. TENET will continue services offered through its newly developed Internet Resources, its Customer Support Center and its Professional Development program. Also, TENET will continue to provide enhanced tenet.edu electronic mail accounts for the Texas education community.

As part of our agreement, the Commissioner generously agreed to donate more than one million dollars of telecommunications equipment for use by TENET to continue our services. The Dana Center has agreed that all educational resources developed through grants by the Agency will be available to all Texas educators free of charge. We have agreed to work together in ways that provide the best resources for all Texas educators.

During the next few weeks, a fee-based application process will be initiated for TENET users. By December 31, 1997, educators who currently have TENET accounts will need to upgrade to TENET Plus. Also, educators who have TENET Plus accounts will receive instructions for maintaining their TENET Plus accounts. TENET web users will need a TENET Plus account to access certain resources, such as the TENET directory, the educational search engine, and the educator forums. Many other areas of the web, however, will remain open to the general public.

For a fee, TENET Plus accounts will be available to private school educators, home schoolers, retired teachers, university faculty and staff, volunteers involved in education, and many others. For more information, please feel free to contact the TENET office at 512-475-9440.

We look forward to continued work with the Texas Education Agency, Education Service Centers, institutions of higher education, professional associations, and other

partners in providing resources to support K-12 education.

We deeply appreciate the support you have shown to TENET, the Charles A. Dana Center, and the Texas Education Agency as we've worked together to create an agreement benefitting Texas educators and students.

Sincerely,

Connie Stout,
Director, Texas Education Network (TENET)
Attachment: FAQs RE: Status of TENET

Received: (from root@localhost) by formby.tenet.edu (8.8.6/8.7.1) id SAA30542 for users.aq@tenet.edu; Fri, 24 Oct 1997 18:23:31 -0500 (CDT)
Message-Id: <199710242323.SAA30542@formby.tenet.edu>
To: All TENET users <all.tenet.users@tenet.edu>
Date: Fri, 24 Oct 1997 16:01:24 -0500
From: "Connie Stout" <cstout@tenet.edu>
Subject: 1998 TENET Membership
Status:
X-PMFLAGS: 33554560 0

****OPENING A NEW CHAPTER IN LEARNING FOR TEXAS STUDENTS****
Enroll now to continue your membership in the TENET community in 1998.

Activate your 1998 TENET membership between October 29th and December 12th, and you'll tap into a powerful resource for you and your students. Even better, you'll receive two months free! Remember, your current TENET account is funded by TEA through December only. So the time is now to become a TENET member for 1998, and enjoy all the advantages TENET provides educators like you. For a limited time you can get started for just $28 per year. Rest assured, there's no better investment for your students and your career.

TENET automatically connects you with a community of Texas educators, allowing you to share ideas and concerns with educators across the state. In addition, you'll always stay in touch thanks to your "tenet.edu" e-mail address that's identifiable and portable. It will stay with you throughout your professional career.

TENET OFFERS YOU A 4TH R: RESOURCES
As a TENET member, you can access a wealth of Online Resources that are easy to use and organized specifically for educators. These include easy access to content which is vital to anyone in Texas education, such as web resources correlated to the TEKS, grant information, important links to specific subject areas, and an educator job search. You can even conduct customized educational searches, share information in countless newsgroups, and participate in password-protected online discussion areas with document sharing.

As a TENET member, you can count on customer support that enables you to call or e-mail when you need technical help. The Customer Support Desk even provides you with advice on technical matters, consumer information, and online assistance via the Internet. You can also choose from Professional Development courses that include: Master Training, Basic Internet, Web Development, Using the Internet in the Classroom, Industry-Certified Networking Fundamentals (Windows NT available soon), and Electronic Mentoring.

IF YOU WANT MORE POWER IN THE CLASSROOM, RAISE YOUR HAND
TENET is an information resource created solely for Texas educators like you. By

joining the TENET community between October 29th and December 12th, you'll receive a special discount, too. Enroll online at www.tenet.edu beginning October 29.
Membership Fees

$37 first year *
$28 annual renewal
* Plus tax where applicable

Special rate: Enroll by Dec. 12, 1997 for $28* and get 14 months of membership (January 1, 1998, through Feb 28, 1999)

DIRECTIONS FOR 1998 MEMBERSHIP ENROLLMENT
On Monday, October 27, 1997, a message will be sent to all current TENET Account Holders giving specific directions on how to activate your 1998 membership.

TENET FAQs Regarding Status of TENET and TENET Plus

We encourage you to look also at the Texas Education Ageny FAQ document located at http://www.tea.state.tx.us/press/tenetfaq.html

1. Texas Education Agency will be withdrawing its funding from TENET Plus on December 31, 1997. What is going to happen to TENET Plus?

TENET Plus will continue to offer high-quality Internet services and resources, training, technical assistance, and customer support. TENET Plus will remain with the Charles A. Dana Center at The University of Texas at Austin and work closely with TEA to provide resources for the educational community. You will receive more information about continuing your TENET Plus account in the next few weeks.

2. Will I get to keep my TENET email address?

Yes. TENET email can still be used with any Internet Service Provider or through your school district's dedicated access.

3. When will the TENET text-based resource and modem pool network no longer be available to Texas educators?

TEA's financial support of the TENET text-based network will be completely phased out by December 31, 1997. TENET will no longer be able support the text-based network. TENET account holders must upgrade to TENET Plus accounts by December 31, 1997, in order to keep their tenet.edu mail account.

4. What will I need to do when the TENET text-based resource and modem pool network goes away?

Prior to December 31, 1997, you will need to seek an Internet Service Provider for access to the Internet. In addition, you should evaluate your computer equipment to determine if your current hardware and software system will support a graphical Web browser.

Information about ISPs can be found on our web site at:
http://www.tenet.edu/help/faq/isp.html

5. I can access the TENET text-based resource and modem pool network with my current computer. Will I have to upgrade my computer if I use an Internet Service Provider?

You should check with local Internet Service Providers to determine their requirements. Most ISPs do require that your computer support a graphical Web browser. If your

computer does not, you will need to upgrade your system. Information about ISPs can be found on our web site at: http://www.tenet.edu/help/faq/isp.html

6. What is included in a TENET Plus account?

TENET Plus accounts provide enhanced email, educational search capabilities, and curriculum and other educational resources, in addition to the Educators' Forum - a secure collaborative environment for newsgroups and discussions.

7. How do I apply for a TENET Plus account?

Texas educators may apply for a TENET Plus account on the TENET web site with the online interactive TENET Plus application. The application is located at: http://www.tenet.edu/help/application.html

For more information on the TENET Plus application and additional help, check here: http://www.tenet.edu/help/faq/tpapp.html

8. When can I pay for my TENET Plus account?

In the next few weeks information addressing fees and payments will be sent to the TENET community.

9. What does it mean for me that TEA will no longer fund TENET?

TENET is committed to providing resources that complement those available on the TEA web site. TEA and TENET will continue to work together to provide online resources for the educational community. A fee will need to be assessed to support the TENET services.

10. Will TENET provide a directory of the names of Texas educators and their respective email addresses so I can continue to correspond with my colleagues?

Yes, a directory of TENET users will be available soon on the TENET Home Page, at http://www.tenet.edu.

11. One of the best features of TENET Plus was the abundance of resources that TENET Plus made available to K-12 educators. What will happen to those resources?

TENET will continue to work with Education Service Centers and the Texas Education Agency to seek funds to support the development of resources for Texas educators. TENET Plus resources will continue to be available for all Texas educators. In addition, we have just received a NASA grant as well as a grant from the National Science Foundation, both of which will help provide an abundance of resources for educators.

See also the TEA FAQ response.

12. What will happen to the TENET newsgroups?

TENET will continue to support many of the TENET newsgroups.

See also the TEA FAQ response.

13. What are the plans for the TENET Master Training program?

TENET will continue to support the TENET Master Training program. Information about the TENET Master Training program and numerous training opportunities available through August 1998 can be found on the TENET web site at: http://www.tenet.edu/tenet-info/publications/training.html

14. What will happen to the special groups like the Emerging Technologies group and the Teachers Accessing Technology group which were formed by TENET?

These groups will continue and will be supported by other grants.

15. What will to happen to the TENET staff?

The TENET staff remain a part of the Charles A. Dana Center and will continue to be employees of The University of Texas at Austin.

16. How are TENET and Southwestern Bell related?

TENET is a technical support, training, and resource provider and is accessible through a dedicated connection at school and through all Internet Service Providers (ISP) including Southwestern Bell Internet Service. TENET will no longer be an Internet Service Provider with access to the Internet.

17. My Southwestern Bell toll free number no longer works. How can I get it operative again?

Southwestern Bell Telephone provided that toll free under H.B 2128 which directs SWBT to provide toll free access where there is not a local ISP. When local ISPs notify SWBT they want the toll free calling blocked, SWBT by law must comply. You may want to explore other options with SBIS or contact your local ISP.

Questions regarding Southwestern Bell need to be addressed to Southwestern Bell Internet Services or the Texas Education Agency.

Southwestern Bell: 800-NET-HELP

Texas Education Agency: (512) 463-9800

18. I recently signed up for the Southwestern Bell Internet Services' (SBIS) "Southwestern Bell Internet Access for Educators" $8.95 per month Internet Access package. What will happen to my e-mail come December 31, 1997?

Nothing. TENET Plus will continue to provide Texas educators email and other educational resources. Your email will continue and your email address will not change.

If you wish to continue receiving TENET Plus email, do not change your email settings. TENET Plus email will continue uninterrupted.

Connie Stout Director,
10100 Burnet Road, PRC. CMS 1.154
Austin, TX 78758
http://www.tenet.edu/

Texas Education Network
University of Texas Austin
512-475-9440 voice
512-475-9445 fax

To: All TENET users
From: Sam Zigrossi
Date: Monday, 26 Oct 98 11:31:08 CST
Subject: TENET Update

GREAT NEWS, TENET services will continue to be offered to educators through 1999!

The University of Texas Academic Computing and Instructional Technology Services (ACITS) will be taking over the technical operations of TENET after December 1998 and will continue to provide services at least through December 1999.

As many of you know, ACITS was involved in the original development and operation of TENET. TENET was then transferred to the Charles A. Dana Center for further development, particularly in the area of content development. Dr. Tom Edgar, Associate Vice President of ACITS, has been instrumental in developing the support plan for the continuation of TENET services through The University of Texas.

In summary, the status of TENET is as follows:

1. The tenet.edu domain name will remain active indefinitely. So if schools, districts, etc are using the domain name, they will not have to make any changes.

2. The www.tenet.edu website will also remain active after December 1998. We will be changing some things, by transferring some materials to other sites, but the website will continue to be a great site to direct users to various educational resources as it currently does.
3. The tenet.edu mail referral system will remain active through at least December of 1999.
4. The ACITS group will be taking over the technical management of the system next year, and will not require users to pay a subscription fee. The plan is to provide users a tenet.edu mailbox and access to some chat/forum services (currently under development) .

NOTE: There will be no new subscribers/users until ACITS works out their technical support plan which will not be until early 1999.

The University is to be commended for supporting the Texas Education Network, and continuing to look at ways to connect other University resources to the education community via TENET. We hope to expand TENET membership by offering this new free service, and to continue to make it more valuable to participants.

We want to express our wholehearted thanks to the hundreds of you that took the time to share your ideas, suggestions, and support as a result of the June communication we sent to you. The information was very useful as we worked to put a plan in place for both continuing and evolving the TENET resource for educators. We will put up-to-date

information on www.tenet.edu.

We look forward to our continued association, and the exciting future in educational technology.

Sam Zigrossi
Director of SSI
Charles A. Dana Center
2901 N. IH 35 STE 2.200
Austin, TX 78722
512-232-2274
512-232-1855 Fax
samz@mail.utexas.edu

Dr Tom Edgar
Associate Vice President ACITS
Computation Center (G2700)
The University of Texas
Austin, Tx 78722
acits@cc.utexas.edu

TEXAS EDUCATION AGENCY

Southwestern Bell Internet Services for Educators Program
December 16, 1998 Announcement

December 16, 1998

TO THE SUPERINTENDENT ADDRESSED:

The Texas Education Agency is continuing to implement the Commissioner's Public Access Initiative. This initiative includes providing information to educators, legislators, and the public over the Internet. Some changes to the Agency's operation are already in place, and many educators across the state are already benefiting from them. For example, public school educators in the state are eligible to receive electronic mail through their regional education service center. In addition, many Agency business applications, including AskTED, EMAT Online, and others, are now taking place over the Internet.

For the past two years, the Agency, through an agreement with the General Services Commission, has provided subsidized access to the Internet through Southwestern Bell Internet Services (SBIS). The SBIS for Educators program focuses on providing access to the Internet from home. The access initiative focuses Agency resources on providing access from school or work. In many cases, it is more cost effective for school districts to offer dial-up access to their educators. More and more districts are installing connections to the Internet with assistance from the Telecommunications Infrastructure Fund, federal, state, and local funding sources.

In June the Agency notified educators that the Agency would no longer subsidize SBIS service for educators (see attached letter). Today's letter provides an update on the rate available beginning January 1, 1999. Although the Agency-subsidized rate will end on December 31, 1998, educators can still use SBIS for Internet access. SBIS offers a rate of $21.95 per month for 150 hours of access plus a one time $14.95 installation fee. Current SBIS subscribers will automatically rollover to the $21.95 plan on January 1, 1999, and pay no installation fee. There will be no break in service for current subscribers.

This change will also affect the use of the special toll-free number (1-888-SBC-4TEA / 1-888-722-4832) now being used by educators for Internet access. That toll-free number was provided by Southwestern Bell Telephone Company exclusively to the Agency to assist our efforts to provide toll-free Internet access to educators. Since we will no longer subsidize Internet access for educators, the use of the toll-free number will also be discontinued on March 31, 1999. However, Southwestern Bell Telephone will continue to provide toll-free dialing to educational institutions and libraries in its service area that do not have access to a local Internet Service Provider (ISP) as required by House Bill 2128, passed in 1995. Any school (district or campus) that is eligible for

toll-free dialing to an ISP can choose to provide that toll-free number to its faculty for their use in reaching the ISP selected by the school. This toll-free dialing can be obtained by completing an Agreement and Request Form and submitting it to Southwestern Bell Telephone. To receive a copy of the form, please email requests to the following address: ls3605@sbc.com. Only one Agreement and Request Fom per educational institution should be submitted for a toll-free number.

In summary, if you are using 1-888-722-4832 to reach SBIS, you will need to have your school make an application to Southwestern Bell Telephone to obtain a new toll-free dialing arrangement before March 31, 1999.

For information about the Commissioner's Access Initiative, see the Agency's homepage at http://www.tea.state.tx.us or send electronic mail to cap@tea.tetn.net or call the Division of Instructional Technology at 512-463-9400. For information about SBIS account services or billing, see SBIS's Customer Service page at http://dialup.swbell.net/customer/ or send electronic mail to support@swbell.net.

Sincerely yours,

Felipe Alanis

Deputy Commissioner for Programs and Instruction

Attachment

Dear TENET Subscriber:

Greetings! I'm writing to give you some information about the future of TENET. I'm sure you've heard a lot of different things over the past few years, and you may have found it difficult to sort out just what was happening. So here it is.

TENET is now operated and funded entirely by The University of Texas at Austin. Effective March 1, 1999, a limited subset of TENET services will be transferred to ACITS, the Academic Computing and Instructional Technology Services division of The
University. These are:

> World Wide Web services, including the TENET Web site (http://www.tenet.edu) and hosting for certain Web-based projects developed by TENET subscribers, e.g., those supported by TENET mini-grants Electronic mail, including a full-time person to answer your Help Desk questions via email; permanent @tenet.edu email addresses for individual subscribers no matter where you move within the state; school-district.tenet.edu domain names for districts and campuses; and hosting electronic mailing lists to support TENET subscribers' projects.

Please note! As of March 1, 1999, these services will be available at no charge to TENET subscribers! These services are similar to those available to faculty at the University of Texas at Austin, and we offer them to TENET subscribers because we believe it's important to support our colleagues in the Texas education system. All we ask is that you complete a TENET subscription request so that we can keep your account information current.

That's the good news. The bad news is that, at least for now, there are certain services that TENET can no longer provide. The following services will be discontinued effective March 1, 1999:

TENET Forums
TENET newsgroups
The search engine on the TENET Web site
The TENET Master Trainers program

We believe that we've been able to preserve the services that TENET subscribers currently find essential. Our TENET Committee will continue to evaluate subscriber interest, and will introduce additional TENET services as subscriber support and our budget permit. Please feel free to contact us at the above address with your ideas.

TENET is important to us here at UT, and we know that it's been important to you. We also know that it hasn't been everything it could be in recent months. We're committed to changing that.

With best regards and continuing thanks for all you do.

Sheldon Ekland-Olson
Executive Vice President and Provost
The University of Texas at Austin

New Tenet Web, and Discontinuation of Search and Forums - 13 May 1999

3 May 1999

On 1 June 1999 you will see a new home page for www.tenet.edu. If you would like to see a mockup of the new page, we have it available for you now at http://www.tenet.edu/newhome/. Please send comments and suggestions to tenet@cc.utexas.edu.

We also want to announce some additional changes that will be happening at the same time. The changes are summarized below. Additional details on these changes are available at http://www.tenet.edu/announce/banner.html.

1. We have received inquiries about the rate increase by Southwestern Bell for their ISP service for Texas educators. We would like to clarify this situation. Tenet did offer a low-cost statewide dial-in network for Texas educators during the years 1991-1998. But in 1998, the Texas Education Agency took over this function and negotiated a separate contract with Southwestern Bell to provide dial-up connections to the Internet. Tenet has not been an Internet Service Provider since 1998 nor is it part of the discussions between TEA and Southwestern Bell. The letter from TEA describing the end of the reduced Southwestern Bell rates is included in the "Details" section of the Web site mentioned above. Please contact Southwestern Bell directly for any additional information concerning your ISP account (support@swbell.net). You may use ANY Internet Service Provider to connect you to the Internet and then access your free Tenet account and its services.

2. We have heard your requests for family filtered search engines. We will provide a new, clickable link that will bring up the Ask Jeeves for Kids page at www.ajkids.com. AskJeeves for Kids offers several advantages over our previous search engine: a) it performs best when you ask it a question ("Where can I find fireworks sound effects written in Java for my web page?") instead of the usual keyword approach; and b) it uses commercial family filtering software instead of our homegrown bad keywords system. We recognize that the Ask Jeeves for Kids does have the limitation that visually it is designed for kids. The Ask company is looking into having separate pages for pre-teens and teens.

3. As previously announced, Forums will be removed from service on 1 June. We did hear you though when you asked us about the UNITE forum, a job bank. We received permission from TASAnet, the Texas Association of School Administrators network, to provide a clickable link to their comprehensive Texas educators job bank, http://www2.tasanet.org/ejb.html. This job bank has a lot more data than was available in the UNITE forum.

4. We have received a few phone inquiries asking for help. We are glad to be

offering you technical support. Unfortunately, we are ONLY budgeted to help you via email. We can not return phone calls nor staff a phone desk. But we look forward to serving you via email, please see http://www.tenet.edu/help/. Our goal is to answer routine questions within one to two working days.

5. We are also putting together a survey of Tenet users and of teachers who are not using Tenet to learn more about various web-based service needs of the Texas education community. We want to learn how The University of Texas at Austin can make the Tenet web site more valuable to Texas K-12 teachers. We look forward to working with you!

Regards,

The Tenet Group tenet@cc.utexas.edu

Zelina Urias-Barker

From: Gene Titus [gene@mpd.ots.utexas.edu]
Sent: Friday, August 04, 2000 11:22 PM
To: Zelina Urias-Barker
Subject: Re: Information on Number of TENET subscribers.

Hi Zelina,

The TENET project has been passed around a couple of times here at UT and no longer has funding. The current number of subscribers is 6,000, and that is just e-mail accounts. Tenet no longer has any web based restriction on usage. Anyone can use the web based resources.

1998 would be 50,000
1999 would be down to 10,000 as funding ran out. Also, in 1999, a subscriber was defined as a user who has checked his e-mail within the last 6 months. I deleted around 40,000 account that were not being used in February 1999.

Now the e-mail system is waiting to fade away. There are too many free email services offered on the net for the University to spend money on the project.

Hope that helps.

Gene Titus
Tenet Postmaster

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