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Study of the use of telecommunications in the classroom

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STUDY OF THE USE OF TELECOMMUNICATIONS IN THE CLASSROOM

by

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ABSTRACT

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Study of the Use of Telecommunications
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Dr. Louis Molinari
Elementary Education / Computer Emphasis

The purpose of this study was to investigate the level of integration of technology in the classroom. Specifically, the study was to look at computer software and related Internet and telecommunication usage.

The study took place in Camden, Cumberland, Gloucester, and Salem Counties in New Jersey. Teachers in four public school districts from each county were invited to participate. A letter was sent to the chief administrator of each selected school district, explaining the purpose and significance of the study. A packet was also sent to each teacher in the participating schools. The packet included an introductory letter and a questionnaire. In addition, the questionnaire was posted on the Internet.

Differences were found in the actual use of telecommunications among the selected participating schools. Teachers and schools were using many, but not all of the technology standards recommended by the New Jersey Department of Education.

MINI-ABSTRACT

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A survey was conducted from four public schools each in Camden, Cumberland, Gloucester, and Salem Counties, New Jersey. The study was to investigate the use of telecommunications via Internet and distance education in the classrooms. Differences were found among the recommended use and actual use in the participating classrooms.

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THE PROBLEM

Introduction

In the early 1800s, schools were described as having only one room, four walls, blackboards, tables and chairs. The students sat at their assigned desks while the teacher stood in front of the room, or moved about to see if the class was paying attention. The students sat for long periods of time, listened carefully to the teacher, and spoke only when directed to do so (Rowe, Shih, and Smith, 1998).

Today, our current education system is more or less based on the educational model described above. Traditional instruction is very verbal, seldom visual, and rarely hands on. Students receive assignments near the end of a period and are required to complete it on a given date. This teaching method requires students to retain information to be used at a later time. Today's education should not be relegated solely to the teacher or the chalkboard. Classrooms still may use overhead projectors, audio and video tapes, and television, but computers and distance learning are actively becoming mainstays in the classroom (Rowe, Shih, and Smith, 1998). The classroom environment has potential to change and probably will change drastically. However, we must be sure that the new change to do technology is given the proper direction.

With new technologies in the classroom, it seems obvious

that new methods for educators need to be used. These methods need to be developed, refined, and utilized by teachers. Technology is becoming a major factor in classroom teaching and learning and therefore, these methods must reflect this new methodology, a methodology based on the various forms of telecommunications.

Computer technology allows students to acquire knowledge that is housed not only in a one room schoolhouse, but in a virtual space that is not subject to limitations of the geographic location of the school or the length of the school day (Compaq Educational Resources, 1999). Students can, with the use of telecommunications, communicate with other students from around the world, via video conferencing, or at their own convenience through e-mail, listservs, or electronic bulletin boards. Experts tell us that when schools use telecommunications, students become highly motivated. This leads to increased student involvement and they become more responsible for their individual learning (Rowe, Shih, and Smith, 1998).

Significance of the Study

The use of the Internet is worldwide. Computers are used very frequently today. Computer technology can be found in stores, businesses, homes, and even the entertainment industry. Many people employ computer technology in their daily lives. They use the Internet and the World Wide Web (WWW) for shopping, banking, publishing, communicating, and for finding information. Education experts expect schools to be a key instrument for solving technological and

sociological problems, and they are expected to prepare our work force for the future (Ornstein and Levine, 1997). It follows that our current educational system should prepare our students with the skills necessary to compete and be successful citizens of society (Ornstein and Levine, 1997).

The purpose of this study is to document how technology through telecommunications has been integrated into the public school system. Telecommunications in this study includes Internet use and forms of distance learning.

Experts tell us that the role of the computer in education continues to increase. In 1980, there were only 50,000 computers used in the nation's public schools. By 1985 the numbers increased to 500,000 (Ornstein and Levine, 1997). In the Spring of 2001 an estimated 9.8 million computers were available for instructional use (Technology Update, 2001).

A study was started in 1990, by the Software Publishers Association (Kearsley, Lynch, and McDonald, 1996). This study was completed in 1994, and was based on 133 research reviews and reports from other original research projects. The association's main conclusion was that educational technology had a significant, positive impact on achievement in all subject areas, across all levels of schools, in regular and special needs classrooms.

Public school programs in computer literacy, computer-assisted instruction, and telecommunicational technologies continue to reflect our nation's transition to a high-tech society (Ornstein and Levine, 1997). Most schools today incorporate technology as the best way to give all students an equal educational opportunity (Kearsley, Lynch, and

McDonald, 1996).

One major use of the computer deals with its connection to the Internet. In the fall of 2000, ninety-eight percent of public schools were connected to the Internet (National Center for Educational Statistics, 2000). These computer internet networks allow students and teachers to exchange e-mail or hold on-line conferences with other schools. Information can be collected from distant databases as well as the World Wide Web. Even the poorest school districts can gain equal access to this almost unlimited amount of information (Ornstein and Levine, 1997).

Another form of computer use in our schools is telecommunications. It is defined as teleconferences, teleclasses, and other forms of distance learning (Kearsley, Lynch, and McDonald, 1996).

For education, an important benefit of distance learning is that it can be conducted both synchronous and asynchronously. This allows an instructor to teach students in any location. Distance learning can provide students in rural areas and inner cities the opportunity to take foreign language courses or advanced placement classes: classes that would not be offered in normal settings because of travel or instructional costs (Kearsley, Lynch, and McDonald, 1996).

Learning via computer activity provides opportunities for student involvement or collaboration. With collaborative learning, students may discuss, research, investigate, and disseminate information in small groups and with other groups of students that are not within the school system. Experts recognize that students have more ownership and

responsibility in their learning. They become problem solvers rather than just listener-competitors within a single classroom. The process of creating, analyzing, and evaluating in collaboration increases socialization skills, cultural awareness, general interest, focus, and synthesis efforts (Ellsworth study, as cited in Rowe, Shih, and Smith, 1998).

Electronic dissemination of collaborative projects provides students unlimited opportunities to share results of their learning experiences. In a regular classroom, sharing involves the teacher and a few peers, but with electronic dissemination, a forum for communication and collaboration is established. Students can gain interaction with other students who have additional thoughts and comments to build upon foundational ideas developed in the collaboration process. (Rowe, Shih. and Smith, 1998).

The World Wide Web provides an almost unlimited audience for sharing projects, ideas, and issues over web pages. The World Wide Web can enable school districts to become part of a larger, global, learning community. Students not only have opportunity to learn from their teachers, but also from teachers in other school districts as well (Rowe, Shih, and Smith, 1998).

Teachers may also benefit from networking with their peers (Rockland, 1995). Middle school math teachers may learn more about NCTM teaching standards through on-line discussions, bulletin boards, and e-mail. Teachers are able to get support from fellow educators in their educational field.

The Internet is a pipeline of information in which

educational programming can be offered as a source of useful information (Gifford, 2001). Any information that is broadcast via telecommunications can be enhanced and enriched by web presence (Krebs study as cited in Gifford, 2001). Education-based distance learning networks that were established in recent years, are very viable in the K-12 market. The success of direct broadcast educational systems opens up new avenues for distance learning. The future of distance learning by telecommunications is intertwined with the Internet streaming media.

Given the technology scenario for the present and the future, it is fair to ask whether such systems are capable of delivering an appropriate level of quality education (Romiszowski, 1993). When properly planned, Internet use and distance learning could be more effective than other traditional education instruction methods.

Programs of study may be created with educational information pulled together from various sources and institutions, and offer the promise of overcoming major conventional obstacles, namely the long reaction time required by educational institutions to adapt curricula and content to the changing needs of our society (Romiszowski, 1993).

Statement of the Problem

It is the purpose of this study to discover the level of integration of technology in a typical classroom of today. Specifically, this study will look at the computer and related Internet and telecommunication use.

It is also the purpose of this study to discover if particular factors can be related to the amount of technology integration. The factors could be, but not limited to social-economic status of the district, experience and gender of the participants, and technology training of the teachers.

Specific Hypothesis

The availability of computers, hardware, software, and other technological devises have been incorporated into our schools significantly over the pasts two decades. More money has been budgeted for school districts to increase and enhance educational technology. Therefore, it is hypothesized that with the Internet, distance learning, and other telecommunications becoming more available and affordable, there will be no significant differences in the use of telecommunications technology among public schools selected for this study.

Method of Study

The participants for this study were teachers chosen from a stratified selected sample of elementary schools in Gloucester, Camden, Salem, and Cumberland Counties in New Jersey (see Appendix A). The schools selected represented a cross-section of districts identified according to their District Factor Rating (DFG) by the New Jersey Department of Education (see Appendix B).

Schools were identified from each of the selected districts in the counties mentioned above. Teacher participants were arranged into four groups: Kindergarten

through Grade Three, Grade Four through Grade Six, Grades Seven and Eight,and Grades Nine through Twelve.

The instrument selected was a questionnaire developed by the author that asked the participants to share facts and opinions regarding the use of computer software, Internet and distance learning technology in their particular schools or classrooms (see Appendix C).

The questionnaire asked participants how they were using Internet and distance learning technologies within their areas of instruction. The results were collected, analyzed, and compared to the state survey for use of technology and telecommunications of the public school systems in New Jersey (New Jersey Department of Education, 2001).

A survey was also conducted on the Internet. The short survey was placed on the bulletin board at Yahoo Groups.Com [http://groups.yahoo.com/group/veteran teachers]. At this web site, teachers from around the country had the opportunity to share their ideas on educational technology topics (see Appendix D).

Limitation of the Study

The limitation of this study is that it is restricted to only four counties in the state of New Jersey. The social-economic status, multicultural backgrounds, and other factors could effect the outcome of the study, when compared to the state norm (New Jersey Department of Education, 2001).

Definition of Terms Used

Asynchronous Communication: A method of data communication in which the transmission of bits of data is not synchronized by a clock signal but is accomplished by sending the bits one after another, with a start bit and a stop bit to mark the beginning and end, respectively, of each data unit. Telephone lines can be used for asynchronous communication.

Electronic Bulletin Boards: A computer system equipped with one or more modems or other means of network access that serves as an information and message-passing center for remote users.

District Factor Group (DFG): A system, introduced by the New Jersey Department of Education, that provides a means of ranking school districts by their socioeconomic status. The DFG status is comprised of the following seven traits: 1.Percentage of population with no high school diploma, 2.Percentage with some college, 3.Occupations, 4.Population density, 5.Income levels, 6.Unemployment, and 7.Poverty levels.

E-Mail: The exchange of text messages and communication files over a communications network, such as a local area network or the Internet, usually between computers or terminals.

Ethernet: A local area network (LAN) hardware, communication, and cabling standard originally developed by the Xerox Corporation that can link up to 1,024 nodes in a bus network. A high-speed standard using a baseband communication technique, Ethernet provides for a raw data

transfer rate of 10 Mbps(One million bits per second), with actual throughput in the range of 2 to 3 Mbps. Ethernet uses carrier sense multiple access with collision detection techniques to prevent network failures when two devices try to access the network at the same time.

Internet: The worldwide collection of networks and gateways that use TCP/IP protocols to communicate with one another.

Listservs: One of the most popular commercial mailing list managers, where a group of names and e-mail addresses are grouped under a single name.

Node: In a local area network (LAN), a connection point that can create, receive, or repeat a message. Nodes include repeaters, file servers, and shared peripherals. In common usage, however, the term node is synonymous with workstation.

Search Engine: Any program that locates needed information in a database, but especially an Internet-accessible search service that enables a person to search for information on the Internet. Leading Internet search engines include Alta Vista, Google, Hot Bot, Lycos, and Northern Light.

Synchronous Communication: Sending data at very high speeds by using circuits in which electronic clock signals synchronize the data transfer. Computers in high-speed mainframe computer networks use synchronous communication.

Technology: The application of science and engineering to the development of machines and procedures in order to enhance or improve human conditions or efficiency.

Telecommunications: Transmission of information between

two computers in different locations, usually over telephone, cable wires, or fiber optics.

Video Conferencing: Teleconferencing in which video images are transmitted among the various geographically separated participants in a meeting.

Virtual: Of or pertaining to a device, service, or sensory input that is perceived to be what is not in actuality, usually as more real or concrete than it actually is.

Organization of the Thesis

The thesis will organized into five chapters.

Chapter One will describe the problem that is to be investigated. It will contain the significance of the study, the statement of the problem, the specific hypothesis, the method of study chosen, important limitations of the study, and some key definitions of terms used.

Chapter Two will contain the review of the literature. This literature review will begin with an introduction. It will explain what some experts have said about the use of Internet, distance education, and other forms of educational technology. Ideas will also be presented where Internet and distance learning are currently being modified for use in areas of telecommunications.

Chapter Three will give a detailed description of the design of this study. The design will describe the setting, a description and sample of the population being surveyed, and details of the instrument being implemented in the study.

Chapter Four gives an analysis of the data that was

collected for this study. Comparisons will be made showing Internet and distance learning among the schools chosen in Gloucester, Camden, Cumberland, and Salem Counties. The data will then be analyzed and compared to the state norm in regard to educational usage of the Internet and forms of distance education (New Jersey Department of Education, 2001).

In the final section of the study, Chapter Five will present the author's conclusions and recommendations. The author will present the final summary of the study, and recommendations for any future studies in this area.

The study also contains an Abstract, a Mini-Abstract, Table of Contents, Listings of all figures, illustrations, tables, a Bibliography, and an Appendix.

Chapter Two

REVIEW OF THE LITERATURE

Introduction

Internet-based education is a form of distance learning in which course content is delivered and the interactions are created by the technologies and methodologies of the Internet (Jung, 1999). The Internet is rich with media. It is an online environment that allows people to interact with others, either asynchronously or synchronously. The Internet can create a collaborative environment, or learning can take place in a self-paced, flexible way. The Internet allows a person to take an educational course, or just gather information from anywhere in the world (Jung, 1999).

Distance learning, combined with technology, is now defined as "the ability to teach or communicate with large or small groups of people, dispersed across a wide geographical area, through the use of single or multiple telecommunication services" (Petersen, 1998, para. 1).

This chapter presents relevant background, information reviews, the history of telecommunications and early uses of educational technology. Specifically, the Internet and distance learning, as described by experts, is presented, as well as early attempts at educational television, radio and computer technology.

Present advocates chosen for this chapter will present current examples of Internet and distance learning integration into the educational system.

Early Development of Technology

Before the Internet and distance learning, there were several tools of technology used in public education. In the early 1800's, for example, the slate chalkboard, chalk, and textbooks were technological tools used in the classrooms (Grolier, 1993). In the year 1879, the incandescent lamp was invented by Thomas A. Edison (Edison International, 1999). This source of artificial lighting had a major influence on the way that students could view their class work.

Other technology inventions that came along, were also used in schools. There was the telephone, invented in 1876, by Alexander Graham Bell (Telegraphy, 1974). This form of communication technology is still very much used today as an important source of communication.

The ball-point pen was invented by Lazio Jozsef Biro in 1939. This particular writing instrument went on sale to the public in 1945 (Feel for Writing, n.d.). However, American ball-point pens did not become popular until the 1950's.

A technological machine that made its way into public education was the typewriter. The first practical typewriter was developed by Christopher Latham Sholes in 1868 (Rehr, n.d.). Six years later, the first commercial typewriter was placed on the market by Remington and Sons. This typewriter was refined in 1878. One of the refinements was the addition of the shift bar. This allowed the user to type both upper and lower case letters. It was named the No.2 machine, and even though it took an entire decade, Remington Number 2 was successful, and the Typewriter Industry was on its way (Rehr, n.d.).

In 1942, electric typewriters started to become popular (O'Shea, 1997). Also in the 1940s, small portable typewriters became very successful. Through the years, typewriters continued to change and be refined for educational and commercial use (Cassingham cited in Grolier, 1997). The electronic typewriters could approach modern word processors in things they were able to do.

Developments in early electronics in the 1940s and 1950s made possible the creation of the electronic calculator (Ball and Flamm, 1996). Mechanical calculators, slide rules, as well as paper and pencil, were educational methods of doing calculations. In the early 1960's, calculators were complicated motor-assisted mechanical adding machines with no other electronic parts. These complex gear system calculators performed multiplication and division by using repetitive addition or subtraction (Ball and Flamm, 1996). Calculators have been refined and are still preferred in the classrooms of modern times.

These and other scientific, technological inventions of their time, made their way into public education.

Early Telecommunications

Communication ties together parts of society the way the nervous system ties together the human body. Telecommunication deals with electronic signals. For more than 50 years, some type of electronic messages have been part of the educational program, from telegraphs through satellite dishes (Comptons, 1995). Living in the modern world, there are two main types of communication media: mass

media, such as television, radio, and newspapers. The other is more direct, point to point, such as telephone, telegraph, or data transmissions.

Telecommunications began with the the development of the telegraph in the early 1830s, by Samuel F.B. Morse (Smithsonian Institution, 2001). For the first time, information could be transmitted in great distances almost instantly.

With the invention of the telephone in 1876, by Alexander Graham Bell, early telecommunications began to be transformed. The telephone system turned into dial phoning, and this modern form spread into the middle decades of the Twentieth Century (Silk Road Group, 1993-2002).

The American Telegraph and Telephone Company (AT&T) was incorporated in 1885. Through the AT&T monopoly, over 250,000 telephones were being used in the United States by 1890 (Silk Road Group, 1993-2002).

After 1975, a new transformation of telecommunications began. Telephone lines began to be used with large masses of computer data, as millions of computers were being connected together into a global network (Kristula, 1997).

Until the 1980s, the world telecommunications system had a relatively simple structure. In the United States, telephone service was supplied by a regulated monopoly, AT&T, as mentioned above.

New technology also brought continuing changes in the providers of telecommunications. Private companies in the US, such as AT&T, provided satellite communication links within the country (NASA Experimental Communications Satellites,

2000). In most cases, telecommunications systems transmitted information not only by telephone, but also by other methods, such as open wire, multi pair cable, and coaxial cable.

So with the beginning of modern telecommunications, global networks not only sent voice communications, but also graphics, text, video images, and encoded data. New telecommunication services have been introduced for businesses, home, automobiles, and education (Harris, 2000-2001).

For the past thirty years, telecommunication networks have been greatly enhanced. New broadcasting techniques, optical transmissions, and communications satellites have overcome the limitations of radio waves, which mostly travel in a straight line. Communication satellites, which are orbiting the earth, receive and retransmit signals, when interconnected, to almost any place on our planet (NASA Experimental Communications Satellites, 2000).

Since the 1960s, computer design has included developed systems for remote linkage of users to other computers. The global networks, as mentioned earlier, were mostly used by the military, government, and large company commercial users. The networks had become increasingly interconnected, and have included other regions of the world. Networked connections increased exponentially as use of telephones and personal computers merged. Educational institutions used the merger to begin a reformation in education (Grolier, 1997).

The best known noncommercial computer network that evolved from this technology became known as the Internet. Scholars of modern growth and development of technology, see

telecommunications, the Internet, and its computer capabilities, as a major infrastructure component of the information age. Information has become essential to all things we associate with the quality of life: economic opportunity, education, health care, and public services (Washington Research Council, 1997).

Educational Television: Early Years

A young Russian immigrant named Vladimir Zworykin developed a system of transmitting sounds and pictures: television. This early conception of television focused on a mechanical scanning system with motors and rotating disks. It produced a picture that was only about one square inch. In 1929, Zworykin demonstrated this all-electronic television system in Pittsburgh, Pennsylvania (Zworykin and Television, n.d.). Ten years later (1939) at the World's Fair, television was introduced to the public.

Television in the United States had unbound growth in the 1940s and 1950s. It reflected well-established patterns of early radio broadcasting with regard to financing and regulation. This commercial broadcasting got its economic power from three major networks as advertisements were aired to a national audience (Mareth, 1997). However, noncommercial broadcasting did not do very well at all. Commercial broadcasters aired only a certain amount of nonprofit programming for public-relational needs, which fluctuated widely.

Noncommercial television languished until about 1952. Then, Frieda Hennock, a member of the Federal Communications

Commission, spearheaded a drive to reserve as-yet unlicensed television channels for education. Set aside were 242 channels, but most of these were hard to tune ultra-high-frequency (UHF), and no funding was available to pay for any programs (Broadcast History Timeline, 1998).

Nevertheless, a small chain of educational television stations began to emerge in the 1950s and early 1960s. The funding for these stations came from the Ford Foundation at first, and later on in 1962, by grants from the federal government.

In 1970, the PBS network was established. For the first time, noncommercial television had a national mandate. Public Television was not a fourth network, but the system was run by local competing television stations and two Washington bureaucracies: The Public Broadcasting Service (PBS) and The Corporation for Public Broadcasting (Broadcast History Timeline, 1998). Although PBS was still underfunded, it survived because of viewer donations, private corporate underwriters, and congressional appropriations.

The strongest area of the public broadcasting schedule has been used in public education for many years (Groliers, 1993). Cultural programs like science documentaries, concerts, operas, plays, and especially children's programs have been a mainstay in education. Programs, such as Sesame Street, are still achieving success after many years of broadcasting.

Radio Broadcasting: The Beginnings

Radio was the real beginning of wireless transmission

(Carroll, McArthur, & Holmes, 1997-1998). In 1895, the first experimental transmission of wireless signals was carried out by Guglielmo Marconi. Later in 1901, Marconi made the first transatlantic wireless transmission, using Morse code. This was the early beginnings of electronic, international communications (Marconi Foundation, n.d.).

In the early 1920s, Frank Conrad, while working for Westinghouse, broke new grounds in electronics with shortwave radio signals. Conrad demonstrated that shortwave signals became very strong at great distances (Shortwave and Network Broadcasting, n.d.). Shortwave broadcasts made in Forest Hills, New York by Conrad, could be heard in Europe, Australia, South America, and the Antarctic. For the first time in history, a person could talk into a microphone and be heard almost anywhere on Earth. From this site, Westinghouse operated the first national and world-wide radio network.

Between 1911 and 1930, the idea of radio broadcasting began to grow. The Radio Corporation of America was founded, and the act of daily radio broadcasting began (Carroll, McArthur, and Holmes, 1997-1998).

It was between these years that educational broadcasting began in England. The British Broadcasting Corporation (BBC) began programs for schools and young people in the United Kingdom. In 1930, the BBC began regular, daily educational broadcasts (Carroll, McArthur, and Holmes, 1997-1998).

In the United States, in 1934, The Federal Radio Commission, along with the Federal Communications Commission (FCC) was started by an act of Congress. From then on, a special license would be required in order to broadcast in

the United States (Broadcast History Timeline, n.d.).

However, in 1937, The United States adopted a radio code. It simply stated that information was a social duty and should only be in the public interest. Radio should provide entertainment, information, and education. This in no way should be subject to censorship and should broadcast the truth (Carroll, McArthur, & Holmes, 1997-98).

Since its development, radio communication has been revolutionizing the world. Radio became so popular that people had many opportunities to hear it in some form or fashion.

When television became the electronic medium of the 1950s, experts predicted the demise of radio (Comptons, 1995). Instead, the radio medium flourished, and radio stations began to multiply. By the late 1980s, there were over 4,900 FM stations and 4,200 AM stations broadcasting.

However, some national commercial networks seemed to fade from the scene. Most radio stations targeted a local area for potential listeners. FM stations mostly specialized in music, while AM stations broadcast more talk, news, and general information programming. Educational radio broadcasts were also very limited. Families gathered around the dinner table to watch television rather than listening to the radio (Carroll, McArthur, and Holmes, 1997-1998).

This did not mean that the age of radio was gone. With the advent of satellite transmission, a new type of radio network had emerged. Radio producers were selling programs, via satellite links, to any radio station with equipment to receive them (Mareth, 1997). Many educational and

informational shows became very popular on radio again.

The National Public Radio and American Public Radio had risen in popularity. These two networks supplied programs to radio stations across the country (Comptons, 1995). The programs included news, information, nostalgia, and culture.

There are now countless radio stations worldwide that include local, statewide, and national information (Carroll, McArthur, and Holmes, 1997-98). Radio has revolutionized the world and will continue to impact telecommunications in years to come.

Beginning of the Computer Age

Historically, the most important and widely use computing instrument was the abacus (Ways of Counting, n.d.). In 1642, Blaise Pascal was credited with building the first digital calculating machine. Although it could perform only addition, it was used by Pascal's father to help with collecting of taxes (Meyer, 2001).

In 1822, Charles Babbage of England, developed a small, automatic, calculating instrument called an Analytical Engine (Norfolk Academy Web, n.d.). This machine was intended to be steam-powered, fully automatic, and run by a fixed instructional program. The input portion of the Analytical Engine was an important milestone in the history of computer programming. Babbage got the idea of punch card programming from the French inventor, Jacquard. Jacquard created a revolution in the textile industry. He invented a mechanical method of weaving patterns in cloth. The weaving machine used arrays of metal rods with punched cards. These cards struck

Babbage as the key to automated calculation. Babbage's engine was considered a great advance in calculation machinery. However, it was never fully developed.

Ada Byron, known as Lady Lovelace, was an associate and friend of Charles Babbage. Lady Lovelace knew of Babbage's idea for a calculating machine. Even though the engine was not built, Ada experimented with writing sequences of instructions. If the object of the instructions was to weave a complex calculation out of subcalculations, it was tedious to write instructions over and over again (Rheingold, 2000). Ada felt that a machine should store instructions for later use. When a calculation requires the instructions, a program should be able to retrieve them. Lady Lovelace created the loop, which is the most fundamental procedure in programming languages.

With these early machines already in use, automated computation was introduced in 1890 by Herman Hollerith and James Powers (Meyer, 2001). Hollerith and Powers built a machine that could automatically read information that was punched onto cards, without any human intervention. This particular early computer was used by the U.S. Census Bureau. Other improved punch-card machines soon followed.

It seemed obvious that computer-type machines were finding their way into the field of education. Computers improved as time went on. After Russia launched the first space satellite "Sputnik" in 1956, the National Defense Education Act in 1958, brought some money and new technology into our nation's schools. This was done primarily through vocational education. Computers were not accepted yet in

classrooms that used the teacher/manager method to deliver information to students (History of Computers, 1996).

In 1963, The Vocational Education Act was passed by the United States government. This resulted in even more money for technology in schools, but still the teacher/manager method of transmitting information was used in most classrooms. Two years later, in 1965, the Elementary and Secondary Education Act brought in more money for schools. This money was to be spent on new computers, but most of the money went to computers for administration or school counseling (History of Computers, 1996).

In the 1970s, computers finally started to enter the regular classrooms. In 1971, a few companies begin to develop mainframe and minicomputer-based instructional programs (History of Computers, 1996). By the year 1979, fifteen million PCs were estimated to be in use throughout the world, as basic spreadsheet and word processing programs were created.

As education entered the 1980s, the introduction and widespread use of personal computers were seen at all levels of education (Groliers, 1993). The number of computers used in elementary and secondary schools increased from 100,000 in 1980 to over 2.5 million by 1990. Students used the computers for learning about various subjects or simply as an educational tool. By the end of 1980, the average school in America had a ratio of one computer per twenty students. This was not enough to affect classroom learning like textbooks or lectures, but it was a beginning (Becker, 1997).

As the 1990s began, many computer supporters believed

that computers were a much more powerful learning medium than any others that preceded it (Bigelow, 1997). The essential interactive nature of computers contributed to decision making among students. Learning tasks became individualized, allowing students to receive immediate feedback. By working collaboratively on computers, students were lead to greater initiative and more autonomous learning (Rowe, Shih, and Smith, 1998).

As the 1990s continued on, more multimedia incorporated technology was developed. Schools were using videodiscs, multimedia authoring tools and Computer Assisted Instruction on CD-ROM computer discs (History of Computers, 1998). By 1994, digital video, virtual reality, and three-dimentional systems gained attention among many computer enthusiasts. HyperCard, Hyperstudio, and Powerpoint were object-oriented software programs that grew in popularity in many school districts.

As the twenty-first century began, it was certain that computer and telecommunicational technology would continue to impact the educational environment. The computer field as a whole continues to experience tremendous growth (Meyer, 2001). Computer and telecommunication technologies continue to be integrated into the education process. Computer networking, computer mail, and electronic publishing are just a few applications that continue to mature through time. However, the most phenomenal growth in telecommunications, has been in the development of the Internet and the World Wide Web (Berners-Lee, n.d.).

Beginnings of the Internet and the Web

In 1957, the USSR launched Sputnik, the first artificial earth satellite (Kristula, 1997). The United States in response to this event, formed the Advanced Research Projects Agency (ARPA). This was created within the Defense Department to establish US lead in science and technology applicable to the military.

The RAND Corporation (a government agency), faced a strange strategic problem: How could US authorities during this cold-war, successfully communicate if there was a nuclear attack (Sterling, 1993)? America would need a command and control network that was linked from city to city, state to state, and base to base. Switches and wires could not be totally protected. How would the network be commanded and controlled?

In 1962, Paul Baran, of the RAND Corporation, was commissioned by the Air Force to study this problem. There had to be a military research network that could survive a nuclear strike and decentralized so that if any locations were attacked, the military could still have control of nuclear arms for a counter attack (Kristula, 1997). When Baran finished his study, he documented several ways to solve this problem. His final proposal was a packet switched network: "Packet switching is the breaking down of data into datagrams or packets that are labeled to indicate the origin and the destination of the information and the forwarding of these packets from one computer to another computer until the information arrives at its final destination computer. This was crucial to the realization of a computer network. If

packets are lost at any given point, the message can be resent by the originator"(Baran, as quoted in Kristula,1997). The route that a packet took was not important. Only the final results would really matter (Sterling, 1993). Basically, any packet of information would travel from one node to another, until it ended up in the proper location. If pieces of the network were destroyed, packets of information would still remain airborne, and arrive at nodes that survived. This system seemed somewhat inefficient, but it was very sturdy.

During the 1960s, this idea of a packet-switching network was studied not only by RAND, but also by the Massachusetts Institute of Technology (MIT), and the University of California at Los Angeles (UCLA). The National Physical Laboratory in England set up the first test network based on Baran's proposal (Leiner et al.2001).

ARPA started ARPANET (after its Pentagon Sponsor) and in 1969, a physical network was constructed in the United States. There were four linking nodes at this time: UCLA, SRI (in Stanford), University of California at Santa Barbara, and the University of Utah (Kristula, 1997).

The four computers at these locations could transfer information and data on dedicated high-speed transmission lines. They could even be programmed remotely from other computer nodes (Sterling,1993). So, because of ARPANET, scientists, researchers and educators could share one another's computer facilities by long distance.

By the 1970s, computer networks began to expand. In October of 1972, a successful demonstration of the ARPANET

took place at the International Computer Communication Conference (Leiner, et al.2001). It was also in 1972 that electronic mail (email) was introduced. In July of that year, the first email program was written. It could list, selectively read, file, forward, and respond to messages. From there, email took off as one of the largest network applications for years to come.

In 1973, improvements continued on the ARPANET. The original standard for communication was called Network Control Protocol (NCP) (Sterling,1993). Development began on the protocol later to be called TCP/IP. This new protocol was to allow diverse computer networks to interconnect and communicate with each other (Kristula, 1997).

It was in the year 1974, that ARPANET became known as the Internet (Leiner et al. 2001, and Berners-Lee, n.d.). This term was based on the idea that there would be multiple independent networks of different design, beginning with ARPA as the pioneering packet switching network, but soon to include satellite networks, ground-based radio networks, and other similar communication networks. A major initial motivation for the ARPANET and the Internet was resource sharing.

Also in the 1970s, Ethernet was developed, which allowed coaxial cable to send data at a more rapid speed. USENET (the decentralized news group network) was also created (Kristula, 1997).

The 1980s saw continued developments to the Internet. In 1984, the National Science Foundation got into the Internet with the introduction of new, faster, supercomputers. This

set a pace for technical advancement by other organizations (Sterling, 1993). Other government agencies became involved with the Internet: NASA, National Institute of Health, and the US Department of Energy, to name a few.

In 1984, ARPANET was divided into two networks: MILNET and ARPANET. MILNET was to serve the United States military, and ARPANET was to support advanced research (Kristula, 1997). In 1987, the National Science Foundation formed the Corporation for Research and Educational Networking (CREN).

Thus, by 1985, the Internet was already well established as a technology supporting a broad community of researchers and developers (Leiner et al. 2001). It was beginning to be used by many communities for daily computer communications. Electronic mail was being being used tremendously across many communities, even if operating computer systems were different.

In 1991, the World Wide Web (WWW), often referred to as the Web, was developed at the European Organization for Nuclear Research. This was a fast method for scientists to share important documents (Berners-Lee, n.d.).

On October 24, 1995, the Federal Networking Council (FNC) defined the term Internet: "Internet refers to the global information system that is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons; is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; provides, uses or makes accessible, either publicly or

privately, high level services layered on the communications and related infrastructure described herein" (FNC as quoted in Leiner et al., 2001).

The Internet or the Web is no longer strictly in its original base in military and research institutions. The Internet and the Web has moved into elementary and secondary schools, businesses, public libraries, the commercial sector, and of course, private homes (Sterling,1993).

The Internet and the Web has revolutionized the computer, communications, and telecommunications world like nothing before (Leiner et al., 2001). The invention of the telegraph, telephone, radio, and the computer set the stage for this unprecedented integration of technological capabilities. The Internet and the World Wide Web represent one of the most successful examples of investment and commitment to research and development of information infrastructure.

Early Years of Distance Education

Today's distance education is not a new idea. Back in the year 1728, The Boston Gazette paper advertised a short-hand education course. Those who were interested could learn on a weekly basis by mail (Distance Learning Timeline, 2001).

In 1840, Isaac Pitman, an educator, used the Penny Post to teach his idea, called phonographic shorthand. This was a self-taught course, to be learned in one's own home (Distance Learning Timeline, 2001).

In 1873, Anna Eliot Ticknor founded the Boston-Based Society to encourage study at home. Monthly correspondence

with guided readings and frequent tests were provided. Most of the students were women (Distance Learning Timeline, 2001).

By the year 1905, distance learning was becoming very popular. It was the Calvert School that established the Home Instruction Department. In the 1930s, The Calvert School was shipping materials and school supplies to students in more than fifty countries (Distance Learning Timeline, 2001).

With the help of television, distance learning took a new direction. Many experts agree that the first true distance educational television program was called Sunrise Semester. This program took place in 1959, and was based in Chicago. Sunrise Semester featured a single broadcaster, and a teacher standing in front of a classroom, with a camera shooting over the heads of the students (Freed, 1999). This particular program was not economically feasible, and soon ended.

In November of 1965, a telephone network was introduced to make continuing education programs available to doctors in Wisconsin. When the service was initiated, a telephone operator in Madison activated the network by calling every location 15 minutes before program time (Gooch, 2001). Participating physicians used standard desktop speaker phones to hear programs, ask questions, or make comments. In early 1966, The University of Wisconsin Extension Division leased a network of private or dedicated telephone lines from the Wisconsin Telephone Company. This began exclusive educational use and a 24-hour accessibility for the new Educational Telephone Network (ETN).

The state of California, promoted a program that funded a two-year task force from 1970 to 1972. The objective was to design a television course or a telecourse of the future (Freed, 1999). Dr. Bernard Luskin led the task force. The task forced described a telecourse as a complete course of study in a given subject, where the students are separated from the teacher, standing or sitting before a camera in a classroom or studio somewhere else, in real time or not. Provisions must be made for answering student questions, giving and grading tests, and reporting student progress to the school. All curricula should meet established academic standards (Freed, 1997).

The California model spread across the country. During the 1980s and early 1990s, an increasing number of adults found they needed refresher courses to keep up with the knowledge explosion. Many adults did not wish to return to the campus (Gooch, 2001). Computers and satellite technology made it possible to deliver adult education to students thousands of miles away.

As of 1994, The University of Wisconsin at Madison, famous for its own distance learning, was effectively utilizing expanded telecommunications services. Courses were being videotaped and broadcast to students interested in receiving credits towards a master's degree. The university's extension telecommunications division and the State Educational Communications Board purchased a satellite uplink in order to deliver instruction (Gooch, 2001).

Although today's Distance Educational programs are quite sophisticated, it is important to understand that

correspondence study, combined with new telecommunications technology is still providing an educational package that is used for distance learning (Gooch, 2001). Correspondence study has been the important component since the late 1700s. Some well known individuals who achieved success via educational correspondence have been Abraham Lincoln, Thomas Edison, and Henry Ford.

As we continue into the 2000s, new media innovations and public response to these innovations are advancing distance learning from a tiny educational activity to a design model guiding education agendas all over the world (Freed, 1999).

Computer Technology: Now and the Future

Since their Introduction in the schools, computers and computer software have become increasingly available to students (Groliers, 1997). Computers are used for learning and teaching in four important ways: First, they help acquire information more rapidly. Second, learning with a computer involves progressive development of skills, like reading and math. Third, learning with a computer develops analytic competencies and complex understandings. Finally, a huge element in learning is communicating with others, that is, finding and engaging an audience with a person's ideas and question (Jacques, n.d.).

Education supporters believe the essential interactive nature of using a computer promotes decision making and manipulations of visual environments (Groliers, 1997, and Comptons, 1995). Having students work collaboratively on computers leads to greater initiative and more autonomous

learning. Because computers are so pervasive in society, "computer literacy" is itself a worthy goal (Becker, 1997).

Internet Today:

The Internet is one of the most important tools in education. Internet-based education and training are being used in many countries around the world (Jung, 1999). Materials and courses, from the simple to the complex are being developed by instructional design experts.

Internet-based education is a form of distance learning in which course contents are delivered and interactions are provided by the technologies and methodologies of the Internet. This online environment allows people to interact with others asynchronously or synchronously in a collaborative structure (Jung, 1999). A person using the Internet can gain access to remote multimedia, databases, and resource learning information. The Internet can allow a learner to enroll in a course from anywhere in the world at anytime.

Today, we are surrounded by interactive telecommunications that influence how we live and how we learn (Compaq Educational Resources, 2001). With Internet and distance learning, educators and students can use programs such as email, video conferencing, and many online distance computer applications that break boundaries of traditional education. For example, students from the United States can collaborate with students from England. The students could decide to collaborate on information about World War II. With this collaborative way of communicating, students will get

information and data from both sides of the Atlantic Ocean. A different perspective about the war can also be learned by all of the students involved.

Telecommunications technology, with the Internet can extend the possibilities for collaboration and extend the diversity of knowledge beyond anything that could be imagined (Riel, as cited in Compaq Educational Resources, 2001). Collaborative learning allows students to work in teams to develop a body of knowledge in which they share ownership. Well-designed and planned collaborative learning helps improve social and academic skills that will be needed in the future.

With computer technology, learners have the capability to complete multiple tasks such as word processing, saving, revising, and distributing information. The Internet allows enhancement of both teaching and learning (Harasim and Windschitl, as cited in Rowe, Shih. and Smith, 1998). Because of the Internet environment, in which instructions can be given through both synchronous and asynchronous modes, learners may participate actively. Learners can also interact with many components in order to achieve the learning objectives.

On-line learning can be self directed. Learners have the responsibility to maintain a learning pace, sequence, and academic content (Rowe, Shih. and Smith, 1998). Resources on the Internet and the World Wide Web provide information and assistance to all levels of education. This is available to the consumer as well as the academic researcher (Jacques, 2001). The Internet is a link to knowledge and resources that

offers information just as readily as professional colleagues and libraries.

On the Internet, there are websites that provide crucial in-depth resources for distance education (Jacques, 2001). These site contain information about educational courses, learning institution services, reports, full text research papers, and product information to name a few.

During the past several years, commercial and non-commercial courseware products, web-based course delivery systems, and communications have exploded (Stahl and Branaman, 2000). These and other systems provide easy to use tools and resources that allow an instructor to place courses on line. For many individuals, the availability of core materials and course resources may be preferential. It can also mean the difference between success and failure.

In addition to courseware products becoming available, online text books and digital text materials can also be obtained to enhance the educational process (Stahl and Branaman, 2000). On-line information can be highlighted, noted, and linked to many supplemental materials.

Digital material on the Internet can be presented in text, graphic, audio, video, or in any combination of these media types (Stahl and Branaman, 2000). This quality of informational resources has enormous implications for students that have problems with areas of multimedia. For students with special needs, texts can be magnified or even read aloud through synthetic speech.

For our schools, there are many learning strategies available by way of online education (Walker, 1997 and

Cotton, 1998). Students are able to use such services as Newsgroups, Chat Lines, Search Engines, Bulletin Boards, and participate in collaborative mailing groups.

One of the most used services today is electronic mail or email. With email, students can get help with speaking, listening, and writing for purposes that are meaningful to them (Lerman, 1998). Students can use email to create and send travel brochures, write and share virtual autobiographies, and compare social issues with their peers. With email in schools, students can send letters to government officials, and conduct a cultural exchange with a person from another part of the world with ease. Email can also be used in many other ways that have educational value (Walker, 1997 and Cotton, 1998).

Multimedia and hypermedia contexts such as the World Wide Web support Internet learning (Kerka, 1998). Individuals can construct their own understanding of the world as they acquire knowledge and reflect on their own experiences. Online learning can assist the construction of knowledge by showing learners the links among pieces of information and supporting individual learning styles (Dede, as cited in Kerka, 1998).

With the computer, Internet discussion requires and facilitates learning-how-to-learn skills. These skills have been identified as locating and accessing information resources, organizing information, conducting self-assessment, and collaborating (Eastmond, as cited in Kerka, 1998). Because of the new activities that technology is encouraging, schools are changing.

"The Role of Online Communication in Schools: A National Study" demonstrates that students with online access perform better (CAST, 2001). The study, conducted by CAST (Center for Applied Special Technology), an independent research organization, isolates the impact of online use and measures its effect on student learning in the classroom. The study compared the work of about 500 students in grades 4-6 in seven urban school districts (Chicago, Dayton, Detroit, Memphis, Miami, Oakland, and Washington DC). Half of the students had online access in their classrooms, and half did not. The results according to CAST showed higher scores on measurements of information management, communication, and presentation of ideas for experimental groups with online access than for control groups with no online access. This study offers evidence that by using the Internet, students can become independent, critical thinkers, able to locate information, organize and evaluate it. Students with use of the Internet can also effectively express their new knowledge and ideas in compelling ways.

The power of partnerships and the value of alliances in education has existed for many years. Hardware vendors have collaborated with providers and users to demonstrate the value of technology (Charp, 2001). Creating and utilizing an environment that connects people so they can share information has become essential in today's society. The growth of the Internet in education has demonstrated that collaborative efforts are assisting in solving many educational problems. Partnerships are valuable in today's world.

Many universities, private corporations, and for profit companies are collaborating to provide training for educational personnel (Charp, 2001). More federal, state and local funds are being provided for professional development. Many communities are equipping libraries and community centers for use by students and adults alike. Free technology training is being made available to our senior citizens. Partnerships and collaborative efforts must continue to help solve our educational problems and address the ongoing needs of our educational community.

Distance Learning Today

Distance learning today exists in many forms. Since the beginning of educational correspondence classes, distance learning has evolved with technology into being able to teach or communicate with groups of people, dispersed across a wide area (Petersen, 2001).

According to Petersen, one example of distance learning was achieved at NASA (National Aeronautics and Space Administration). Many projects at the NASA Lewis Research Center in Cleveland, Ohio, became involved in distance learning as a way to achieve NASA's goals of increased education and community outreach.

Today, distance learners include colleges and universities, K-12 school students, public school teachers, and individuals from the business areas (Petersen, 2001). Distance learning provides an opportunity for people who are at a disadvantage when pursuing college degrees. They are people who must work during traditional classroom hours.

These individuals can use distance learning to enroll in courses at convenient times and places, often from their homes in the evenings. Distance learning can also help parts of the population who are single parents, disabled citizens, and those who are geographically too far to attend regular educational institutions (Kerka, 1998 and Petersen, 2001).

As mentioned above, distance learning is valuable to K-12 students and teachers. It can provide additional outside learning sources with minimal or no travel expenses involved (Sullivan, 2001). School administrators can combine students from different school districts into one class when funding or enrollment is low, or qualified teachers are not available.

Juniors and Seniors in high schools are able to take advance placement classes for college credits without actually having to leave the school building (Petersen, 2001).

Teachers today are able to attend professional development workshops by way of distance learning technology. School districts can use valuable outside speakers to talk with students and educators (Petersen, 1998). These distance learning activities can save costs in travel accommodations alone.

Another form of distance learning is through videoconferencing. This type of technology requires special equipment and room setup for best results (Romiszowski, 1993). Live video and audio capabilities and two-way interaction between presenters and the audience make videoconferencing an innovative, effective way of reaching a

targeted audience.

Finally, with distance learning, it becomes possible for students to travel by taking electronic field trips. Students can visit locations, such as Antarctica, that is not possible by regular transportation methods (Compaq Educational Resources, 2001).

There are many benefits with students taking an electronic field trip. Students can be exposed to distant lands and cultures that they may never be able to visit in person (Sullivan, 2001). Students are able to see the connections to what they are learning in school and how it relates to the real world. This can foster a community of learners for students, parents, as well as teachers.

Distance learning technology, whether integrated with the Internet or not, is very active in our educational schools systems today. Distance learning can provide an enormous boost toward the goal of achieving quality educational opportunities for all (Sullivan, 2001).

Since technology is becoming so widely used today, we are using technology to enhance the development of the curriculum. In New Jersey, students are expected to develop skills in the use of information, up-to-date technology, and tools to improve learning, achieving goals and giving presentations. Students are expected to use technological tools for problem solving, writing, and research (New Jersey Department of Education, 2001).

The following Core Curriculum Content Standards have been adapted into the State of New Jersey's Curriculum:

All students will be able to:

1. Understand how technological systems function.
2. Select appropriate tools and technology for specific activities.
3. Demonstrate skills needed to effectively access and use technology-based materials through keyboarding, troubleshooting, and retrieving and managing information.
4. Develop, search, and manipulate databases.
5. Access technology-based communication and information systems.
6. Access and assess information on specific topics using both technological and print resources available in libraries or media centers.
7. Use technology and other tools to solve problems, collect data, and make decisions.
8. Use technology and other tools, including word-processing, spreadsheet and presentation programs, and print or graphic utilities, to produce products.
9. Use technology to present designs and results of investigations.
10. Discuss problems related to the increasing use of technologies.

With the proper technology facilities and training, these ten goals should be accomplished by almost every student in New Jersey (see Appendix E).

Chapter Three

DESIGN OF THE STUDY

Setting:

The setting for this survey was chosen from school districts in four Southern counties in New Jersey. The counties selected were Camden, Cumberland, Gloucester and Salem Counties (see Appendix A).

Camden County occupies a mostly metropolitan area of about 222 square miles. There are about 2,293 persons per square mile and over 185,700 household residences. This made Camden County the most densely populated county in this study. Camden County has a total population of about 508,930 people, made up of about 71% White, 18% Black, 4% Asian, Hispanic, and other ethnic groups (U.S.Census Bureau, 2000).

Cumberland County occupies a large metropolitan area in Southern New Jersey of about 489 square miles. There are about 300 people per square mile, with a total population of over 146,400. There are a total of about 49,140 households, with an ethnic makeup of 66% White, 20% Black, and 9% Hispanic (U.S.Census Bureau, 2000).

Gloucester County is a large metropolitan area of 325 square miles. There is a population of about 254,600 people. There are 784 people located in Gloucester County per square mile. The ethnic makeup is about 87% White, 9% Black, 3% Hispanic, and 1% Asian. The total number of resident households in Gloucester County is about 90,720 (U.S.Census Bureau, 2000).

The final selection for this study is Salem County.

Salem County was the smallest populated county represented in this study. There are mostly farmlands and open spaces, accounting for 338 square miles. The total population is around 64,300 people. There about 190 people living in Salem County per square mile, and only about 24,300 household residences. The ethnic background consists of 81% White, 15% Black, and about 4% Hispanic (U.S.Census Bureau, 2000).

After the selection of the counties, four school districts were chosen from each of the four counties mentioned above. The districts were selected in a stratified sample, based on their social economic status as identified by the New Jersey Department of Education. The New Jersey Department of Education placed each school district into District Factor Groups (DFG). Each school district is identified by letters A through J, with the letter A representing the areas poorest school districts and the letter J representing the areas richest school districts (see Appendix B).

In Camden County, the school districts of Bellmawr, Camden City, Cherry Hill, and Pennsauken were invited to participate. Camden City had a DFG rating of A, Bellmawr had a DFG rating of B, Pennsauken's DFG was CD, and Cherry Hill had a DFG rating of I.

In Cumberland County, Bridgeton, Greenwich, Millville and Vineland school districts were asked to be in the study. The Bridgeton School District had a DFG rating of A, while Greenwich, Millville, and Vineland all received a DFG rating of B.

The County of Gloucester was represented in the study by

the school districts of Franklin Township, Pitman, Wenonah, and Westville. All four districts had a different DFG rating. Westville had a DFG label of B, Franklin Township had a CD rating, Pitman was labeled with a DFG rating of DE, and Wenonah's rating was I.

The final county chosen for this study was Salem County. The public school districts invited to be part of the study were the Elmer School District, Quinton Township School District, Upper Pittsgrove Township District, and the Woodstown-Pilesgrove School District.

For the Quinton Township District, it had been labeled with a DFG rating of B. Elmer schools had a District Factor Label of CD, while Upper Pittsgrove was given a DFG rating of DE and Woodstown-Pilesgrove received a DFG rating of FG.

All of the school districts selected in this study had a District Factor Group (DFG) rating from A, the poorest school districts, to I, the richest districts. There were no districts represented with a DFG rating of H or J.

The names, phone numbers, and addresses of each school chosen from the school districts were obtained through the New Jersey Department of Education's Directory Web Site.

Participants

The sample participants for this study were teachers selected from each of the participating school districts in Camden, Cumberland, Gloucester, and Salem Counties. Each teacher and school chosen to participate represented a stratified sample of the total enrollment for each of the four counties in New Jersey.

In Camden County, the participants were a stratified sample chosen from four public school districts. The selection was based on the New Jersey Department of Education District Factor Group for School Districts (DFG). The four districts chosen represented about 2,513 teachers, which is 39% of the total number of teachers in Camden County. The student population of the four districts is 36,193, which is about 41% of the total student enrollment of Camden County Schools.

In the district of Bellmawr, a total of about 66 teachers and 965 students were represented by one school in the school district. The total enrollment of the Bellmawr School District is identified by students that are 88% White, 2% Black, 4% Hispanic, and 6% Asian.

In the Cherry Hill School System, there are approximately 504 teachers and 10,791 students. Two schools were chosen at random to participate in the study. The enrollment of the Cherry Hill School District is identified by students that are ethically identified as 79% White, 6% Black, 2% Hispanic, and 13% Asian.

For the Camden City School District, two schools were selected to represent the 1,512 teachers and about 18,393 enrolled students. Camden City Schools are made up of students that are identified as 2% White, 57% Black, and 39% Hispanic.

Finally, in Camden County, Pennsauken Public Schools was asked to participate. Pennsauken has around 6,044 enrolled students, and employs 431 certified teachers. The students are identified as 42% White, 34% Black, 18% Hispanic, and 6%

Asian and Native American. Two schools were chosen to be represented in this study.

In Cumberland County, four school districts were chosen to take part in the survey. The selection was based on the DFG rating for New Jersey school districts. In Cumberland County, there are 1,534 certified teachers and 19,434 students that were represented. This is about 76% of the total amount of teachers and students in Cumberland County, New Jersey.

For Bridgeton Public Schools, there is a population of 4,108 students and 373 teachers. The students represented comprise of 18% that are White, 57% Black, 24% Hispanic, and the remaining 1% Native American. Two schools were chosen to participate in this large school district.

In the small school district of Greenwich, there are only 97 enrolled students and 10 teachers. This district is categorized as 84% White, 14% Black, and 2% Hispanic and Native American. There is only one school in this K-8 district chosen for the study.

For the Millville Public School District, 425 teachers and 5,848 students were represented in this study. The Millville School population is made up of an enrollment that is 62% White, 24% Black, 13% Hispanic, and 1% Asian and Native American. Two schools and their teachers were surveyed in this study.

Finally in Cumberland County, New Jersey, The Vineland School District was asked to participate. Vineland has an enrollment of 9,381 students and 726 certified school teachers. Vineland student population is classified as 38%

White, 19% Black, 41% Hispanic, and the remaining 2% Asian and Native American. Two schools were selected from the Vineland School District to participate.

For Gloucester County, New Jersey, four school districts were also chosen to take part in the survey. The selection was based on the New Jersey Department of Education's DFG rating system. The four school districts selected in Gloucester County have a total of 3,844 students, which is about 9% of the entire enrollment of Gloucester County. There are also 279 teachers from the selected four districts, representing 9% of the teaching staff in Gloucester County.

In Franklin Township, one school was chosen to represent the 1,507 students and 98 certified teachers. Franklin Township Schools have students classified as 89% White, 7% Black, 3% Hispanic, and 1% Asian.

In the Pitman School District, 1,710 students and 134 teachers were represented by one school in the district. Pitman is made up of a student population that is 96% White, 2% Black, and 2% Hispanic and Asian.

The Wenonah Public School system is comprised of one school. There are about 193 students and 17 certified teachers. Wenonah's population is about 98% White and 2% Black and Asian.

In the Westville School district, the population of students are 88% White, 7% Black, 4% Hispanic, and only 1% Asian. There are about 435 students and 30 teachers. Since this is the only school in the Westville District, it was selected to participate in the study.

The final four school districts that were invited to

participate in the study were from Salem County, New Jersey. The four districts were also chosen as a stratified sample based on their DFG rating. These four districts account for 21% of the total enrolled students in Salem County, as well as 18% of the certified teachers. The four districts represented about 2,465 students as well as 168 teachers.

From the Elmer District, Elmer School is the only school chosen to participate in the study. Elmer has about 10 teachers and only 132 enrolled students. The students are made up of a population that is 95% White and 5% Black.

In Quinton Township, there is only one school in the district. It has a population of 78% White, 19% Black, and 3% Hispanic. There are about 315 students enrolled in Quinton Township. The 22 teachers were asked to participate in the study.

Another small school district in Salem County is also represented by one school. The Upper Pittsgrove Township District has about 29 teachers and 409 students. The student body is 94% White, 3% Black, and only 3% Hispanic.

The largest school district in Salem County, chosen to participate is the Woodstown-Pilesgrove School District. This district has about 1,609 students and 109 teachers. The student population consist of 88% White, 10% Black, and about 2% Hispanic students (see Appendix A).

Instrument

A questionnaire was constructed for this study. The telecommunication questionnaire was developed by the author for the participating teachers (see Appendix C).

For this teacher questionnaire, there were five sections about telecommunications and technology. The first section (A), asked general demographic information, such as gender, years in education, district information, and current teaching assignment.

The second section (B) asked about technology resources in the classroom. This section contained questions that elicited a response about the resources used by the teachers this year with their students and how often they were used on a weekly and monthly basis.

The third section (C) asked nine questions identifying Internet usage. This section was made up of numerical questions that asked for responses in regard to Internet applications. The applications included E-Mail, Chat Rooms, and Search Engines to name a few. The teachers were also asked to indicate the time each application is used on an average weekly and monthly basis.

In the fourth section of the questionnaire (D), five questions were asked about distance learning. Four of the questions asked about the weekly and daily use of television, video conferencing,collaboration with other school districts, and television courses. The last question remained open-ended.

The final section (E) contained school information type questions. There were six short, open-ended questions asking about Internet connected computers, number of students, computer labs, time on the Internet, on-line courses, and technology integration.

Procedure

The teachers invited to participate in the study, were selected from the schools that were chosen in regard to the district's DFG rating, as mentioned earlier. A letter explaining the topic and significance of the survey was sent to the school districts' chief administrator (see Appendix F). The letter identified the author and gave a brief background about the reason and justification for the study. The letter asked the chief school administrator to help with the survey. Instructions were given to distribute the questionnaires to the teaching staff. It was requested that when the questionnaires were completed, the teachers should place them in a folder to be collected by the administrator and mailed back to the author in a self-contained, postage paid envelope.

All questionnaires for the teaching staff contained a letter that explained the reason and significance of the study (see Appendix G). The letter to the teachers gave directions for completing the questionnaire and placing their responses in a folder located in the office or the teacher's room upon completion. A due date for completion of the survey was also contained in the letter.

All of the responses remained anonymous.

A phone call to each participating school was placed to assure a good representation of the study from each school district.

Scoring

The scoring for this questionnaire was represented as an average given for each individual question in the survey. The

participants were asked to respond to thirty questions about technology and telecommunication usage within their individual classrooms and schools. Each individual question was tabulated for the participating school and then averages were arrived at based on the number of participating teachers per response.

For Part A of the questionnaire, the participants were asked four very general demographic type questions which had an impact on the overall results of the study. The questions asked for responses in regard to gender, years in education, type of school district, and the participant's current teaching assignment.

Part B of the questionnaire asked each participant to respond to six questions about the technology resources in their school and classroom. The responses were categorized in two groups: Hours per week and hours per month. The answers were collected, totaled, and averages were given based on the number of participants for each of the six answered responses.

Part C of the questionnaire asked each participant to respond to nine questions about Internet applications in their school and classroom. The responses were placed in two categories: Hours per week and hours per month. The responses to the questions were collected, totaled, and averages were given based on the number of participants for each of the nine answered questions.

In Part D of the survey-questionnaire, five questions were given to each participant about the use of face to face, distance learning applications for their schools and

classrooms. As with Parts B and C of the survey, these questions too were placed in two categories: Hours per week and hours per month. These five answers were also collected, totaled, and averages were also arrived at based on the number of participants for each answered question.

Finally, in Part E of the survey-questionnaire, six short, open-ended questions were asked of each participant in regard to school information. The answers elicited several numerical responses, one yes or no answer, and an open-ended question about on-line courses. The answered questions were collected, totaled, and averages were given based on the number of participants for each answered response.

Upon completion of the survey, questions in sections B, C, and D of the questionnaire were grouped individually, and averages were calculated for each section.

In Section B, question seven was calculated as the average monthly software use for each participating school in the study. In Section C, questions eleven through nineteen were calculated as the average monthly use for the Internet in each participating school. Finally, In Section D, all five questions were tabulated, and the results were presented as the average monthly distance learning usage (face to face) for each participating school in the study.

Chapter Four

ANALYSIS OF THE DATA

Of the sixteen school districts from the four counties invited to participate in the study, nine districts replied to the survey on the first mailing. Thus, the district response rate was 56% on the mailing of the questionnaires.

In Camden County, only one school replied. In this school, seven classroom teachers out of nine returned their survey. This represents a response rate of 78% of the classroom teachers in that school and 11% of the teachers from the entire school district. Telephone calls were made to the other school districts, in order to receive a better response rate.

Teacher Telecommunications Questionnaire Results:
County: Camden. DFG Rating: B.

A. Demographic Information

Participating Male Teachers: **0** Participating Female Teachers: **7** TOTAL: **7 of 9**
Years in Education: 1-5: **One** 6-10: **None** 11-15: **None** 16-20: **One** 21-25: **One** 25+: **Four.**
District: **Suburban.**
Current Teaching Assignments: K-3: **Seven Teachers** Grade 4: **None.**

In Cumberland County, New Jersey, no school districts responded to the survey on the initial mailing. Telephone calls were made to all four of the selected school districts. Only one district declined to participate in the telecommunication survey, and the other three gave no response.

In Gloucester County, New Jersey, all four school districts responded to the telecommunications survey. In one district, one participating school had twelve of nineteen classroom teachers respond to the survey. This amounts to 63%

of the classroom teachers in this school, and about 2% of the entire teaching staff in the school district.

Teacher Telecommunications Questionnaire Results:
County: Gloucester DFG Rating: CD.

A. Demographic Information

Participating Male Teachers: **3** Participating Female Teachers: **9** TOTAL: **12 of 19**
Years in Education: 1-5: **One** 6-10: **Two** 11-15: **Two** 16-20: **Two** 21-25: **Three** 25+: **Two.**
District: **Rural.**
Current Teaching Assignments: 4-6: **Twelve Teachers**

In another school district, thirteen out of eighteen classroom teachers responded to the survey from one participating school. This is a 72% response rate from this school and about a 43% response rate for the entire staff in the school district.

Teacher Telecommunications Questionnaire Results:
County: Gloucester. DFG Rating: B.

A. Demographic Information

Participating Male Teachers: **0** Participating Female Teachers: **13** TOTAL: **13 of 18**
Years in Education: 1-5: **Four** 6-10: **Zero** 11-15: **One** 16-20: **Three** 21-25: **Three** 25+: **Two.**
District: **Suburban.**
Current Teaching Assignments: K-3: **Seven Teachers** 4-6: **Six Teachers.**

In the third district from Gloucester County, five out of ten teachers responded to the survey in a participating school. This accounts for a 50% response rate from the school, and a 4% response rate from the entire school district.

Teacher Telecommunications Questionnaire Results:
County: Gloucester DFG Rating: DE.

A. Demographic Information

Participating Male Teachers: **0** Participating Female Teachers: **5** TOTAL: **5 of 10**
Years in Education: 1-5: **One** 6-10: **Two** 11-15: **One** 16-20: **One** 21-25: **One** 25+: **Zero.**
District: **Suburban.**
Current Teaching Assignments: K-5: **Five Teachers.**

For the final participating school in Gloucester County, six teachers out of thirteen responded to the questionnaire.

This is the only school in this particular district, and it represents 46% of the teachers in the school and the entire school district.

Teacher Telecommunications Questionnaire Results:
County: Gloucester DFG Rating: I.

A. Demographic Information

Participating Male Teachers: **0** Participating Female Teachers: **6** TOTAL: **6 of 13**
Years in Education: 1-5: **Three** 6-10: **One** 11-15: **One** 16-20: **Zero** 21-25: **Zero** 25+: **One.**
District: **Suburban.**
Current Teaching Assignments: K-6: **Six Teachers.**

In Salem County, New Jersey, all four districts invited to participate in this study also responded to the survey. In one school district, six out of nine teachers returned their surveys. This is a 66% return rate for the entire teaching staff in the school and school district.

Teacher Telecommunications Questionnaire Results:
County: Salem DFG Rating: CD.

A. Demographic Information

Participating Male Teachers: **1** Participating Female Teachers: **5** TOTAL: **6 of 9**
Years in Education: 1-5: **One** 6-10: **One** 11-15: **None** 16-20: **One** 21-25: **One** 25+: **Two.**
District: **Rural.**
Current Teaching Assignments: K-3: **Three Teachers** 4-6: **Three Teachers.**

In another school district, which contains one school with students from grades Kindergarten through Eight, ten classroom teachers out eighteen responded to the survey. This is an average response rate of 55%.

Teacher Telecommunications Questionnaire Results:
County: Salem. DFG Rating: B.

A. Demographic Information

Participating Male Teachers: **0** Participating Female Teachers: **10** TOTAL: **10 of 18**
Years in Education: 1-5: **Zero** 6-10: **Two** 11-15: **Three** 16-20: **Two** 21-25: **Two** 25+: **One.**
District: **Rural.**
Current Teaching Assignments: K-4: **Six Teachers** 7-8: **Four Teachers.**

In the third school district, thirteen out of twenty-four teachers replied to the survey on telecommunications.

This is about 54% of the classroom teachers in this participating school district.

Teacher Telecommunications Questionnaire Results:
County: Salem. DFG Rating: DE.

A. Demographic Information

Participating Male Teachers: **1** Participating Female Teachers: **12** TOTAL: **13 of 24**
Years in Education: 1-5: **One** 6-10: **Three** 11-15: **Three** 16-20: **Five** 21-25: **None** 25+: **One.**
District: **Rural.**
Current Teaching Assignments: K-3: **Four.** 4-6: **Five.** 7-8: **Four.**

Finally, in the fourth school district, the only reply to the telecommunications survey came from the high school, which represents grades nine through twelve. Twenty-one of the thirty-nine high school classroom teachers sent back a response to the survey. This is about 54% of the entire high school classroom teachers, 36% of the entire high school teaching staff, and 19% of the entire teaching staff in this rural school district.

Teacher Telecommunications Questionnaire Results:
County: Salem. DFG Rating: FG.

A. Demographic Information

Participating Male Teachers: **3** Participating Female Teachers: **18** TOTAL: **21 of 39**
Years in Education: 1-5: **Two** 6-10: **Two** 11-15: **Four** 16-20: **Five** 21-25: **Three** 25+: **Five.**
District: **Rural.**
Current Teaching Assignments: 9-12: **Twenty-One Teachers**

Through the Internet, only one teacher responded to the survey. The questionnaire was placed in the Veteran Teachers Group section at Yahoo Groups.Com (see Appendix D).

Overall Summary of Research Questions

In Section A of the questionnaire, which asked for general demographic information, the totals for the nine participating schools yielded 93 out of 159 possible teacher responses. This was a 58% overall response rate. The

participating teachers included eight males and eighty-five females. There were fourteen teachers who have been in education between 1 and 5 years, twelve teachers between 6 and 10 years, fifteen teachers between 11 and 15 years, twenty teachers between 16 and 20 years, fourteen that have taught from 21 to 25 years, and finally, eighteen teachers with more than 25 years of experience.

Teacher Telecommunications Questionnaire

Schools: All Nine Participating Districts: All Nine Participating

A. Demographic Information

Place an X beside the choice that best describes you.
Gender: Males: **8** Females: **85** Total Participation: **93 out of 159 (58%)**
Years in Education: 1-5: **14** 6-10: **12** 11-15: **15** 16-20: **20** 21-25: **14** 25+: **18**
Your District is: Rural: 5 Districts. Urban: None. Suburban: 4 Districts.
Current Teaching Assignment/Grades: K - 12.

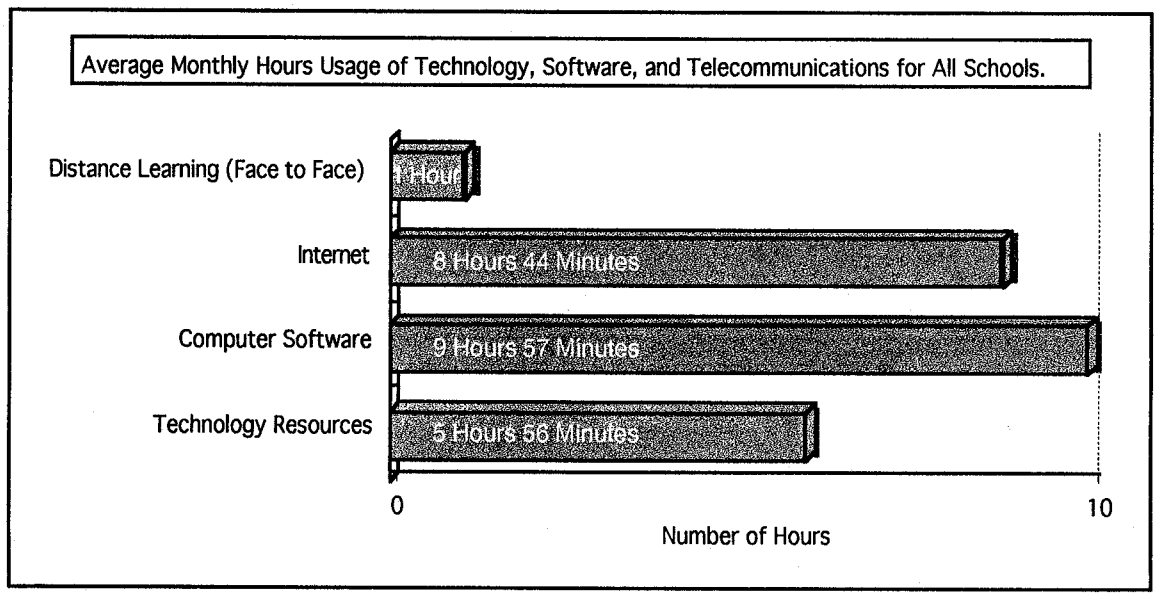
In Section B of the survey, the 58% of the teachers surveyed in nine different schools together averaged 5 hours and 56 minutes of monthly use of various technology resources. These resources included the use of television, VCRs, DVD players, video and digital cameras.

A separate analysis was calculated for computer software use by the nine schools and participating teachers. The nine participating schools and districts averaged 9 hours and 57 minutes monthly use of computer software. This included computer software used in word processing, presentation programs, and for the Internet.

Section C of the survey asked the participating schools to respond to nine questions about the overall use of the Internet in their classrooms. Of the one hundred and fifty-

nine teachers surveyed, the ninety-three participating teachers monthly combined average for nine different schools was 8 hours and 44 minutes. The nine questions in this section asked the teachers to respond to their use of email, chat rooms, search engines, and data bases to name a few.

Section D asked the teachers to respond to questions about distance learning. This section included questions about public television, video conferencing, collaboration, and television courses. The response rate to distance learning was very low. The average monthly use of distance learning for all nine schools was only 1 hour per month.



Finally, Section E of the survey, asked a few general questions about school information. The combined average of the nine participating schools included 3.2 computers in each regular classroom. The average class size was 18.8 students. Each school had a separate computer lab, and two schools had 2 separate computer labs. There was an average of 25 computers in these labs, and all were connected to the

Internet. The classes used the separate computer labs on a monthly average of 5.6 times per month.

Some of ways technology was integrated in the school district's curriculum included, but not limited to research, special projects, search engines, and for presentation programs.

County Comparisons

After the results of the surveys were gathered, a comparison was made between the four participating schools in Salem and Gloucester Counties. County comparisons were made that showed a monthly, hourly average of telecommunication usage in the areas of technology resources, computer software, Internet, and distance learning. The final set of averages were in the area of school information.

The participating schools for Salem County were Elmer, Quinton Township, Upper Pittsgrove Township, and Woodstown High School. For Gloucester County, the participating schools were the Parkview School in Westville, the Memorial School in Pitman, the Reutter School in Franklin Township, and the Wenonah Public School.

In Section A of the survey, general demographic information was given about the participating teachers. In Salem County, fifty out of ninety teachers responded to the survey. This accounts for a return rate of 56%. Of the fifty responses, five teachers were male and forty-five teachers were female. There were four teachers with one to five years of teaching experience, eight teachers with six to ten years experience, and ten teachers with between eleven and fifteen

years experience. There were thirteen teachers with sixteen to twenty years experience, six teachers with twenty-one through twenty five years of experience, and finally nine participating teachers who have taught for over twenty-five years.

Teacher Telecommunications Questionnaire

Schools: Salem County

A. Demographic Information

Place an X beside the choice that best describes you.
Gender: Males: 5 Females: 45 Total: 50 out of 90 (56%)
Years in Education: 1-5: 4 6-10: 8 11-15: 10 16-20: 13 21-25: 6 25+: 9
Your District is: rural
Current Teaching Assignment/Grades: K-12.

In Gloucester County, thirty-six out of sixty teachers replied to the survey. This was an average of 60% of the total number of teachers in the participating schools. Of the thirty-six participating teachers, three were male and thirty-three were female. There were five teachers who had between one and five years teaching experience. There were also five teachers that had between six and ten years experience and five with eleven through fifteen years of experience. The final groups of educators had six teachers with sixteen through twenty years experience, seven with twenty-one through twenty-five years, and five teachers with more than twenty-five years of teaching experience.

Teacher Telecommunications Questionnaire

Schools: Gloucester County

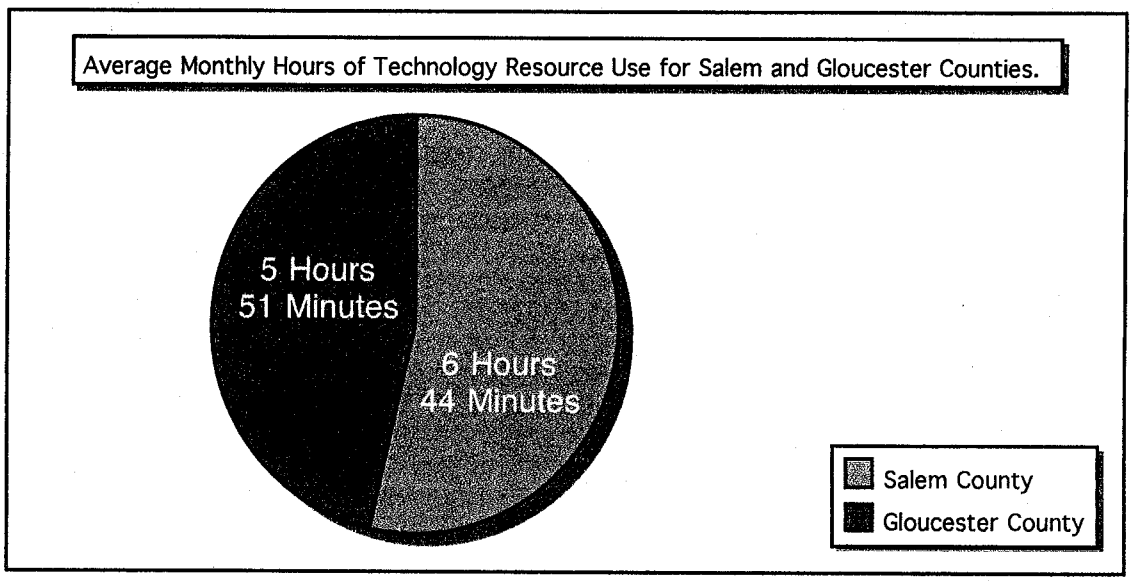
A. Demographic Information

Place an X beside the choice that best describes you.
Gender: Males: 3 Females: 33 Total: 36 out of 60 (60%)
Years in Education: 1-5: 8 6-10: 5 11-15: 5 16-20: 6 21-25: 7 25+: 5
Your District is: Suburban: 3 Rural: 1
Current Teaching Assignment/Grades: K-6.

Thus, 4% more teachers from selected schools in Gloucester County (60%) responded to the survey than in Salem County (56%).

In Section B of the questionnaire, Salem County had a combined, classroom average monthly use of 6 hours and 44 minutes in the area of technology resources. The resources included the use of television, VCRs, DVD players, and video and digital cameras.

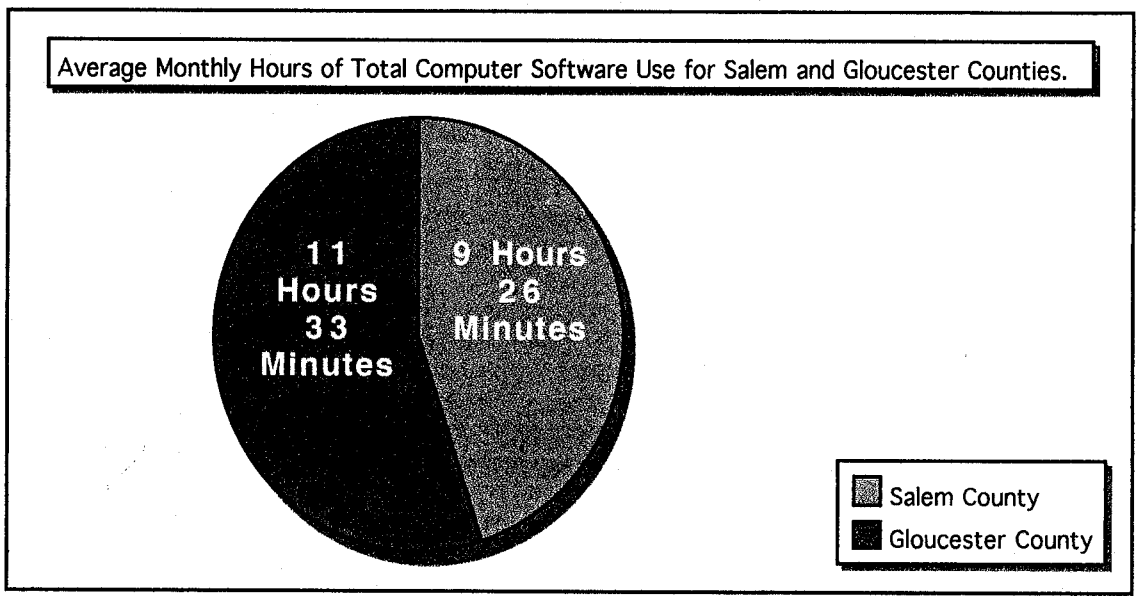
For Gloucester County, the classroom monthly average for technology resource usage was 5 hours and 51 minutes. The resources were previously identified as television, VCRs, DVD players, video cameras, and digital cameras.



On a monthly average, the four selected schools from Salem County averaged only 53 more minutes of monthly technology resource usage than the selected schools in Gloucester County.

Also from Section B, the average hourly use of computer software for the month was identified. The participating

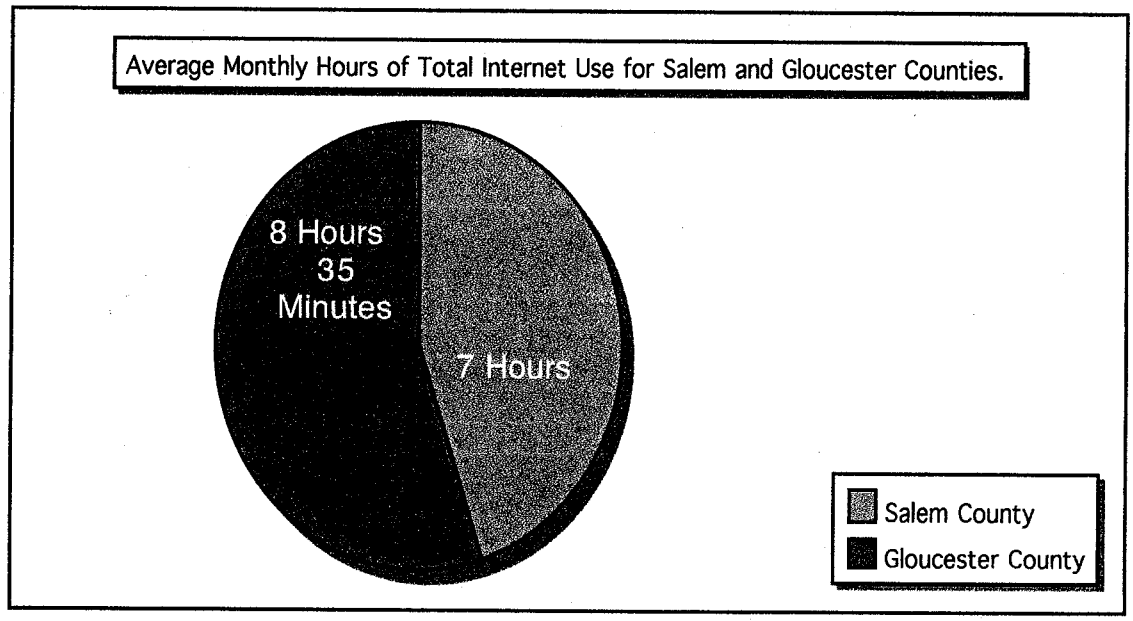
schools from Salem County used computer software on the average of about 9 hours and 26 minutes per month, while in Gloucester County, the average monthly use was for 11 hours and 33 minutes.



For purposes of this study, Gloucester County participating schools use computer software on the average of 2 hours and 7 minutes more than the schools from Salem County. Examination of the means and a *t* test for independent samples (*df* = .05) indicated that there was essentially no difference between the groups (see Appendix H). A *t* test was used because the groups were selectively chosen.

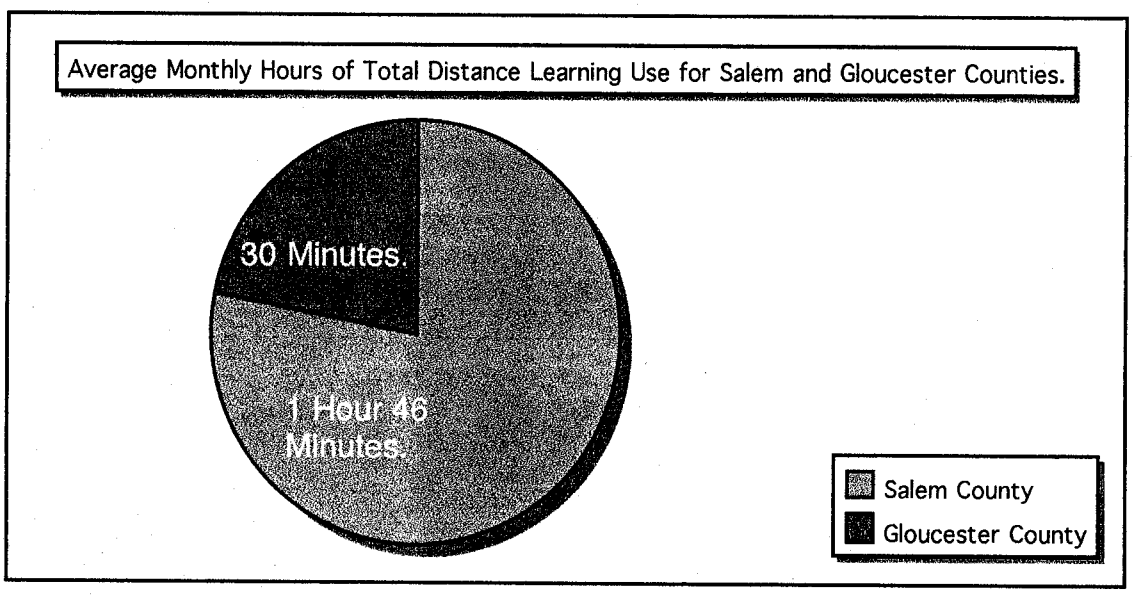
In Section C of this two county comparison, the average hourly use of the Internet for the month was identified. The four selected schools from Salem County collectively averaged 7 hours of Internet usage per month. The four selected schools from Gloucester County collectively averaged 8 hours and 35 minutes of Internet use per month. Thus, Gloucester

County schools in this study used the Internet an average of 1 hour and 35 minutes more per month than the schools in Salem County. Further examination of the means and a t test for independent samples (*df* = .05) indicated that there was essentially no difference between the two groups (see Appendix H). A t test was used because these groups were selectively chosen.



In Section D of the two county comparison, Salem County selected schools averaged 1 hour and 46 minutes per month for using distance learning (distance learning refers to public television, face to face video conferencing, collaboration, and television courses). The participating schools in Gloucester County averaged only 30 minutes of distance learning per month. Salem County schools used distance learning at an average of 1 hour and 16 minutes more per month than the Gloucester County participating schools. Further examination of the means and a t test for independent

samples (*df* = .05) also indicated that there was no difference between the two groups (see Appendix H). A t test was used because the groups were selectively chosen.



Finally, Section E of the questionnaire was analyzed. The participating schools in Salem County had an average of 3.6 computers in their regular classrooms, as compared to Gloucester County participating schools, which averaged 3.4 computers in their classrooms. All computers in both counties were connected to the Internet. The average regular class size in Salem County participating schools was 21 students. The average class size in Gloucester County was 17.25 students. All schools in the study had separate computer labs, where the average amount of class visits per month was 5.5 times in Salem County, and 6 times per month in Gloucester County. Thus, the average class in Gloucester County has 3.75 less students than Salem County. However, all classes use their respective computer labs about the same amount of times each month.

Rural and Suburban Schools

After the results of the surveys were gathered, a second comparison was made between the nine participating schools separated into Rural and Suburban School Districts. Individual comparisons were made that showed a monthly, hourly average of telecommunication usage in the areas of computer software, Internet, and distance learning. The final set of averages were in the area of school information.

The five participating schools for the Rural Districts were Elmer, Quinton Township, Reutter School in Franklin Township, Upper Pittsgrove Township, and Woodstown High School. For the Suburban Districts, the four participating schools were the Parkview School in Westville, the Memorial School in Pitman, the Burke School in Bellmawr, and the Wenonah Public School.

In Section A of the survey, general demographic information was given about the participating teachers. In the rural districts, sixty-two out of one hundred and nine teachers responded to the survey. This accounts for a response rate of 57%. Of the sixty-two responses, eight teachers were male and fifty-four teachers were female. There were five teachers with one to five years of teaching experience, ten teachers with six to ten years experience, and twelve teachers with between eleven and fifteen years experience. Also, there were fifteen teachers with sixteen to twenty years experience, nine teachers with twenty-one through twenty five years of experience, and finally eleven participating teachers who have taught for twenty-five years.

Teacher Telecommunications Questionnaire

Schools: Rural

A. Demographic Information

Place an X beside the choice that best describes you.
Gender: Males: 8 Females: 54 Total: 62 out of 109 (57%)
Years in Education: 1-5: 5 6-10: 10 11-15: 12 16-20: 15 21-25: 9 25+: 11
Your District is: Rural
Current Teaching Assignment/Grades: K-12.

In the suburban districts, thirty-one out of fifty teachers responded to the survey. This was an average of 62% of the total number of participating schools. Of the thirty-one participating teachers, there were no male teachers. There were eight teachers who had between one and five years teaching experience. There were also three teachers that had between six and ten years experience and three with eleven through fifteen years of experience. The final groups of educators had five teachers with sixteen through twenty years experience, five with twenty-one through twenty-five years, and seven teachers with more than twenty-five years of teaching experience.

Teacher Telecommunications Questionnaire

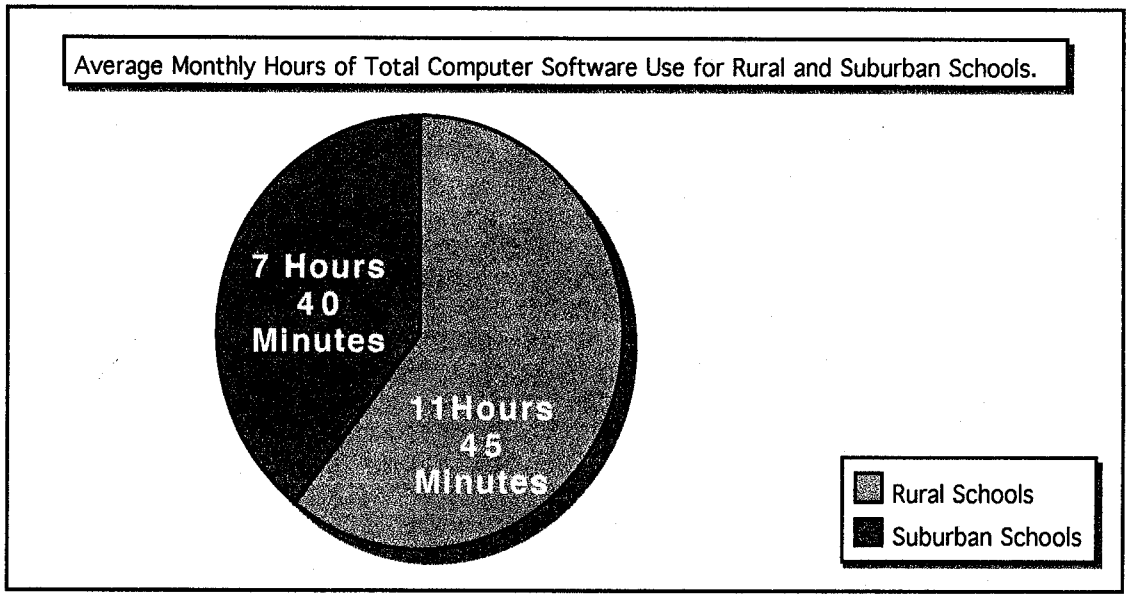
Schools: Suburban

A. Demographic Information

Place an X beside the choice that best describes you.
Gender: Males: 0 Females: 31 Total: 31 out of 50 (62%)
Years in Education: 1-5: 8 6-10: 3 11-15: 3 16-20: 5 21-25: 5 25+: 7
Your District is: Suburban
Current Teaching Assignment/Grades: K-6.

Thus, 5% more teachers from selected schools in the suburban school districts (62%) responded to the survey than in the rural districts (57%).

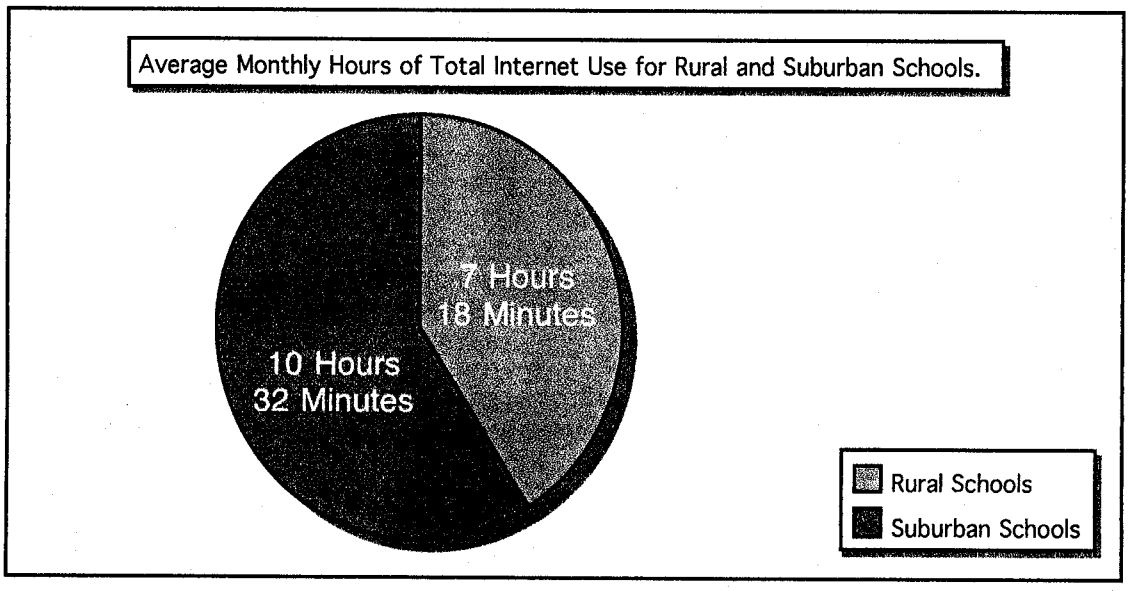
From Section B, the average hourly use of computer software for the month was identified. The participating schools from the rural school districts used computer software on the average of about 11 hours and 45 minutes per month, while in the suburban districts, the average monthly use was for 7 hours and 40 minutes.



For purposes of this study, the rural district participating schools use computer software on the average of 4 hours and 5 minutes more per month than schools from the suburban districts. Examination of the means and a *t* test for independent samples (*df* = .05) indicated that there was essentially no difference between the groups (see Appendix H). A *t* test was used because the groups were selectively chosen.

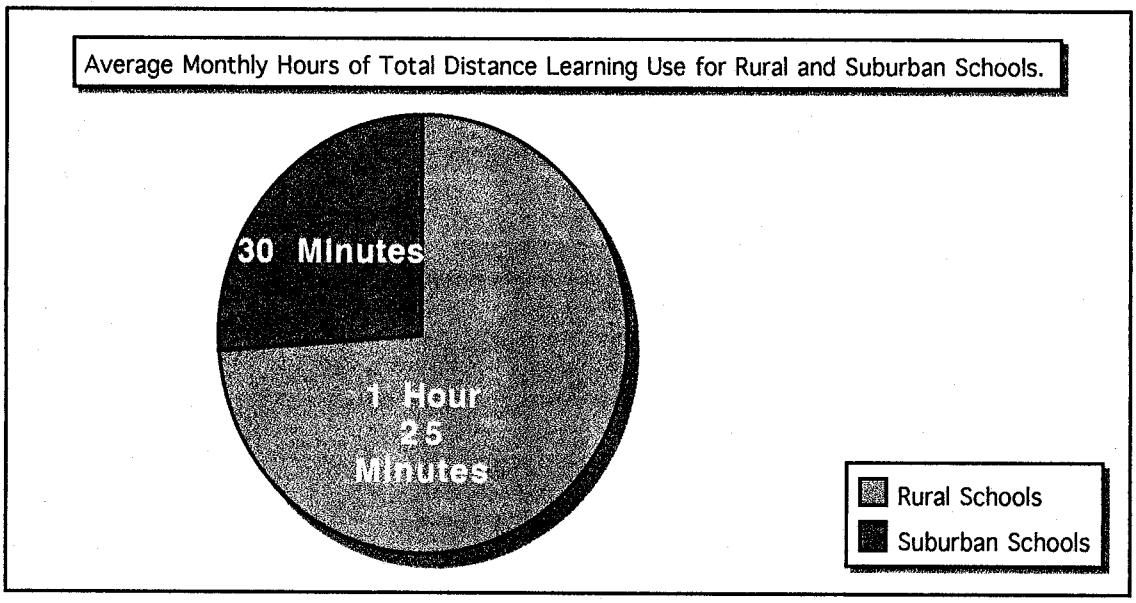
In Section C of this comparison, the average hourly use of the Internet for the month was identified. The five selected schools from rural school districts collectively averaged 7 hours and 18 minutes of Internet usage per month.

The four selected schools from the suburban districts collectively averaged 10 hours and 32 minutes of Internet use per month. Thus, suburban schools in this study used the Internet an average of 3 hours and 14 minutes more per month than the schools in the rural districts.



Further examination of the means and a *t* test for independent samples (*df* = .05) indicated that there was essentially no difference between the two groups (see Appendix H). A *t* test was used because the groups were also selectively chosen.

In Section D of the comparison, rural district selected schools averaged 1 hour and 25 minutes per month for using distance learning. The participating schools in the suburban schools averaged only 30 minutes of distance learning per month. Rural schools used distance learning at an average 55 minutes more per month than the suburban participating schools.



Further examination of the means and a t test for independent samples (*df* = .05) also indicated that there was no difference between the two groups (see Appendix H). A t test was used because the groups were selectively chosen.

Finally, Section E of the questionnaire was analyzed. The participating schools in the rural school districts had an average of 4.1 computers in their regular classrooms, as compared to the suburban participating schools, which averaged 2.1 computers in their regular classrooms. All computers were connected to the Internet. The average regular class size in rural schools was 21 students. The average class size in suburban schools was 16 students. All schools in the study had separate computer labs, where the average amount of visits per month was 5.2 times in rural schools, and 6 times per month in suburban schools. Thus, the average class in suburban schools has 5 less students than rural schools. However, all classes use their respective computer

labs about the same amount of times per month.

NJDOE School Technology Survey 2001

A brief, final analysis was made that compared Internet and Distance Learning in Gloucester and Salem Counties, with the New Jersey Department of Education (NJDOE) Technology Survey from 2001. Although the NJDOE survey was very detailed, some of its data could be used in this study (see Appendix I).

In the area of Internet, the NJDOE survey indicates that schools in Gloucester County have 89.2% Internet connections. This study shows that the four selected schools from Gloucester County have 100% Internet access. For Salem County, the NJDOE survey also indicates 98.1% Internet connections. The four selected schools have 100% Internet connections. The state average for classrooms with Internet connections is 84.0% (see Appendix I).

In the area of distance learning, the NJDOE survey shows that schools in Gloucester County have a 78.7% capability for distance education (see Appendix I). In the study of the four selected schools from Gloucester County, the average monthly use of distance learning is only 30 minutes per month. It appears that these four schools are not using distance education in regard to the NJDOE capability.

For distance learning in Salem County, the NJDOE shows that the schools in their survey have a 73.5% distance learning capability (see Appendix I). The four schools in the study from Salem County show an average monthly use of distance education as 1 hour and 46 minutes. Although the study indicates a more average monthly use of distance

education in Salem County than Gloucester County, it appears as though Salem County Schools are also not using the distance learning capabilities as indicated in the NJDOE Technology Survey. The state average for schools with Distance Learning Capabilities is 76.8% (see Appendix I).

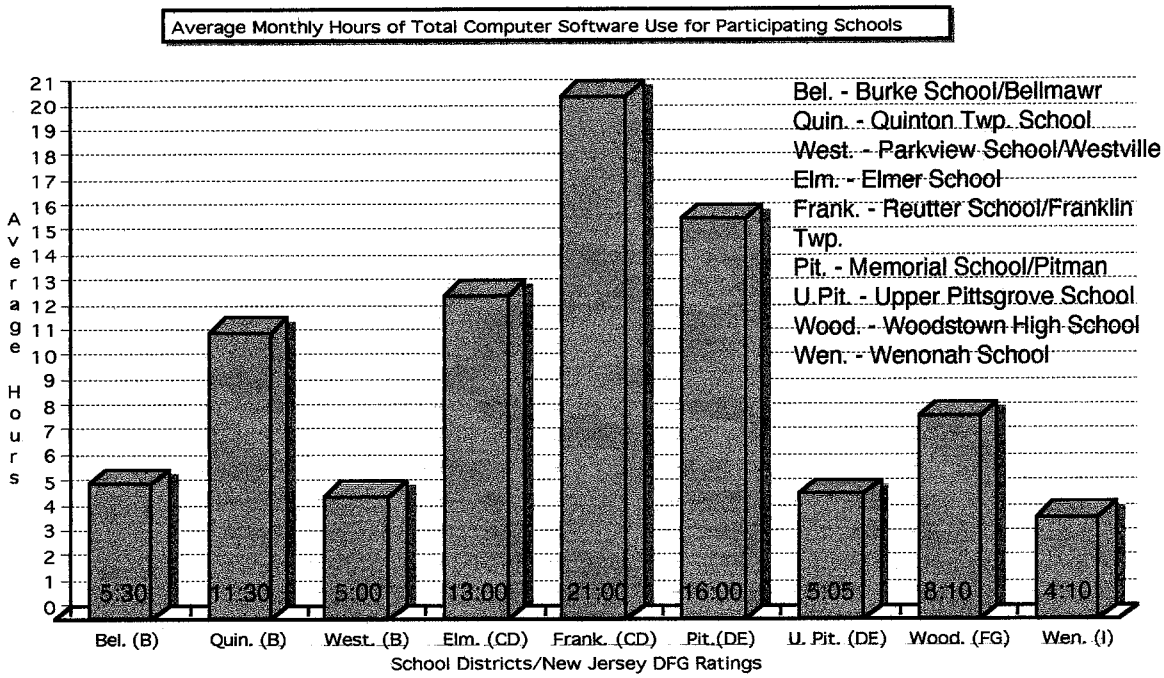
According to the NJDOE 2001 Technology Survey, Gloucester County has 51.1% of its teachers at the Intermediate skill level in the use of Technology in Instruction, and 26.9% at the Advanced skill level. Salem County, according to the NJDOE Survey, has 47.5% of its teachers at Intermediate skill level, and 30.2% at the Advanced level for Technology in Instruction. The study indicated very little skill levels in instructional technology, for the participating teachers (see Appendix I).

Individual School Analysis

As previously stated, nine school districts participated in this study. This gave a response rate of 56% of the districts that were invited to participate. The participating schools were grouped and analyzed by county and geographical setting. There were no significant differences in the use of telecommunications among these schools when studied by comparative grouping.

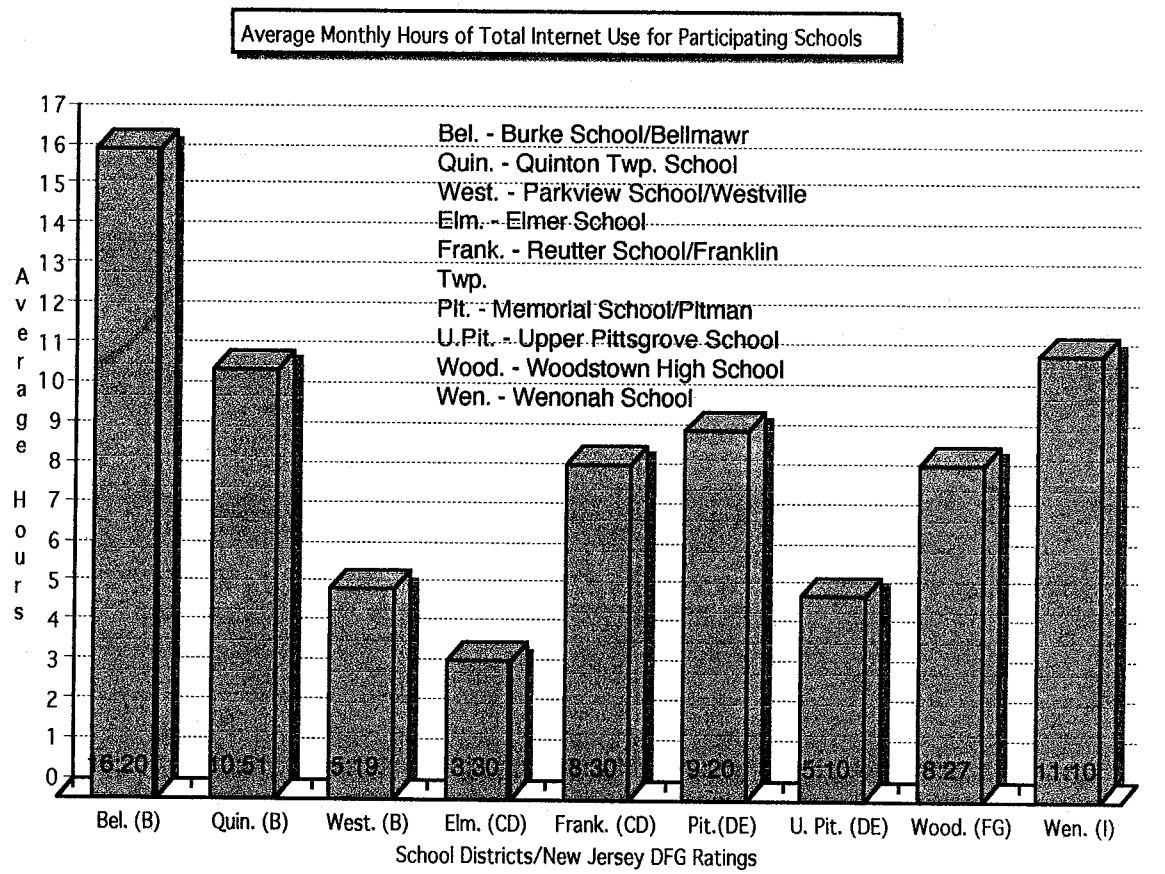
However, when each of the nine participating schools were studied on an individual basis, there were several differences in the use of telecommunications technology. In the area of monthly computer software use, the Reutter School in Franklin Township implemented this technology the most. The Reutter School used software on an average of 21 hours

per month. Reutter had a DFG rating of CD, whereas the school district of Wenonah had the highest social economic rating of I in this study. Wenonah used computer software for an average of only 4 hours and 10 minutes per month. All other schools with a lower DFG and economic rating used computer software more per month than did Wenonah. Even Quinton Township, with a low social economic rating used software more per month than two other schools with the same rating, and more than three schools with higher DFG ratings.



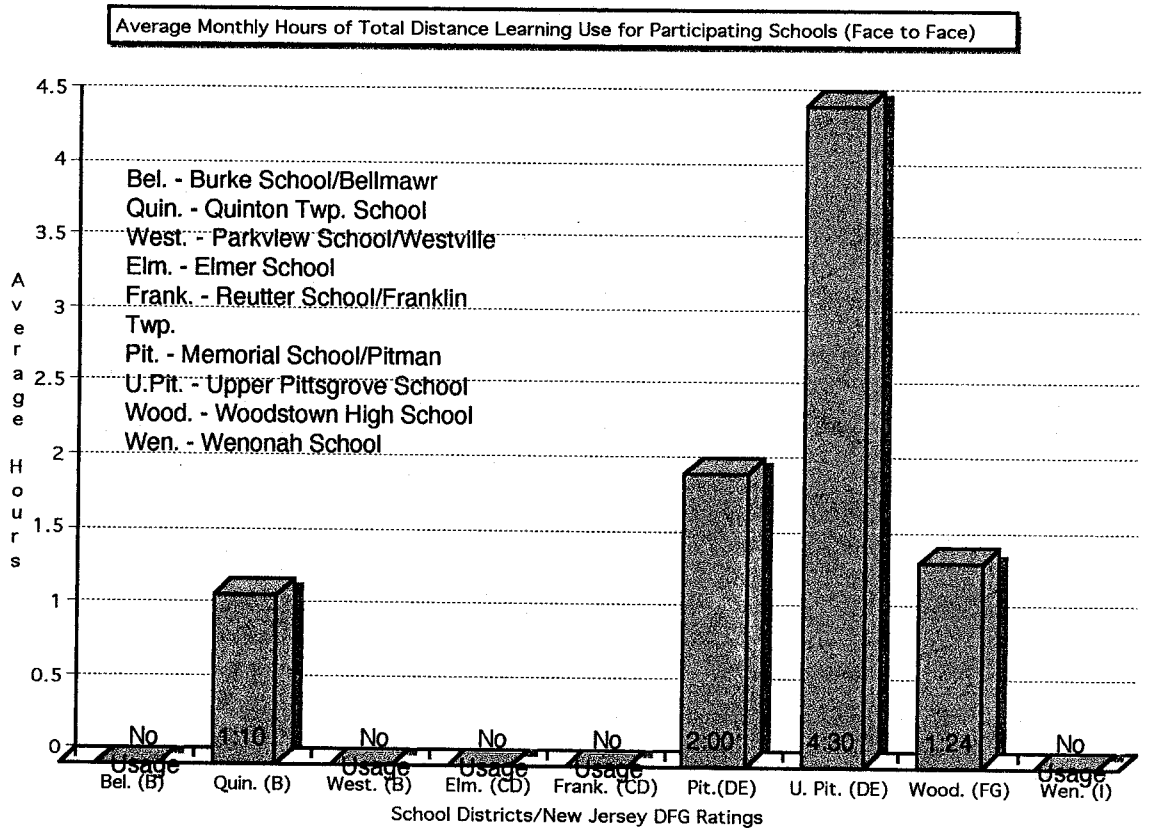
For Internet use, which is the emphasis of this study, there was also inconsistent data to report. The school that averaged using the Internet the most, on a monthly basis, was the Burke School in the district of Bellmawr. Burke School students, according to this study, used Internet on an average of 16 hours and 20 minutes per month. Bellmawr School District has a DFG rating of B. Wenonah School, which has the

highest social economic rating in this study, used the Internet on a monthly average of 11 hours and 10 minutes. This average was lower than two school districts with lower DFG ratings. The Elmer School had the lowest average monthly use of only 3 hours and 30 minutes, according to the study. Elmer School had a DFG rating of CD.



Finally, for the study of distance education, five of the schools in this study reported no use of distance learning. The highest reported use for distance learning came from Upper Pittsgrove Township Schools. This school reported a monthly average use of distance learning of 4 hours and 30 minutes. Upper Pittsgrove had a lower DFG rating than

Wenonah, which did not report any distance learning use at all. Quinton Township Schools, with one of the lowest DFG ratings in this study, used distance learning on an average of 1 hour and 10 minutes per month. Two other districts with the same DFG rating, did not report any use of distance education.



It is felt that after analysis of the data from this study, a school districts social economic status had no consistent effect on the use of computer software and telecommunications. However, the study does indicate that schools in a rural setting seem to use distance education more than schools in a suburban setting. Three rural schools that participated in the study, used distance education as part of their technology. Only one school in the suburban

setting reported any use of distance learning on a monthly basis. Statistics from this study show the use of distance education is, perhaps, more economically feasible in a rural setting than in a suburban one. The cost of implementing educational programs is more economical through distance education, than by the hiring of additional staff for these rural school districts that are separated from other schools by great distances.

Finally, the rural schools class size averaged 5 more students (21) per regular classroom than the suburban schools (16). There were also an average of more computers (4.1) per classroom than in suburban ones (2.1). Again, it may be more economical to add additional education programs into the classroom by way of computer technology than the hiring of additional staff.

Chapter Five

CONCLUSIONS AND RECOMMENDATIONS

Summary of the Problem

The purpose of this study was to investigate the level of integration of technology in a typical classroom of today. Specifically, the purpose of the study was to look at the computer and related Internet and telecommunication use.

It was also the purpose of this study to see if particular factors can be related to the amount of technology integration. These factors could have been, but not limited to the social-economic status of a particular school district, the experience and gender of the participants, and technology training of the teachers involved in the study.

Summary of the Hypothesis

The specific hypothesis stated that with the Internet, distance learning, and other telecommunications becoming more available, there was to be no significant differences in the use of telecommunications technology among public schools selected for this study.

Summary of the Method of Investigation

The participants for this study were teachers that were chosen from a stratified sample of schools in Gloucester, Camden, Salem, and Cumberland Counties in New Jersey. The four schools selected from each county represented a cross-section of districts identified according to their District Factor Rating (DFG) from the New Jersey Department of

Education (NJDOE). The schools were then placed into different catagories (see Appendix B).

A questionnaire was developed for each participant by the author. The participants were asked to share facts and opinions regarding the use of computer software, Internet, and distance learning in their particular schools or classrooms. The questionnaires were completed, collected, and analyzed by the author (see Appendix C).

Conclusions

All schools invited to participate in this study did not reply. Several districts declined, while others gave no response.

When participating schools that responded to the study, were grouped by counties, the grouping seemed to be evenly divided, based on their DFG ratings from the New Jersey Department of Education. The DFG ratings for Gloucester County were B, CD, DE, and I. For Salem County, the DFG ratings were B, CD, DE, and FG. So, there were four similar DFG ratings for each county in the study.

Upon examination of technology resources for each county, there was only a difference in average monthly use of about 53 minutes. In the area of software, there was a monthly average difference of about 2 hours and 30 minutes. For usage of the Internet, the average monthly difference between the counties was only about 1 hour and 35 minutes.

In the area of distance learning, neither county participating schools reported any significant numbers when using any form of distance education.

When the usage for all of the technology resources, (software, Internet, distance learning) mentioned above were averaged together, there was only an average, monthly difference of about 1 hour and 35 minutes between Salem and Gloucester Counties. With this comparison, It was concluded that there is no significant difference in the use of telecommunications technology among the schools participating in this study. The DFG ratings in this comparison factor showed no significant differences between the two county study. It was also concluded that the years of experience among the participating teachers and their genders, had no factor in regard to the use of telecommunication usage among the schools in this study.

Upon examination of the school districts, according to whether they are classified as rural or suburban, differences were minimal. In examining the area of computer software, the difference in monthly average use of computer software was 4 hours and 5 minutes. For the monthly average use of Internet applications, the difference was 3 hours and 12 minutes. Finally, for the average monthly use of distance education, the difference between the Rural and Suburban counties was only 55 minutes. When the totals of monthly use of computer software, Internet, and distance learning are combined for the Rural Schools and the Suburban schools, there is only a monthly time difference of 38 minutes. I conclude, as before stated, that there is no significant difference in the use of telecommunication technology among public schools in this survey.

Upon further examination of each participating school in

this study, there were not enough participating schools to place in each New Jersey Department of Education DFG social-economic categories.

Recommendations

It is recommended that school districts need to establish more emphasis in the area of teacher training of technology. The survey among the 93 participating teachers yielded very little response in regard to any on-line courses or significant technology training.

It was stated in the area of Core Curriculum Content Standards, that "Students will be expected to develop skills in the use of information, up-to-date educational technology, and other tools to improve learning, achieve goals, and produce products and presentations" (See Appendix E). If public teachers are not trained enough in these areas, then the goal of training the student becomes a very difficult task.

It is also recommended that school districts should try to raise the average level of technology as studied by the New Jersey Department of Education's School Technology Survey from 2001 (see Appendix I). Technology needs to be integrated more in the areas of core curriculum content areas, student-to-computer ratios per classroom, teacher training, and through distance education.

Recommendations for Future Study

It is recommended that there needs to be further study in the area of technology training for all staff members in

public education. This to include, but not limited to teachers, teaching assistants, administrators, and perhaps, school board members.

It is also recommended that further study needs to be done in the areas of:

- Technology in rich versus poor school districts.
- Integration of school curriculum for school computer labs, and how other specialized area teachers use technology for their particular curriculum areas.
- Comparisons in the age and experience of newer classroom teachers versus teachers with more years of experience.
- Applications of technology in regard to the New Jersey Core Curriculum Content Standards on Information, Technology, and Other Tools (see Appendix E).
- Cost of the implementation of technology to public schools, in all areas and all social-economic backgrounds.

Finally, any further study of technology in education needs to take place for more school districts, more counties in New Jersey, and more schools in each of the New Jersey Department of Education District Factor Group (DFG) Ratings.

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APPENDICES:

Appendix A

Listing of School Districts Asked to Participate in the Telecommunications Survey

Camden County, New Jersey:

Bellmawr School District
256 Anderson Avenue
Belmawr, NJ 08031
Phone: (856) 931-3620

Camden City School District
201 North Front Street
Camden, NJ 08102-1935
Phone: (856) 966-2040

Cherry Hill Public Schools
Mulberg Administration Building
45 Ranaldo Terrace
Cherry Hill, NJ 08034-0391
Phone: (856) 429-5600

Pennsauken Public Schools
1695 Hylton Road
Pennsauken, NJ 08110
Phone: (856) 662-8505

Cumberland County, New Jersey:

Bridgeton School District
P.O. Box 657
Bridgeton, NJ 08302
Phone: (856) 455-8030

Greenwich School District
839 Ye Greate Street
Greenwich, NJ 08323
Phone: (856) 451-5513

Appendix A

Millville Public Schools
P.O. Box 5010
Millville, NJ 08332
Phone: (856) 327-7575

Vineland Public Schools
625 Plum Street
Vineland, NJ 08360
Phone: (856) 794-6700

Gloucester County, New Jersey:

Franklin Township Public Schools
3228 Coles Mill Road
Franklinville, NJ 08322-3029
Phone: (856) 629-9500

Pitman Public Schools
420 Hudson Avenue
Pitman, NJ 08071
Phone: (856) 589-2145

Wenonah Public School
200 North Clinton Avenue
Wenonah, NJ 08090
Phone: (856) 468-6000

Westville School District
Birch and High Streets
Westville, NJ 08093
Phone: (856) 456-0235

Salem County, New Jersey:

Elmer School
P.O.Box 596
Front Street
Elmer, NJ 08318-0596
Phone: (856) 358-6761

Appendix A

Quinton School District
P.O.Box 365
Robinson Street
Quinton, NJ 08072-0365
Phone: (856) 935-2379

Upper Pittsgrove Township Schools
235 Pine Tavern Road
Monroeville, NJ 08343-9802
Phone: (856) 358-8163

Woodstown-Pilesgrove Regional School District
135 East Avenue
Woodstown, NJ 08098-1336
Phone: (856) 769-1664

Appendix B

New Jersey Department of Education:

District Factor Groups (DFG).

Key: Letter A = Areas' Poorest School Districts

Letter J = Areas' Richest School Districts

School Districts in Study with DFG Rating of A.

1. Bridgeton School District
2. Camden City School District

School Districts in Study with DFG Rating of B.

1. Bellmawr School District
2. Millville City School District
3. Quinton Township School District
4. Vineland City School District
5. Westville School District

School Districts in Study with DFG Rating of CD.

1. Elmer Boro School District
2. Franklin Township School District
3. Greenwich Township School District
4. Pennsauken School District

School Districts in Study with DFG Rating of DE.

1. Pitman Boro School District
2. Upper Pittsgrove Township School District

Appendix B

School District in Study with DFG Rating of FG.

1. Woodstown Public School District

School Districts in Study with DFG Rating of I.

1. Cherry Hill School District
2. Wenonah Boro School District

Note: There were no District Factor Groups in this study identified by an H or J DFG rating.

Appendix C

Teacher Telecommunications Questionnaire

School:_____ District:_____

A. Demographic Information

Place an X beside the choice that best describes you.

1. Gender: Male ___ Female ___
2. Years in Education: 1-5 ___ 6-10 ___ 11-15 ___ 16-20 ___ 21-25 ___ 25 +___
3. Your District is: rural ___ urban ___ suburban ___
4. Current Teaching Assignment/Grade: _____

B. Technology Resources

Below is a list of technology resources. On the average, indicate how often these resources are being used by your students this school year.

	Resource:	Hours/Week:	Hours /Month:
5.	Television	_____	_____
6.	VCR/DVD	_____	_____
7.	Computer Software	_____	_____
8.	Video Camera	_____	_____
9.	Digital Camera	_____	_____
10.	Other: _____	_____	_____

C. Internet

Below is a list of Internet applications. On the average, indicate how often these applications are being used by your students this school year.

	Application:	Hours/Week:	Hours / Month:
11.	E-Mail	_____	_____
12.	Chat Rooms	_____	_____
13.	Bulletin Boards	_____	_____
14.	Newsgroups	_____	_____
15.	Search Engines	_____	_____
16.	Databases	_____	_____
17.	Web Quests	_____	_____
18.	Electronic Field Trips	_____	_____
19.	Other: _____	_____	_____

Appendix C

D. Distance Learning

Below is a list of Distance Learning applications. On the average, indicate how often these services are being used by your students this school year.

	Service:	Hours/Week:	Hours/Month:
20.	Television (PBS, History Channel, etc..)	_____	_____
21.	Video Conferencing (Face to Face)	_____	_____
22.	Collaboration (Face to Face)	_____	_____
23.	Television Courses	_____	_____
24.	Other: _____	_____	_____

E. School Information

Please answer the following questions.

25. How many computers are in your classroom? _____ Connected to the Internet?_____
26. How many students are in your classroom? _____
27. Does your school have a computer lab? _____ If yes, how many computers are in the lab? _____ Connected to the Internet?_____ How often does your class use the computer lab? _____
28. In general, how many hours does your class use the Internet? Per Week _____ Per Month_____
29. As an educator, have you taken any on-line courses? _____ If yes, briefly describe them:_____
    _____
30. Can you briefly describe, how technology is integrated in your school district's curriculum:_____
    _____

Thank you very much for taking the time to complete the questionnaire. I know how valuable your time is. Remember, your answers will remain anonymous.

Mr. Ed Ewing
Rowan University

_____ Yes, I would like a report on the results of the survey upon completion!

Appendix D

Description	Edit	**Posting**	Edit
Group Name	Veteran Teachers	**Posting**	Discussion is for members
Group Email Address	veteranteachers@yahoogroups.com	**Moderation**	Unmoderated
Homepage Address		**Attachments**	Email attachments are permitted
Group Description	School Teachers who have been in the profession for Twenty Years or longer!	**Reply-to**	Replies go to all members of the group
Primary language	English	**Subject tag**	[veteranteachers]
Directory listing type	Listed in directory		

> ----------
> From: edewing1313
> Reply To: veteranteachers@yahoogrou
> Sent: Wednesday, March 6, 2002 10:09 AM
> To: veteranteachers@yahoogrou
> Subject: [veteranteachers] Technology Survey!
>
>
> Teacher Telecommunications Questionnaire
>
School:_Simmons_____
District:____Clayton_____
> A. Demographic Information
>

Appendix D

> Place an X beside
the choice that best describes you.
> 1. Gender: Male ___ Female _X__
> 2. Years in Education: 1-5 ___ 6-10 ___ 11-15 ___ 16-20 ___ 21-25
> ___ 25 +_X__
> 3. Your District is: rural ___ urban ___ suburban _X__
>
>
> 4. Current Teaching Assignment/Grade: _Third_____
>
>
> B. Technology Resources
>
> Below is a list of technology resources. On the average, indicate how
> often these resources are being used by your students this school
> year.
>
> Resource: Hours Per Week:
> Hours Per Month:
> 5. Television ___1hour_____ __5
> hours_____
> 6. VCR/DVD _1 hour_____ _5
> hours_____
> 7. Computer Software ___half hour_____
> 2 hours _____
> 9. Digital Camera _____
> _____
> 10. Other: _____ _____
> _____
>
> C. Internet
>
> Below is a list of Internet applications. On the average, indicate
> how
> often these applications are being used by your students this school
> year.
>
> Application: Hours Per Week:
> Hours Per
> Month:
> 11. E-Mail _____1 hour_____
> _____
> 12. Chat Rooms _____
> _____
> 13. Bulletin Boards _____
> _____
> 14. Newsgroups _____
> _____
> 15. Search Engines _____
> _____
> 16. Databases _____
> _____

> _____
> 17. Web Quests _____
> _____
> 18. Electronic Field Trips _____
>
> _____
> 19. Other: _____ _____
> _____
>
> D. Distance Learning
>
> Below is a list of Distance Learning applications. On the average,
> indicate how often these services are being used by your students
> this
> school year.
>
> Service: Hours Per Week:
> Hours Per Month:
> 20. Television
> (PBS, History Channel, etc..) _____
>
> _____
> 21. Video Conferencing
> (Face to Face) _____
> _____
> 22. Collaboration
> (Face to Face)
> 23. Television Courses _____
> _____
> 24. Other: _____ _____
> _____
>
> E. School Information
>
> Please answer the following questions.
>
> 25. How many computers are in your classroom? ___2__ Connected to tl
> Internet? __1_____
> 26. How many students are in your classroom? __26_____
> 27. Does your school have a computer lab? __yes___ If yes, how many
> computers are in the lab? __30___ Connected to the
> Internet?__30___
> How often does your class use the computer lab? _____
> 28. In general, how many hours does your class use the Internet? Pe
> Week _____ Per Month__1___
> 29. As an educator, have you taken any on-line courses? _no____ If
> yes,
> briefly describe them:_____
>

Appendix D

> _____
> 30. Can you briefly describe, how technology is integrated in your
> school district's curriculum:_____
>
> _____
> _____
>
> _____
> _____
>
> _____
> _____
>
> Thank you very much for taking the time to complete the
> questionnaire.
> I know how valuable your time is.
> Remember, your answers will remain anonymous.
>
> Mr.
> Ed Ewing
>
> Rowan University
>

From:
Teacher in
Grade Three
Herma S. Simmons Elementary School
Grades Pre K-Six.
Clayton, New Jersey.

Appendix E

[NJDOE Home Page]

New Jersey Department of Education New Jersey Core Curriculum Content Standards

Cross-Content Workplace Readiness Standards And Progress Indicators

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Standard 2:
All Students Will Use Information, Technology, And Other Tools

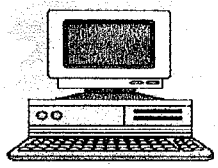
Descriptive Statement: Students will be expected to develop skills in the use of information, up-to-date educational technology, and other tools to improve learning, achieve goals, and produce products and presentations. They will learn to develop, locate, summarize, organize, synthesize, and evaluate information. Students will be expected to use technological tools, such as telecommunications networking, for problem-solving, writing, and research.

Cumulative Progress Indicators

All students will be able to:

1. Understand how technological systems function.
2. Select appropriate tools and technology for specific activities.
3. Demonstrate skills needed to effectively access and use technology-based materials through keyboarding, troubleshooting, and retrieving and managing information.
4. Develop, search, and manipulate databases.
5. Access technology-based communication and information systems.
6. Access and assess information on specific topics using both technological (e.g., computer, telephone, satellite) and print resources available in libraries or media centers.
7. Use technology and other tools to solve problems, collect data, and make decisions.
8. Use technology and other tools, including word-processing, spreadsheet and presentation programs, and print or graphic utilities, to produce products.
9. Use technology to present designs and results of investigations.
10. Discuss problems related to the increasing use of technologies.

Appendix F



From the desk of ...

Ed Ewing
March 4, 2002.

Dear School Administrator,

My name is Ed Ewing. I am currently a graduate student at Rowan University and am completing my master's thesis in computer education. As part of my study, I would like to survey your teachers.

The topic of my study is telecommunications in the classroom. Specifically, the focus is on Distance Learning and Internet usage. Since technology is very much used in today's society, it is important to find out how teachers are using telecommunications with their students. It is also important to understand how telecommunications is affecting changes in school curriculum. The results that are gathered will help school districts in New Jersey continue to incorporate educational technology in their curriculum.

Attached to this letter is a sample letter and questionnaire that needs to be completed by the teachers. I am asking that you distribute the questionnaires to the teachers or you may assign someone for this task. After the questionnaires are completed, have them placed in the folder in the teacher's room or the main office by March 15th, 2002. As soon as the questionnaires are in the folder, you can place the folder in a postage-paid envelope and mail it to me.

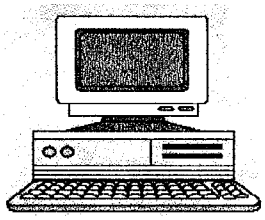
Thank you very much for your help in allowing me to survey your teaching staff. All responses will remain anonymous. If you wish to see a report of the results, please indicate on the bottom of this letter. I will see that you receive a copy upon completion of the study.

Any further questions, I can be reached by phone at (856) 694-0207 or email at: *ewing13@bellatlantic.net.*

Sincerely,

Ed Ewing

Appendix G



From the desk of ... Ed Ewing

March 4, 2002.

Dear Fellow Teachers,

My name is Ed Ewing. I am currently a graduate student at Rowan University and am completing my master's thesis in computer education. As part of my study, I would like you to respond to questions regarding telecommunications technology.

Attached you will find a questionnaire. Please complete in a timely fashion. When the questionnaire is completed, place it in the folder in the teacher's room or the main office by March 15th, 2002. When the surveys are completed, they can be placed in the enclosed postage paid envelope and mailed to me by your administrator. All responses will remain anonymous.

The topic of my study is telecommunications in the classroom. Specifically, the focus is on Distance Learning and Internet usage. Since technology is very much used in today's society, it is important to find out how teachers are using telecommunications with their students. It is also important to understand how telecommunications is affecting changes in school curriculum. The results that are gathered will help school districts in New Jersey continue to incorporate educational technology in their curriculum.

Thank you very much for your participation in this study. If you wish to see a report of the results, please indicate on the bottom of the questionnaire, and I will see that you receive a copy upon completion of the study.

Any further questions, I can be reached by telephone at (856) 694-0207 or by email at: *ewing13@bellatlantic.net.*

Sincerely,

Ed Ewing

Appendix H

t-TEST FOR INDEPENDENT SAMPLES

Statistic	Values
No. of Scores in Group X	4
Sum of Scores in Group X	37.7500
Mean of Group X	9.44
Sum of Squared Scores in Group X	393.81
SS of Group X	37.54
No. of Scores in Group Y	4
Sum of Scores in Group Y	46.1700
Mean of Group Y	11.54
Sum of Squared Scores in Group Y	739.39
SS of Group Y	206.47
t - Value	-0.47
Degrees of freedom	6

Group X

11.5
13
5.08
8.17

Group Y

5
21
16
4.17

Enter Score

Calculate

Clear Scores

Print

Software Use:

X-Salem County
Y-Gloucester County

Main Menu

Appendix H

t – TEST FOR INDEPENDENT SAMPLES

Statistic	Values
No. of Scores in Group X	4
Sum of Scores in Group X	27.97
Mean of Group X	6.99
Sum of Squared Scores in Group X	228.10
SS of Group X	32.52
No. of Scores in Group Y	4
Sum of Scores in Group Y	34.32
Mean of Group Y	8.58
Sum of Squared Scores in Group Y	312.37
SS of Group Y	17.90
t - Value	-0.77
Degrees of freedom	6

Group X

10.85
3.5
5.17
8.45

Group Y

5.32
8.5
9.33
11.17

Enter Score

Calculate

Clear Scores

Print

Internet Use:

X-Salem County
Y-Gloucester County

Main Menu

Appendix H

t – TEST FOR INDEPENDENT SAMPLES

Statistic	Values
No. of Scores in Group X	4
Sum of Scores in Group X	7.07
Mean of Group X	1.77
Sum of Squared Scores in Group X	23.58
SS of Group X	11.08
No. of Scores in Group Y	4
Sum of Scores in Group Y	2.00
Mean of Group Y	0.50
Sum of Squared Scores in Group Y	4.00
SS of Group Y	3.00
t - Value	1.17
Degrees of freedom	6

Group X

1.17
0.00
4.5
1.4

Group Y

0.00
0.00
2.00
0.00

Enter Score

Calculate

Clear Scores

Print

Distance Learning Use:

X-Salem County
Y-Gloucester County

Main Menu

t – TEST FOR INDEPENDENT SAMPLES

Statistic	Values
No. of Scores in Group X	5
Sum of Scores in Group X	58.7500
Mean of Group X	11.75
Sum of Squared Scores in Group X	834.81
SS of Group X	144.49
No. of Scores in Group Y	4
Sum of Scores in Group Y	30.6700
Mean of Group Y	7.67
Sum of Squared Scores in Group Y	328.64
SS of Group Y	93.48
t - Value	1.04
Degrees of freedom	7

Group X

11.50
13.00
21.00
5.06
8.17

Group Y

5.50
5.00
16.00
4.17

Enter Score

Calculate

Clear Scores

Print

Software Use:

X-Rural Schools

Y-Suburban Schools

Main Menu

Appendix H

t – TEST FOR INDEPENDENT SAMPLES

Statistic	Values
No. of Scores in Group X	5
Sum of Scores in Group X	36.47
Mean of Group X	7.29
Sum of Squared Scores in Group X	300.35
SS of Group X	34.34
No. of Scores in Group Y	4
Sum of Scores in Group Y	42.15
Mean of Group Y	10.54
Sum of Squared Scores in Group Y	506.79
SS of Group Y	62.63
t - Value	-1.30
Degrees of freedom	7

Group X

10.85
3.50
8.50
5.17
8.45

Group Y

16.33
5.32
9.33
11.17

Enter Score

Calculate

Clear Scores

Print

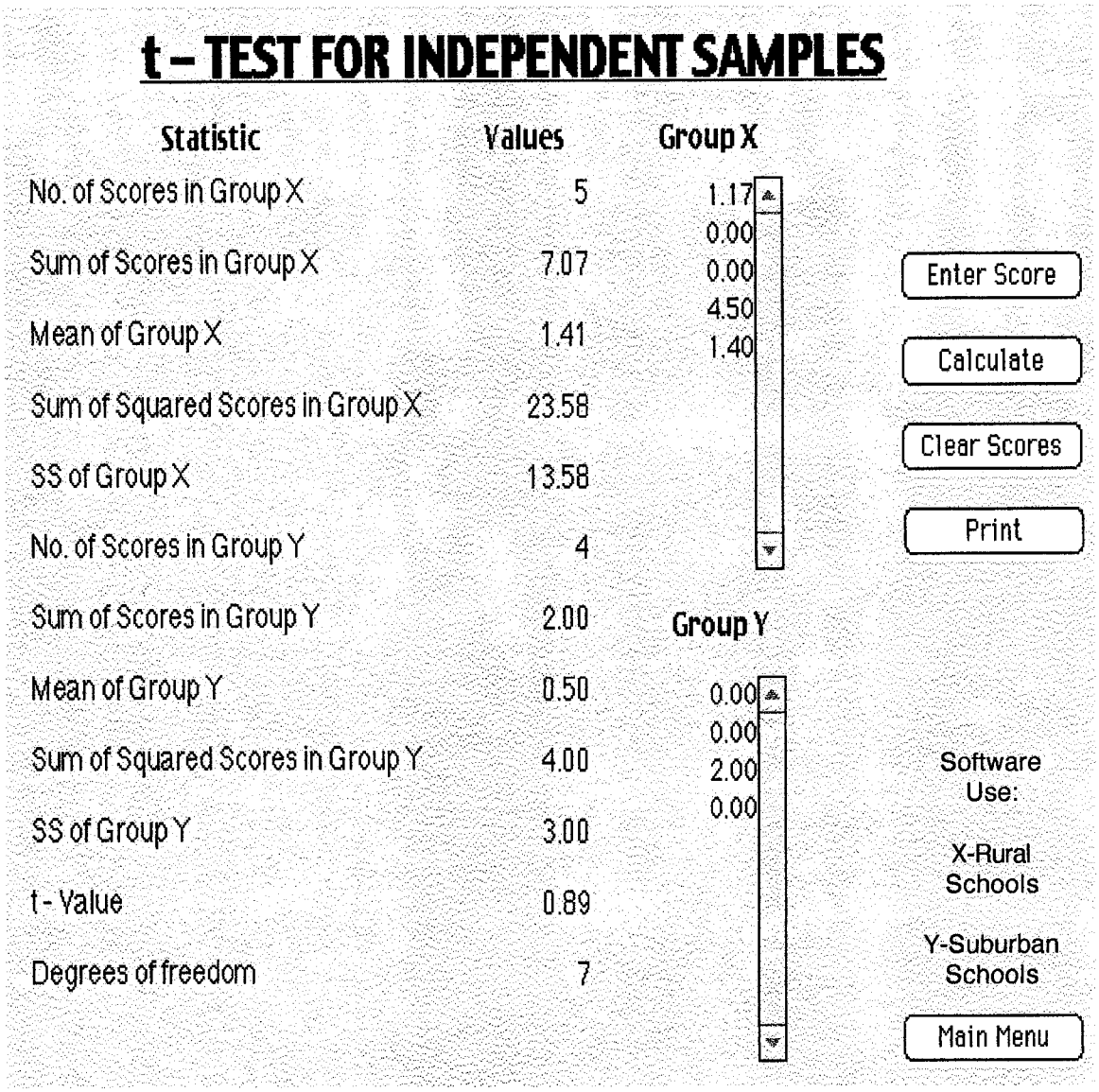
Internet Use:

X-Rural Schools

Y-Suburban Schools

Main Menu

Appendix H


t - TEST FOR INDEPENDENT SAMPLES
Statistic
Values
Group X
No. of Scores in Group X
5
Sum of Scores in Group X
7.07
Mean of Group X
1.41
Sum of Squared Scores in Group X
23.58
SS of Group X
13.58
No. of Scores in Group Y
4
Sum of Scores in Group Y
2.00
Mean of Group Y
0.50
Sum of Squared Scores in Group Y
4.00
SS of Group Y
3.00
t - Value
0.89
Degrees of freedom
7
1.17
0.00
0.00
4.50
1.40
Group Y
0.00
0.00
2.00
0.00
Enter Score
Calculate
Clear Scores
Print
Software Use:
X-Rural Schools
Y-Suburban Schools
Main Menu

Appendix I

2001 New Jersey Public School Technology Survey

Percent Classrooms With Internet Connections

County	% of Classrooms With Internet Connections
ATLANTIC	95.4%
BERGEN	79.9%
BURLINGTON	95.7%
CAMDEN	98.1%
CAPE MAY	91.9%
CUMBERLAND	96.2%
ESSEX	71.1%
GLOUCESTER	89.2%
HUDSON	85.8%
HUNTERDON	95.4%
MERCER	88.4%
MIDDLESEX	57.8%
MONMOUTH	87.2%
MORRIS	88.1%
OCEAN	82.1%
PASSAIC	83.0%
SALEM	98.1%
SOMERSET	88.1%
SUSSEX	95.3%
UNION	82.1%
WARREN	93.6%
STATE	84.0%

Appendix I

[NJDOE Home Page]

2001 New Jersey Public School Technology Survey

Schools With Distance Learning Capabilities & Distance Learning Connections

County	% Schools with Distance Learning Capabilities	Type of Distace Learning as a % of Schools With Distance Learning Connection						
		Internet	ISDN	Desktop video	Cable (ITV)	IDLS County-wide	IntraLATA	ATM
ATLANTIC	64.8%	41.3%	78.3%	6.5%	17.4%	0.0%	2.2%	19.6%
BERGEN	79.4%	99.4%	11.0%	9.9%	12.7%	0.6%	0.6%	39.2%
BURLINGTON	76.1%	94.0%	11.9%	14.9%	26.9%	3.0%	1.5%	11.9%
CAMDEN	75.6%	81.8%	38.4%	18.2%	20.2%	0.0%	1.0%	18.2%
CAPE MAY	92.9%	46.2%	96.2%	7.7%	7.7%	7.7%	0.0%	7.7%
CUMBERLAND	74.5%	71.1%	42.1%	10.5%	10.5%	0.0%	5.3%	28.9%
ESSEX	78.8%	88.8%	37.5%	6.3%	11.9%	6.3%	5.0%	18.1%
GLOUCESTER	78.7%	91.5%	27.1%	32.2%	28.8%	1.7%	0.0%	39.0%
HUDSON	84.3%	96.7%	29.7%	2.2%	34.1%	8.8%	6.6%	7.7%
HUNTERDON	82.5%	100.0%	18.2%	15.2%	18.2%	0.0%	0.0%	0.0%
MERCER	64.0%	72.7%	23.6%	3.6%	50.9%	0.0%	0.0%	23.6%
MIDDLESEX	68.1%	97.2%	19.3%	2.8%	17.4%	5.5%	1.8%	5.5%
MONMOUTH	80.0%	90.5%	31.9%	8.6%	18.1%	0.0%	0.0%	22.4%
MORRIS	83.6%	100.0%	45.3%	3.4%	12.0%	0.9%	0.9%	30.8%
OCEAN	76.3%	100.0%	40.3%	11.7%	10.4%	1.3%	0.0%	5.2%
PASSAIC	71.1%	91.9%	16.3%	4.7%	11.6%	5.8%	3.5%	9.3%
SALEM	73.5%	64.0%	36.0%	4.0%	24.0%	0.0%	0.0%	28.0%
SOMERSET	67.1%	93.6%	21.3%	19.1%	19.1%	8.5%	2.1%	14.9%
SUSSEX	75.7%	89.3%	17.9%	3.6%	10.7%	0.0%	0.0%	14.3%
UNION	81.8%	92.3%	18.8%	9.4%	20.5%	14.5%	10.3%	12.8%
WARREN	92.1%	100.0%	16.7%	33.3%	25.0%	22.2%	2.8%	11.1%
STATE	76.8%	90.0%	29.3%	9.7%	18.5%	4.1%	2.5%	19.1%

Appendix I

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2001 New Jersey Public School Technology Survey

Teacher Skill Levels in the use of Technology in Instruction
(School Based Percentages)

Beginner - Introduction to Operations
Intermediate - Uses Applications
Advanced - Curriculum Integration
Instructor - Teaches Applications

	County Average			
County	Beginner	Intermediate	Advanced	Instructor
ATLANTIC	28.1%	49.1%	20.4%	7.2%
BERGEN	21.8%	51.4%	22.4%	6.5%
BURLINGTON	20.8%	53.5%	20.5%	6.1%
CAMDEN	25.3%	49.9%	20.0%	6.5%
CAPE MAY	20.0%	52.2%	23.2%	6.3%
CUMBERLAND	25.4%	77.3%	20.8%	5.7%
ESSEX	34.5%	43.1%	17.8%	7.4%
GLOUCESTER	16.5%	51.1%	26.9%	7.6%
Hudson	32.6%	47.6%	15.7%	6.6%
HUNTERDON	19.2%	45.6%	25.8%	7.4%
MERCER	24.0%	49.0%	22.2%	7.6%
MIDDLESEX	31.1%	46.9%	18.7%	5.5%
MONMOUTH	21.9%	50.5%	22.2%	7.4%
MORRIS	26.0%	44.6%	24.7%	6.8%
OCEAN	27.5%	50.1%	17.0%	6.4%
PASSAIC	36.3%	40.2%	19.8%	6.3%
SALEM	15.4%	47.5%	30.2%	10.1%
SOMERSET	18.7%	50.8%	25.8%	7.5%
SUSSEX	19.3%	51.7%	22.8%	6.8%
UNION	27.5%	42.8%	25.4%	7.1%
WARREN	17.4%	52.5%	24.5%	7.5%
STATE	26.1%	48.6%	21.5%	6.8%

Appendix I

[NJDOE Home Page]

2001 New Jersey Public School Technology Survey

Student-to-Compuer Ratio and Instructional Computers in Classrooms

County	Student-to-Computer Ratio		% of Instructional Computers in Classrooms*
	All Computers	Multi-Media Computers*	
ATLANTIC	4.1to 1	4.5to 1	63.8%
BERGEN	3.9to 1	4.2to 1	59.1%
BURLINGTON	3.5to 1	3.9to 1	59.4%
CAMDEN	3.6to 1	4.1to 1	60.0%
CAPE MAY	3.5to 1	3.8to 1	64.7%
CUMBERLAND	2.9to 1	3.3to 1	57.4%
ESSEX	4.9to 1	5.5to 1	52.2%
GLOUCESTER	3.7to 1	3.9to 1	52.4%
HUDSON	4.6to 1	4.9to 1	64.5%
HUNTERDON	3.2to 1	3.3to 1	64.4%
MERCER	3.8to 1	4.2to 1	64.1%
MIDDLESEX	4.7to 1	5.5to 1	56.2%
MONMOUTH	4.3to 1	4.5to 1	55.2%
MORRIS	3.9to 1	4.3to 1	51.9%
OCEAN	4.8to 1	5.1to 1	58.3%
PASSAIC	4.9to 1	5.5to 1	56.2%
SALEM	3.2to 1	3.4to 1	55.0%
SOMERSET	3.4to 1	3.5to 1	65.4%
SUSSEX	4.3to 1	4.9to 1	53.5%
UNION	4.0to 1	4.3to 1	68.2%
WARREN	4.1to 1	4.3to 1	56.0%
STATE	4.1to 1	4.5to 1	58.8%

*Multi-Media Computers - 486 and above (i.e. Pentium, Pentium II, Pentium III, Celeron, etc.);