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Educational Technology: A Differential Based On Economic Resources

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EDUCATIONAL TECHNOLOGY:
A DIFFERENTIAL BASED ON ECONOMIC RESOURCES

BY

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INTRODUCTION

Chapter I

"To most of us, progress is not a theory; it is a fact. Perhaps not a fact of nature (although Darwin's theory suggests that it is), but a fact of human history" (Postman, 1999). The power of reason, having its imperfections, was to assist in history's inevitable movement toward progress.

The nineteenth century has proven its faith in progress by introducing the "invention of invention"; the notion that if something can be done then it should be done. As a result, nineteenth century inventions have paved the way to what we recognize now as the digital age society.

In effect, the prelude in the course of technological progress has brought with it many concerns about the future of our society and our children. Over the last decade for instance, technology has advanced at such a speed that our society hasn't reached a plateau for it to balance its progress. In the last few years we have seen a tremendous growth in computer technology especially in the education system, and its growth has allowed for a possible digital divide among our people.

This study will focus on how technology has changed our way of thinking and will explore the current trends in our digital society. Most of the study will concentrate on computer use and the learning patterns of children.

Research Question

How has the use of computers affected formal education in the last decade from a learning and teaching perspective? This study will examine the promises as well as concerns surrounding educational technology and the learning abilities of children and the impacts it will have on their future.

Subsidiary Questions

In order to comprehend the impact computers have in the education sector and its uses for the future, this study will also examine the following questions.

1. Will the use of education technology and computer access change the learning patterns of children in the next decade?

2. What are the comparative differences among schools and school districts in their use of computers within their curriculum as compared to those that do not have such a curriculum established?

3. What is the historical background of the many technological advances made in U.S. education over the last century?

4. How has the formation of our mass media changed our views from an entertainment outlook to a means as an education resource?

5. How do these differences affect the gaps among groups in low-income and high-income brackets?

6. What are the educational disadvantages for children who do not have access to computers in their curriculum, compared to computers to those with access?

7. What critical roles do schools play in maintaining the use of computers and enhancing learning for the 21st century?

Purpose of the Study

Prior to our fast paced digital age the 20th century made outstanding technological accomplishments with the use of machinery. Great efforts were made in making science and technology what it is today.

The nineteenth century produced a massive array of startling and culture-wracking inventions: telegraphy, photography, the rotary press, the telephone, the typewriter, the phonograph, the transatlantic cable, the electric light, movies, the locomotive, rockets, the steamboat, the x-ray, the revolver, and the stethoscope, not to mention canned food, the penny press, the modern magazine, the advertising agency, the modern bureaucracy, and even (although some dispute it) the safety pin. In 1822, Charles Babbage announced that he had invented a machine capable of performing simple arithmetical calculations, and, in 1833, he produced a programmable machine that is the forerunner of the modern computer (Postman, 1999, pg. 39).

The fact is technological progress advanced at such an enormous rate over the last decade that society is still trying to catch up. For instance, in the 1920s radio was intended to bring great promises for a more social and educational society. We ever so slowly incorporated the radio as part of our everyday lives thus giving us a new form of socialization. Eventually these changes would dramatically introduce our society to different forms of information and education. During the course of radio technology, a wide range of effects had been found in children's emotional reactions, from understanding the meanings of reality versus fantasy, as well as the effects it would have

on advertising. The radio, as a form of entertainment and socialization emerged into the mass medium up to 1948.

Television, the mass medium after 1948, had some speculation on society and its impact on business, education, health and social values of our nation's pastime. Television became the largest classroom viewed right from the living room. It is here that technology would transform in such a way that would change into information technology. Television created such climactic and groundbreaking discoveries that it changed the form of interactivity and education for the future.

As new forms of technology advanced many new concerns continue to grow. Society must try to keep pace, examining technological progress and its effect on developmental and social growth on the young. Media and its technological advancements are a challenge to children and their developmental, psychological and sociological growth. The author of this study, through a review of the literature will explore the many facets new technology has contributed to the learning patterns of children. Is the presence of computer use, as the standard of everyday practice, changing the way educators should teach? Are children learning computer technology as a learning tool to prepare them for their careers? Evidence has shown the continued growth into the digital age and the concerns in education as we move forward in the 21-century.

Objectives

The purpose of this study will be to observe the amount of time children spend using the computer for educational purposes. The author will focus on computers as an educational tool, the types of learning practices used in the classroom as well as at home. The first objective will be to describe the history of media technology over the last century and the progress it has made in the educational sector. The second objective of this study will examine the promises as well as concerns on what educational technology and the increased amount of computer use will have on children and their learning abilities. Are children being instructed with the proper use of computers as a research tool or solely for drill and practice techniques? Thirdly, the author will describe how the present growing trend of computer use in the education community has potential disadvantages facing under-served children and the concerns of educators if students are not completely proficient in the use of computers. How do educators teach to students at such a diverse level of knowledge among those with access to computers and to those without? The review of literature will illustrate the changes technology has made in education through the course of history and its current state.

Definition of Terms

#1. <u>Digital Divide</u>: Unequal access to information technology.

#2. <u>Getting America's Students Ready for the 21st Century</u>: In 1994, a program passed by Congress in **Improving America's Schools Act of 1994** (PL 103-382) to provide schools access to computers.

#3. <u>Educational Technology</u>: Growth of ideas, practical solutions and learning through information technology.

#4. <u>Educational Testing Service</u>: Educational Testing Service (ETS) is the world's largest private educational testing and measurement organization and a leader in educational research. The company is dedicated to serving the needs of individuals, educational institutions, and government bodies in almost 200 countries. ETS develops and administers more than 12 million tests worldwide.

#5. <u>Equality of Educational Opportunity</u>: The Equality of Educational Opportunity Study (EEOS), also known as the "Coleman Study," was commissioned by the United States Department of Health, Education, and Welfare in 1964 to assess the availability of equal educational opportunities to children of different race, color, religion, and national origin.

#6. <u>Instructional Television</u>: Instructional Television (ITV) is responsible for acquiring and producing valuable instructional television resources for our public school students, teachers, and administrators.

#7. <u>National Assessment of Educational Progress</u>: For more than 30 years the National Assessment of Educational Progress (NAEP) has served American educators as an information resource, providing reliable profiles of what our students know and can do in key subject areas.

#8. <u>Public Broadcast System</u>: The Corporation for Public Broadcasting is a private, non-profit corporation created by Congress in 1967. It funds over 1,000 public television and radio stations nationwide using an annual appropriation from Congress and funds producers, educators and technology specialists for the development of new public television and radio programming and new media.

#9. <u>SuccessMaker®:</u> is a computer-based reading program that uses literature-based activities to focus on comprehension, vocabulary, phonics and writing.

Limitations

This study is being examined for the purpose of computer use and its application in the educational sector. Computers and children have a broad range of concerns from improper Internet use to socialization issues. However, the digital age is here and will remain as we move forward in this century. The concerns should not be neglected, as the author believes the education system must take responsibility in accepting changes in the digital age. Education must apply new methods of teaching to children and their learning abilities for the future of education.

Most of the study will concentrate on children and their computer use as a learning tool in the last decade. This study will be limited to the amount of time it will take for the educational community to change its standards in education in the digital age. Most of this is due to the limited access to the training and development for teachers and their lack of time learning necessary computer skills to enhance their teaching methods for the 21st century. Lastly, the author will not provide documentation to the causes related to the use of the Internet and its social effect on children.

Chapter II

A REVIEW OF LITERATURE: THE EVOLUTION OF EDUCATIONAL
TECHNOLOGY AND ITS EFFECT ON EDUCATION

Background

The review of the literature for this study encompassed several topics relevant to

the evolution of technology over the last century. It begins with a historical background

on technology from radio and television to computers and its emergence into the

education sector. This chapter is to describe technology over the course of the century

and how the birth of instructional television changed the role of the educational structure

in schools over the last 30 years. The objective is to correlate the changes that have

occurred from the industrialized age of education, and the learning abilities of children,

from textbooks, multimedia, to interactive communication and its rebirth in the digital

society. Historically, new media brought great promise to social and educational

structure, as well as concerns for inappropriate content. The literature gathered focuses on

how mass media has changed the learning patterns of children, and the necessity to

reshape the traditional ways of teaching to accommodate the learning diversities of

children in the digital age of the 21st century.

Over the last decade, computers have made a significant breakthrough in

differentiated learning techniques for students in elementary and secondary levels. The

literature will show that computers change the way children learn. There is a growing

concern for children that do not have access to computers; and their potential educational

pitfalls that they face in their future.

Whether the education system needs to recognize that standards need some redefining to encourage more computer use as part of their curriculum, or teachers need to educate themselves more to change their teaching methods, remains to be seen. Will the next decade change the pedagogy of education towards newer approaches to teaching in a digital age society? Is teaching in the age of digital media changing the way children learn and if so what are the effects in higher test scores?

The History of Technological Advances in the 20th Century

The evolution of technology and mass media advanced in rapid speed over the last century, from radio to the Internet. "Each new media technology brought great promises for social and educational benefits, and great concern for children's exposure to inappropriate and harmful content." (Jennings,Wartella, 2000, p. 32) Some might agree that today's mass media provides too much information for children to consume, and others might view it as a necessary tool for educational development in their future.

In the early 1900s when America was first introduced to the film age, many advocates viewed this form of media as a new means in education and socialization. As with the movies, the introduction of broadcast radio in the 1920s was accompanied by proponents' promises of a vast potential to bring a variety of information and entertainment into homes, schools, and churches, ending isolation and unifying the nation. (Jennings, Wartella, 2000 p.32)

Children and the Technological Age

By the 1940s, the advancement of radio took on a wide range of developmental effects on children. The emotional effects were a primary concern, distinguishing between reality, fantasy, school performance, and product requests to advertising, which flourished as technology progressed. In 1948 television was the number one form of mass medium, with reflection to the concerns of its predecessor, it would again change the impact of socialization and education.

Television has certainly established a new way of communication over the last few decades. As more and more households were entertained by television, children would incorporate this medium as part of their everyday life. We began to see a change in socialization and how this medium would play a huge part in children's thinking skills.

Television and its ideology would change the industrialism architecture of education into a new form of interactive technology that would change the ways children would learn in the future. In Neil Postman's book, "Amusing Ourselves to Death", he describes his distinction between technology and a medium. He states:

> We might say that a technology is to a medium as the brain is to the mind. Like
> the brain, a technology is a physical apparatus. Like the mind, a medium is a use
> to which a physical apparatus is put. A technology becomes a medium as it
> employs a particular symbolic code, as it finds its place in a particular social
> setting, as it insinuates itself into economic and political contexts. A technology,

in other words, is merely a machine. A medium is the social and intellectual environment a machine creates (Postman, 1985, pg. 84).

The use of television and its medium is used differently around the world even though its technological intention is the same as in America. However, the operation of its medium differs from county to country, and in many places television doesn't exist. For these reasons television does not have the same meaning or power in other places as it does in America. Although in the United States, television and its use has been successful and put to its full potential, so much, that the demand for American television has attained high ratings all over the world.

Instructional Television from the Beginning

After almost 30 years of use in American elementary and secondary schools, instructional television (ITV) is still considered an experiment by some educators and researchers, and has been completely dismissed by others as education's "failed medium" (Zugner, 1987).

As a replacement for the classroom teacher, ITV became part of the classroom in the 1950's and early 60's. It has been criticized through the years; nevertheless the medium grew and modified itself along with today's technology. The controversy over the years has been how this medium should be presented, and in what context, to best suit student needs. ITV was not meant to be a solution by any means but a valuable learning

tool, but given the appropriate attention it would support the education system and its educators now and in the future.

There have been some misconceptions to ITV over the last decade. First, television viewing is considered a passive activity, second the enemy of reading, although as obvious as it may seem, the fact is it would fail in the rise of computer technology. Two classes of passivity exist, physical and cognitive. Physical passivity is not an immutable fact of television. Instructional series can engage students in many forms of physical activity—singing, clapping, and even exercising the specialty of one health-promoting television celebrity, Slim Goodbody (Chen, 1989). Other education series such as "Sesame Street" and "The Electric Company" of the 1970s applied music, animation and questions to draw response from the viewers. Studies from the Educational Testing Service (ETS) have proven that these series were effective in encouraging early reading skills to children, and was a way to lure children towards reading. This method of teaching would encourage children to learn, especially in "Head Start" programs where children find fun in learning. Clearly, cognitive activity is being stimulated when children respond aloud to programs that teach reading.

Many suggest that ITV is an old and failed technology as compared to computers and videocassettes that are the ultimate form of learning. However, all new forms of technology have taken a lesson from one another and each evolved in newer ways to increased learning, and with our current technology we are only at the forefront in finding ways to merge with their educational development and their interactive features.

Looking back at the early days of ITV introducing "Sesame Street" to the screen, parents found this teaching activity as a way of letting their children watch television without having to restrict their viewing time. This seemed to lower the responsibility of parents to teaching their children how to read and prepare them for school. However, school is not Sesame Street and it should not take the place of the classroom. A classroom is a place for social interaction between students and teacher, as well as assertive discipline models. ITV did not teach these important educational factors necessary for child development. Sesame Street, and its followers, "The Electric Company" did not intend to take the classroom away from teaching; their objective was to make television educational and informative. "We may take as our guide here John Dewey's observation that the content of a lesson is the least important thing about learning. As he wrote in *Experience and Education*: "'Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only what he is studying at the time. Collateral learning in the way of formation of enduring attitudes... may be and often is more important than the spelling lesson or lesson in geography or history... For these attitudes are fundamentally what count in the future.'" In other words, the most important thing one learns is always something about how one learns. As Dewey wrote in another place, we learn what we do. Television educates by teaching children to do what television-viewing requires of them. And that is precisely remote from what a classroom requires of them as reading a book is from watching a stage show" (Postman, 1986, pg. 144). "The classroom is, at the moment, still tied to the printed word, although that

connection is rapidly weakening" (pg. 145). Educators were attuned to the effects

television had on their students. They became more media conscious because of what the

computer would eventually bring to the future of education. For one, much of their

thoughts focused on this question, how can we use television, or the computer to control

education? Rather, how can we use education to control television, or the computer? The

solution is to take charge in the future of technology and determine how it can be

incorporated into the core of education.

Some critics view television's impact on cognitive development, blaming the

Public Broadcast System (PBS) Sesame Street for negating reading and misinterpreting

the nature of learning. They also accuse television viewing as a passive activity, robbing

children of being creative, and imaginative, physical and social. In other words, television

affects the total learning development of the brain. "Most (heavy-viewing) kids show

lower information, lower reading recognition or readiness to reading, lower reading

levels, says Singer" (Oldenburg, 1992). He examines TV's impact on children and is

convinced that the greatest influence is how parents monitor their children's viewing

habits.

Children & Computers: A New Technology in Learning

The concept of childhood merged into many social, economic and technological

changes by the close of the 20th century. Today children are bombarded daily by

electronic media. The age of ITV was just the premier of how technology would change

the views children and the world around them, as well as the effects on their learning abilities. Research indicates that computers can contribute to self-perception and socialization in home and school. "When children use home computers instead of watching television, it is generally viewed as positive; but when children use computers instead of participating in sports and social activities, it raises concerns about the possible effects on their physical and psychological well-being" (Subrahmanyam, Kraut, Greenfield, Gross, 2000).

A study conducted in 1999 shows children between the ages of 2-17 spent approximately 1.5 hours a day on the computer or playing video games; that number has since increased.

During the early 1980s when home computer ownership became widespread, Alfred Bork, a pioneer in the use of computers for instruction, suggested "the home computer may well become the primary influence upon the educational system of the future" (pg. 128). This era changed technology. The use of computers would prove to be a necessary tool in motivating children toward education, by increasing their knowledge in academic areas such as math, science, language arts, and writing. Needless-to-say, educational technology with the use of computers, may offer various ways to educate children with different learning abilities.

Four basic principles in learning exist. It is in context, active, social and reflective. These principles can offer a framework for teachers and how technology can support instruction. "Technology can facilitate learning by providing real world contexts

that engage learners in solving complex problems" (Driscoll, 2002). The active principle provides learners with technological tools "to think with" so that they can make connections between what they already know, and what they need to know. As a social principle, technology can offer a collaborative working environment encompassing different learning tasks. This can be accomplished by networking various software programs so that student's can exchange thoughts, ideas and responses. The reflective principle provides feedback and dialogue by promoting interactive communication in and out of the classroom. These principles contributed more towards educational technology and computers than the early days of ITV.

Our society and the educational community must be aware of the psychological, social and political effects of new technology as a way to teach students how to use the medium to better their future. Postman, (1999) "my point is that, if we are going to make technology education part of the curriculum, its goal must be to teach students to use technology rather than be used by it. And that they must know how a technology's use affects the society in which they live, as well as their own personal lives. This is something we did not do with television, and, I fear, we are not now doing with computer technology".

These effects in education technology must be addressed and critically evaluated for technology to work to its full potential. There is a concern about costs for education technology and the question of its effectiveness nationally. It asks, does it improve learning? Studies indicate that there are yes and no answers to this question but more

importantly, what are the ways that education technology can be more or less cost effective, and what are the options?

A study of effectiveness (The Milken Family Foundation, 1998) indicate shifts in test scores upward and downward among students who used technology in their classes. In mathematics, a study concluded that eighth graders who used computers for problem-solving, simulated experiments and higher-order thinking performed better on the NAEP (National Assessment of Educational Progress, US Department of Education) than students who used computers primarily for "drill and practice." Importantly, the data also indicate that students who spent more time on computers performed slightly worse on the math assessment tests than their peers who did not, suggesting that the way technology is employed is more important than how often. The debate focused on this last point, and whether the overall impact of computers has been positive or negative. Some other comments made in this debate stated that the misuse of technology does not fully justify any reason for schools to wipe away computers, but how to use them.

Not all educators view technology in the same way. Some view the computer as a tool to teach high tech skills and prepare students for the workplace while others view it as a means to raise test scores. Dr. Harold Wenglinsky, of the Educational Testing Service and author of study states:

> "Technology can indeed be used to these desired ends, but only in the right hands, large amounts of hardware and software have made their way into the classroom. It is now up to teachers to decide how to use it; if they choose to use it for high

order thinking, the public can expect great things from technology; otherwise it may turn out to have been an unnecessary investment" (Milken Family Foundation).

Many educators agree that computers help total learning, only if there is an adequate amount of computers accessible in the classroom. Educational technology in the late 90s had experienced all this because it had not reached permanency in the school system and success rates were questioned.

During this period educators became confused about using computers for learning just as they are confused about teaching in general. Some teachers believe that software can drill students on language arts and higher level math skills. They feel there is not much difference between software learning and workbook learning to solve problems. Others believe that students should use computers as a tool for writing and to conduct research on the Internet. Schools began to acquire computer programs that would enable students to practice different skills. At Cameron Elementary for instance, students in grades three through six spend at least a half an hour every day at computer stations connected to the *SuccessMaker*® software. They practice math, vocabulary and other skills. The computer keeps track of every answer and quiz. And, teachers base student grades in part on those records. Principal George Towery said the repetition and routine on the machines has boosted student achievement. In 1996, the first full year that fourth-graders used the system, their reading and math scores on standardized tests jumped sharply (O'Harrow, 1997).

Like ITV, computers essentially became an electronic flashcard; the machine made learning fun. O'Harrow (1997) explains, "the point is, remember how children have always learned best: mostly by play, experimentation and exploration, a process that can be enhanced by the sometimes tedious work of memorization and practice. Don't make the mistake of assuming that memorization of fact (as opposed to the development of reasoning skills) is the main goal of education."

Computers and the Techno Classroom

At the start of the 1980s computers began to appear as new tools of the classroom. In 1981, 18 percent of schools had computers; in 1991, 98 percent had them. In 1981, 16 percent of schools used computers for instructional purposes. By 1991, 98 percent did so. In 1981, there were, on average, 125 students per computer; in 1991, there were 18. In 1985, students used computers in school labs just over three hours a day; in 1989, that figure had risen to four hours a day (Cuban, 1992). These statistics proved increased use of school computers.

Although a divide among high and low income families began to occur. It was found that students from the higher income bracket had more access to school computers than low-income students. Black students use computers in schools less than white, especially in elementary schools. Pupils whose native language is not English have even less access to computers. Finally, low achieving students are less likely to use machines to enhance reasoning and problem-solving and more likely to use them for drill and

practice (Cuban, 1992). Technology advocates believe these advantages and disadvantages illustrate a resemblance to the revolution of learning from film and radio in schools during the 1920s and 30s and ITV in the 50s and 60s. The primary classroom practices of lecturing and textbooks still remain primary, but have expanded these machines to teach more in less time, motivating students to increase their learning.

Technology and Teaching for the 21st Century

By the close of the 20th century the course of technology made tremendous accomplishments to society; socially, economically and academically. The Internet had taken on a new trend and how children would embrace it.

The Internet became the new vehicle of communication in education, entertainment, and personal connections. Previous research on children and computers indicate that children enjoyed the medium because they gained new skills such as, problem solving and collaborative learning by sharing computer activities in social settings.

Educational resources and experiences are abundant on the Web, which can provide connections to people and places most children could not possibly see first hand, access to information not in the traditional library, and opportunities to participate in activities that do not occur near home (Izenberg, Lieberman, 1998). These skills will be essential for children as they grow and prosper in their careers, as well as a means of communication, which is important in everyday life. Many studies have shown how

children were affected by the emergence of computers as well as its effect on child development, intellectually and socially, as well as the disparities between rich and poor.

The spread of Internet access has been described as nine times faster than that of radio, four times faster than the personal computer, and three times faster than television (Jennings, Wartella, 2000). A national priority was made by Congress to provide computers to schools, so all students would have access. Research has shown that there was an increase in Internet connection in elementary and secondary schools between 1994 and 1999 amounting from 35 percent to 95 percent.

Although these studies have been proven positive in increased learning, concerns in health and child development exist. First, a variety of physical and social activities are essential to a child's health development. Second, effective computer practices are important; parent and teachers must ensure that computers are being used effectively and responsibly. Cautionary measures should be taken in examining the learning experiences children promote through their computer use.

Wartella, Jennings (2000) confirms that public, private, and non-profit groups concerned with the role of computer technology in society should support and encourage the dialogue that has been initiated among researchers, software and Internet companies, and government agencies to create new incentives for developing high quality content for children. To become computer literate in this way, children must have opportunities to use a broad range of applications, from word processing, spreadsheets, and graphics to simulations, networking and programming. Supporters of this view maintain that children

must achieve computer fluency to become effective and responsible users of technology throughout their lives.

There are concerns especially to disadvantaged children without computer access. "'Equality of digital opportunity" is fast becoming synonymous with "equality of educational opportunity'" (Jennings, Wartella, 2000).

The Equality of Access

As of 2000, the results impressively show rapid growth to children's access to computers and the Internet. However, more advantaged children were provided opportunities to effectively use computers to magnify their learning, as opposed to those less advantaged children.

Family income plays a large part in children's access to home computer, whether a computer is located in a classroom, home, or library. There is a difference in a student's opportunity for its meaningful use. Higher income students are likely to use more sophisticated applications for writing, presentation and analysis, whereas lower income students access computers to restore skills just taught. Lower income schools should strive to acquire more advanced applications and better strategies to utilize effective computer use in the classroom, hence, it would bridge the gap in technology for the disadvantaged students. Without computer literacy, the argument goes, disadvantaged groups will become more excluded in the high tech economy (Feder, 2003).

"Although the adoption of these technologies has been rapid, it has occurred at disparate rates in different parts of American society. How computers and Internet are used, and whether they are used at all, often vary by socioeconomic states and other characteristics such as race/ethnicity, household composition, and urban-icity, such that the inequality of use has been termed a 'digital divide'" (De Bell, Chapman, 2001, pg. 5).

This divide among demographic and socioeconomic ties show computer and Internet use is higher among Whites than Blacks and Hispanics, even Asians and American Indians are higher than Hispanics. It is more likely to find children from 5 to 17 years old with highly educated parents using these technologies than parents who are not as educated.

From the year 2000 to the present, studies showed and increase in computer use at school and home. In a recent study of computer use (De Bell, Chapman, 2001, pg. 11) indicate more children use computers at school, 81 percent than at home, 65 percent. Computer use at school exceeds use at home by 30 percentage points more for Blacks and Hispanics. Use at school also exceeds use at home by 30 percentage points for those whose parents did not complete high school; who live with a single mother, who live in households where Spanish is the only language spoken by household members age 15 or over or who live in households where the family income is under $20,000. The study indicates that schools are beginning to narrow the digital divide in terms of computer use. Rates show that computer usage is lower at schools than home use when comparing race/ethnicity, income and parent education level. However, children are using more

computers at school than home, even though nearly all schools have Internet access, the home is the most widely use location.

As previously stated, in 2000 schools were beginning to acquire more computers and Internet access. In fact, nearly all public elementary and secondary schools were now connected to the Internet. Although over 90 percent of schools reported having computers connected to the Internet, only 68 percent of low-income students reported using computers at school. These differences most likely reflect differences in the capabilities and location of the computers available to students (Jennings, Wartella, 2000).

This was all part of a program initiated by the Clinton administration in the mid-1990s. Congress adopted a mandate to provide all schools access to computers for our nation's children. "Getting America's Students Ready for the 21st Century", in June 1996, was the first national educational technology plan costing billions of dollars to connecting children to computers and the Internet (2000).

In 2000, studies begin to indicate a slight closure in the gap of the equality of access, with the aid of public and private-sponsored initiatives. Libraries, community technology centers and schools begin to participate in providing access to children of low-income and special needs to help prepare them for their future in the 21st century.

In 2003 the numbers are shown to greatly increase children's access to the Internet, regardless of age, race/ethnicity or income. The results from a study (Trotter, 2003) show a thinner digital divide. "The results indicate that 65 percent of American children between 2 and 17 now use the Internet – a 59 percent growth rate since 2000,

when 41 percent of children went online from any location. At home access increased dramatically for African American children but found that disadvantaged children still lag significantly behind more advantaged children in Internet access from both home and school."

The Progenies in Education

The evolution of Internet teaching will have serious effects in learning and on teaching, and computers will play a crucial role in the curricula. For over 30 years educators have used computers as learning tools, but beyond that, educators have to look at how to use technology to enhance instruction. Educators and Administrators are beginning to redesign methods of educational practice to enrich and facilitate student's ability to learn. The challenge is not simply to incorporate learning technologies in current institutional approaches, but rather to change our fundamental views about effective teaching and learning and to use technology to do so (Gen, Glahn, 2002).

Teaching style is changing from lecturing to sitting students in front of computers to find information. Educational reformers generally agree that teachers should spend less time lecturing their students and more time engaging them in active learning activities. As the catch phrase goes, "a teacher should be a "guide on the side" rather than a "sage on the stage." This transformation between students and teachers shifts. The teacher becomes more of a consultant rather than a source of authority.

Technology will change the teaching for the future. Online teaching is already growing, and changing in teaching style. As stated in Gen, Glahn (2002):

"Online teaching, therefore is not better than face-to-face teaching nor is it worse. It is only different. The goal of educational progeny is to incorporate the best features of in-class teaching and online teaching and promote active student-centered learning."

This change in curricula into progenies will offer educators a more flexible way to teach. However, it is necessary for teachers to have the proper training in new software applications and technology practices in order to facilitate appropriate teaching methods, and a way to integrate it into the curriculum.

The primary focus here is having a sufficient number of computers available to effectively enhance the teaching of these skills, as well as technical support to assist in the maintenance of hardware and software problems that may occur.

Chapter III

RESEARCH DESIGN AND DEVELOPMENT

Description of Survey

The survey includes fourteen questions. The first five questions are designed to gather background information on educators and their teaching experience, as well as the level of computer training they have acquired. The subsequent questions focus on how computers are used in the classroom and the frequency of its use. The questions also focus on student computer experience and the potential advantages and disadvantages in their learning. The last two questions look at education technology and the changes in the learning patterns of children, as well as the teaching methods of education in the next decade.

Sample

The goal of this survey was to survey 300 educators in two different schools districts, in order to receive a qualitative response that would be relevant to this study. The survey was administered to two school districts of diverse economic status. The individuals were elementary and secondary school teachers from various levels of teaching experience. Because of the differential based on economic resources, some schools may acquire more computer technology than others. The sample of this survey concentrated on the amount of computers one school district has compared to the other, and the effects it has on teaching and learning.

Purpose of the Survey

The intent of this survey was to access how teachers are using educational technology today and how it will change in the future. The literature indicates how the use of technology aids in the learning abilities of students. However, the difference in income levels can determine the amount of money schools invest in educational technology.

Chapter IV

Analyzing the Results of the Survey and Summary

This survey took place over a one month period. The author gathered 149

individuals from two economically diverse school districts. The individuals responded to

answering 14 detailed questions about education technology. After collecting each of the

survey's the author tabulated the responses for each of the 9 questions and 5 statements.

The author measured the results by calculating the percentage of responses based on

charts and graphs.

Question 1: How many years have you been an educator?

For this question seventy-five respondents (51%) overall have been teaching in

the education field for 16+ years. Of that fifty-one percent, fifty-two (69%) were Union

educators and twenty-three (31%) Summit educators. Most educators teaching grade

levels 9-12 responded higher in the 16+ year's category. The remaining percentage

teaching grade levels K-5.

Years as educator
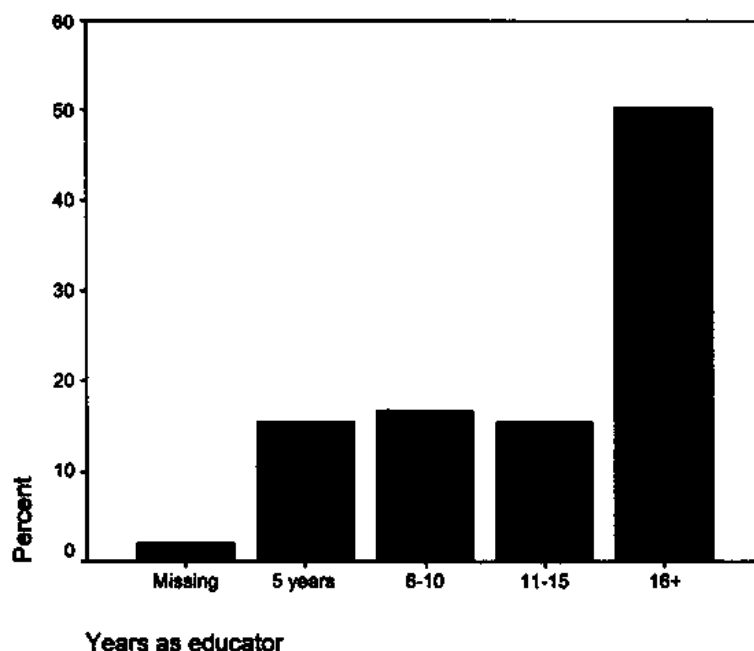
Question 2: What grade level do you teach?

Evaluating this question, sixty respondents (42%) teach grade levels 1-5, indicating forty respondents (68%) from Union are teaching at this level. While most educators responded to teaching grade levels 1-5, they have less teaching experience. Thirty-seven (26%) responded to teaching grade levels 6-8, and thirty-six (25%) teaching grade levels 9-12. That is less than half of the grade levels 1-5 respondents but where most of teaching experience lies. (See question 1).

Question 3: How much computer training have you acquired in the last 5 years?

In reviewing this question, one-hundred and three respondents (69%) have had some computer training in the last 5 years. Sixty-nine Union respondents (67%) have acquired some computer training in the last 5 years, compared to thirty-four Summit respondents (33%). Twenty-three respondents (15%) overall have had extensive training. Eighteen Summit educators (78%) responded higher in extensive training compared to five Union educators (22%). Twenty-two respondents (15%) overall had no training. Twenty-one Union educators (96%) responded to having no training, as compared to one Summit educator (5%).

The correlation between the amount of training acquired verses the amount of teaching experience, signifies that educators having 5-10 years teaching experience have

had some computer training in the last 5 years. Summit proving to have had more

extensive training overall.
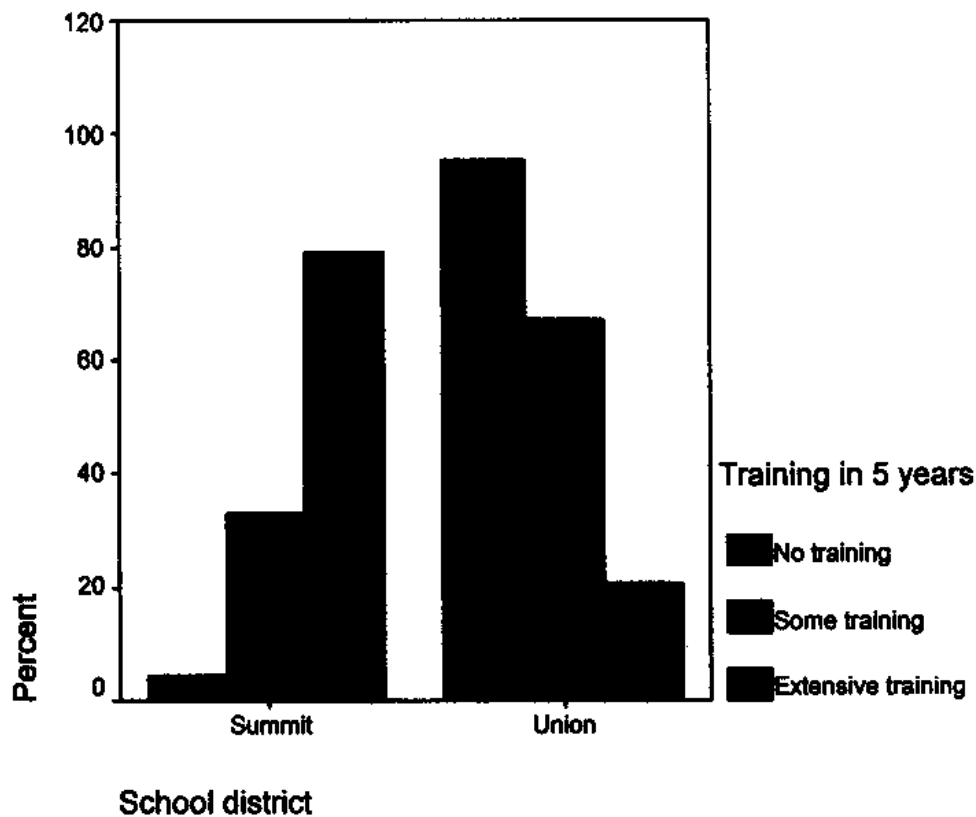
Question 4: Based on your level of computer training, what is your feeling about

teaching lessons using diversified computer techniques?

A breakdown of responses for this question is fifty respondents (34%) overall are

comfortable teaching diversified computer techniques. Thirty-one Summit respondents

(62%) are comfortable and nineteen Union respondents (38%) are comfortable.

Forty-eight respondents (32%) are not comfortable teaching diversified computer techniques, forty-four Union respondents (92%), as opposed to four Summit respondents (8%). Forty-seven respondents (32%) are moderately comfortable, twenty-nine Union respondents (62%) as opposed to eighteen Summit respondents (38%).

More Union respondents teaching all grade levels are not comfortable to moderately comfortable teaching lessons using diversified computer techniques.

The correlation between the amount of computer training acquired and the level of comfort teaching diversified computer techniques prove to be higher in Summit. These educators have shown to have more training, therefore proving a satisfied comfort level.

To conclude, more educators teaching 16+ years and having had some training are not comfortable teaching computer techniques.
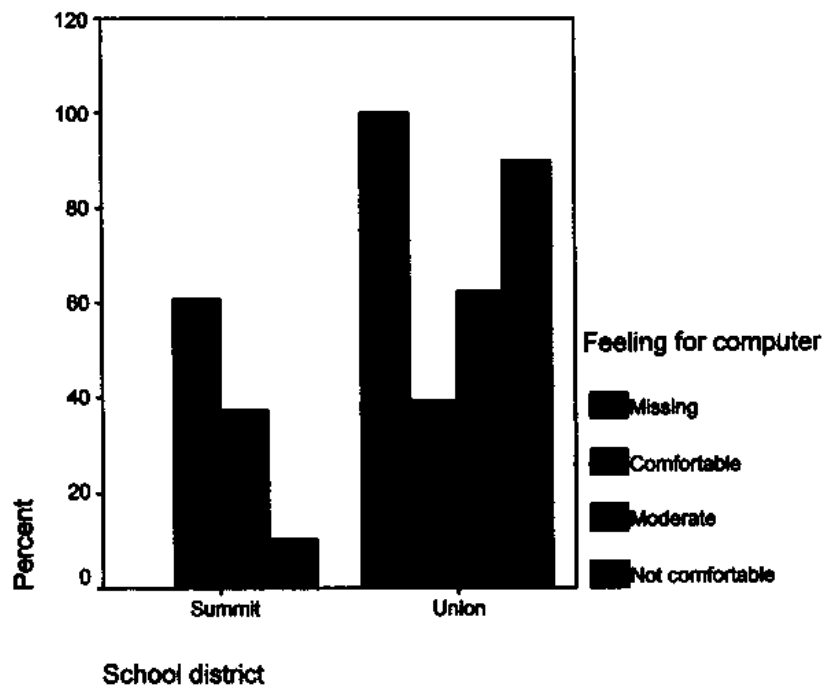
Question 5: What is the approximate total number of students you teach daily?

Upon examining this question seventy-six respondents (52%) overall teach 31+ students on a daily basis. The breakdown between both districts, Union responded to teaching (8%) more students than Summit. Twenty-four Union respondents (68%) indicate an approximate number of students taught daily are 15-20 in grade levels 1-5, twelve Summit respondents (33%) teach 15-20 in grade levels 1-5. Twenty-three Union respondents (77%) compared to seven Summit respondents (23%) indicate an approximate number of student's daily as 21-25.

Grade levels 6-8 and 9-12 prove to be higher among all grade levels, in both districts.

Question 6: On a daily basis, what is the average total number of computers available in your classroom?

In assessing this question eighty respondents (55%) overall has an average of 1-5 computers in the classroom. Summit responded higher to forty-six (56%) while Union responded thirty-four (43%). Union responding higher, fifty-one (98%) to having none for a total number of classroom computers, than one Summit (2%).

Both districts prove to have an average of 1-5 classroom computers, however are teaching more than 31+ students on a daily basis, Union teaching more. There proves to be a limited amount of resources per student, eight students per classroom computer. Union exceeds this by a large number of students taught daily with an average total of

none to 1-5 computers available in the classroom. However, Union educators indicate

they teach 31+ students daily at all grade levels and show an average of zero classroom

computers. Summit educators' teaching 31+ students daily at all grade levels shows an

average of 1-5 total classroom computers.

School district
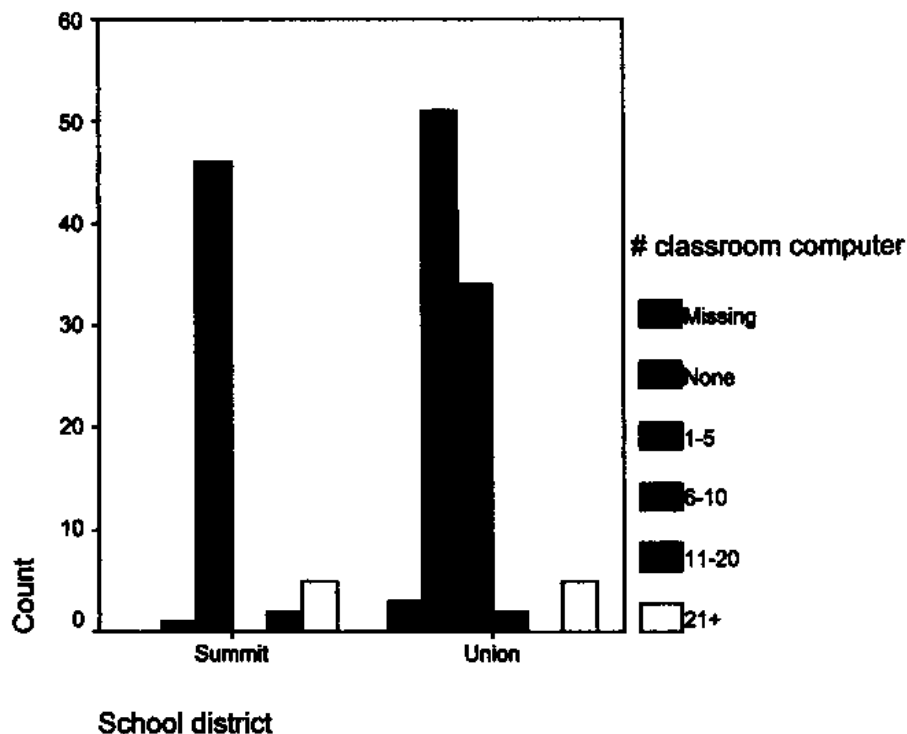
Question 7: How frequently do your students access the computer in school on a weekly basis?

For this question fifty-six respondents (40%) answered the frequency of computer

access in school is 1x/week.

Twenty-nine Union respondents access higher at 1x per week (97%) than Summit (3%), while twenty-four Summit respondents access higher at 2x per week (72%) than nine Union (27%). Summit accesses more than 3x per week (52%) than Union (48%).

This correlation between the frequency of access and to teaching comfortably proves that Union's inexperience and low comfort level teaching computer techniques limits the use of computer access to almost none compared to Summit.

This correlation also reveals the comparison of the amount of computers in the classroom as indicated in question 6, of 1-5 computers and the amount of access time per student in each classroom. Union shows the average total as none and the frequency to access low.

Summit educators show a higher level of computer training and more computer availability therefore indicating more computer access more times a week.

School district
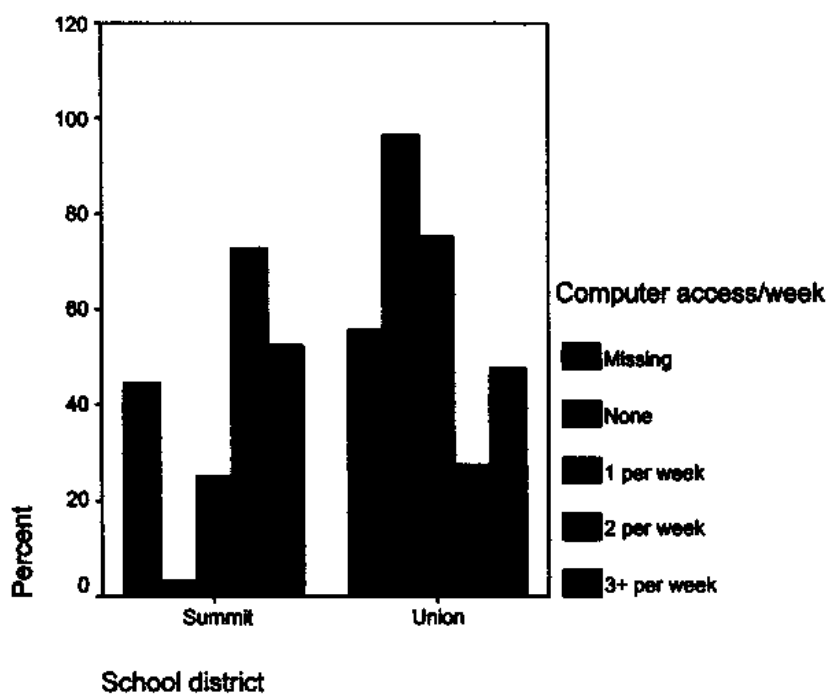
Question 8: Do you utilize your classroom computer for; drill and practice, Internet research, math problem solving, writing techniques?

Responses for question eight were as follows.

Sixty-three respondents (43%) answered N/A overall. Fifty-eight Union respondents (92%) of the overall sixty-three responded N/A.

Thirty-six respondents use Internet research overall (25%) more than drill and practice, math problem solving, and writing techniques. Thirty-three Summit respondents using Internet research (92%) as opposed to three Union (8%).

Thirty-one respondents use drill and practice techniques overall (21%) more than math problem solving and writing techniques. Nineteen Union respondents using drill and practice techniques (61%) most of the time, as opposed to twelve Summit respondents (39%).

Nine respondents use writing techniques overall (6%) more than math problem solving techniques. Seven Union respondents use writing techniques (78%) as opposed to two Summit (22%).

Eight respondents use math problem solving (5%). Six Union respondents (75%) as opposed to Summit (25%).

Union educators are not using Internet research on their classroom computers compared to Summit. Summit classrooms are accessing the computer 2x/week and are using their classroom computers for more Internet research lessons than Union. The correlation again indicates those educators with more training and more access to

computers per week for research applications will access their classroom computers for

more critical learning exercises.
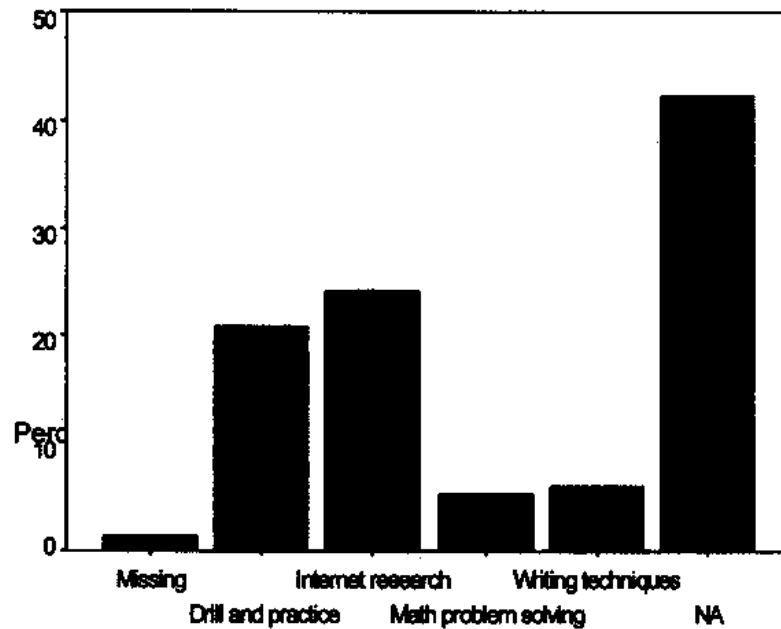
Classroom computer usage one
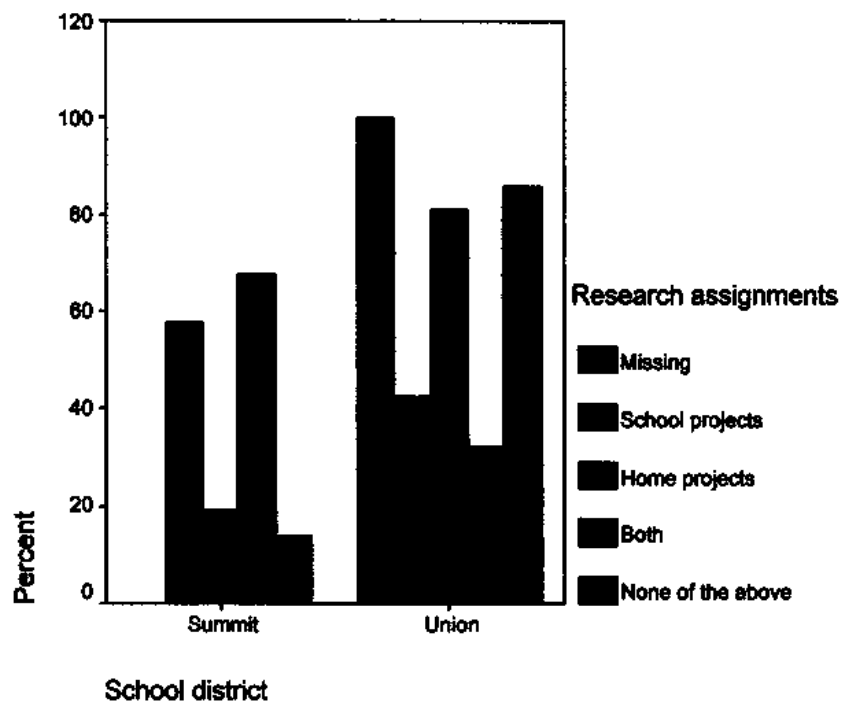
School district

Question 9: Do you give your students computer assignments as a research tool for, School projects, Home projects, both or none of the above?

The results for this question were fifty-seven respondents (39%) overall do not assign their students with computer assignments for research, either home or school projects.

Nineteen Summit respondents assign research projects for school (58%) than home (19%). Whereas, twenty-three Summit respondents assign both home and school projects (68%). In comparison to seventeen Union respondents assign research projects for home (81%) than school (42%). This indicates less computer access and school assignments given because of lack of Internet and computer use in the classroom, therefore more assignments are given for home than school projects.

Statement 10: Most students in my class have little or no knowledge of how to use a computer. SA, A, N, D, SD

For this statement fifty-nine respondents (41%) strongly disagreed that, "most students in their class have little or no knowledge of how to use a computer." Thirty-seven Summit respondents (63%) strongly disagree as opposed to twenty-two Union respondents (37%). Fifty-three respondents (37%) overall disagreed, forty Union respondents (76%) to thirteen Summit respondents (25%). Nineteen Union (86%) responded selected a neutral response. Less than fourteen percent of Summit respondents answered agreed to neutral selections.

Since the majority of responses are fifty-nine (41%) strongly disagree and fifty-three respondents disagree (37%), one can conclude there is a strong belief among educators that students have a considerable amount of knowledge on computer use.

Educators that responded to comments feel that most students have computers at home.

Statement 11: There can be educational disadvantages for children who are without access to computer at school. SA, A, N, D, SD

The results for statement eleven were as follows. Sixty-eight respondents (47%) agree when asked, "there can be educational disadvantages for children who are without access to computer at school.

Forty-four Union respondents (65%) exceeds this answer as compared to twenty-four Summit respondents (35%), based on the shortage of classroom computer in their classroom and the frequency of usage as well as the applications they access.

Sixty-three respondents (43%) strongly agree, indicating thirty-eight Union respondents (60%) exceeding this response as compared to twenty-five Summit respondents (40%). Less than five percent indicated the selection from neutral to strongly disagree to this statement.

It can be noted that educators believe that children without access to computers at school will face educational disadvantages, therefore the limited amount of computers in the schools will cause many disparities.

Statement 12: There can be educational disadvantages for children who are without access to computer at home. SA, A, N, D, SD

The results for statement eleven were as follows. Seventy-three respondents (50%) agree when asked, "there can be educational disadvantages for children who are without access to computer at home."

Forty-six Union respondents (63%) exceed this answer as compared to twenty-seven Summit respondents (37%).

Fifty-four respondents (37%) strongly agree, indicating thirty-three Union respondents (61%) exceeding this response, as compared to twenty-one Summit respondents (39%). Less than six percent indicate the selection neutral to strongly disagree on this statement.

In comparison to question 11 most respondents agree that this would cause educational disadvantages without a home computer.

It can be noted that educators do believe that children without access to a computer at home will face educational disadvantages. Respondents believe the home computer reinforces concepts taught, since learning does not stop when out of the classroom. A computer becomes an enrichment tool and enhances learning. Students would miss exposure to computers in general, and they need to be familiar with them in many workplaces today. Since most students have access to computers at home, students who don't are at a loss.

<u>Statement 13: Considering the experience of your teaching career, do you agree that in the next decade educational technology will make significant changes in the learning patterns of children? SA, A, N, D, SD</u>

In evaluating this question seventy-seven respondents (52%) overall agreed that, in the next decade educational technology will make significant changes in the learning patterns of children. Fifty-two respondents (35%) strongly agree while less than eight percent indicate the selection neutral to disagree in this statement.

To conclude, the majority of educators felt that educational technology will have significant changes in the learning patterns of children.
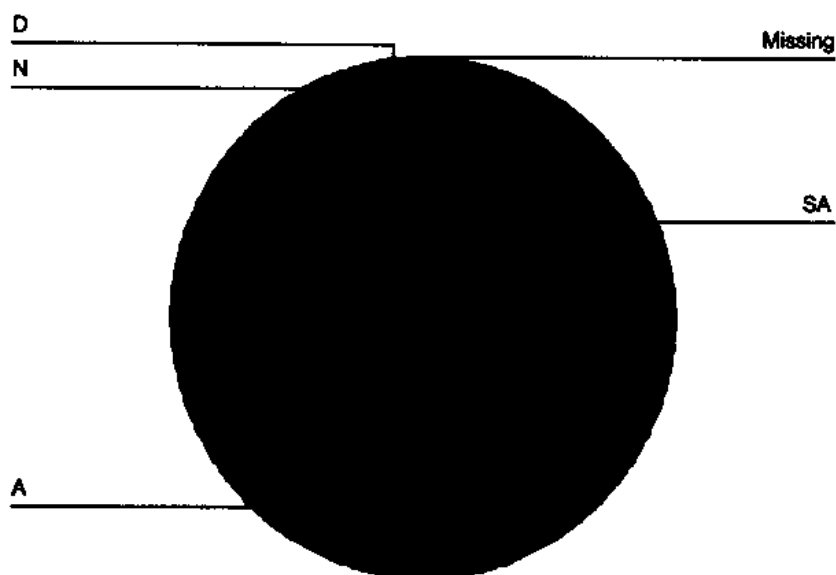
Statement 14: In the course of the next decade, educational technology will radically change the teaching methods of education. SA, A, N, D, SD

The results to this statement are as follows, sixty-eight respondents (47%) agree that, "in the next decade, educational technology will radically change the teaching methods of education." Forty-two respondents (29%) strongly agreed, while less than fourteen percent indicate the selection neutral to strongly disagreed to this statement.

Since the majority sixty-eight (47%) responded with agreement, we can conclude that there is a strong belief that education technology will radically change teaching methods in education in the next decade. It can be noted that changes will happen in wealthy districts because schools of lower income levels do not have enough computers. The lack of technology in poor districts will only deepen the educational gap. Schools that have the necessary tools to change their styles are more likely to experience new methods of teaching using educational technology.
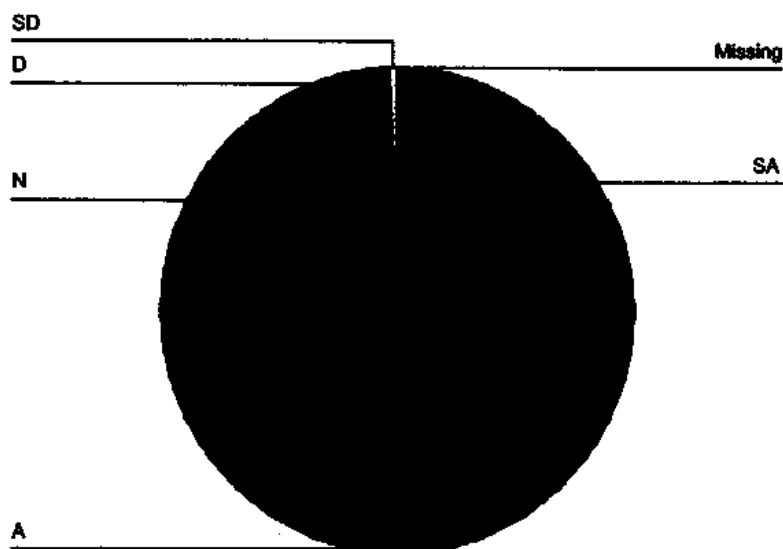
Chapter V

Conclusion

It began as early as the eighteenth century when science and technology would begin to make significant advances from the invention of the mercury thermometer to the steam engine. This knowledge began to flourish bringing about the outgrowth of rationalism. In the eighteenth century many turned away from these traditional thoughts of rational and scientific world-views. This turning point began the conflicts between Christianity and scientific belief. This is not to say that many rationalists turned away from Christianity or the spirituality of God but it brought about constant barriers between rationalists and Christianity.

This relationship is so complex and not merely the focus of this thesis but to demonstrate the realism and definition of rationalism as the way people thought about the world and the power of reason and progress of science and technology. It is this effort to say that rationalists would develop a theory of progress that would enter into what history would eventually call the evolution of technology.

According to author Peter Senge in his book, *The Fifth Discipline: The Art and Practice of The Learning Organization*:

A learning organization is where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together (Senge, 1990).

In a society where rapid changes occur, organizations and learning institutions that are flexible, adaptive and productive will excel. Educational technology is increasing rapidly, administrators, educators and the community must take action if we want students to live intelligently in our technological age. Students who learn in schools equipped with modern resources will have more exposure and opportunity for advancement.

Clearly this means schools with more money can hire teachers experienced in new technology, making it a part of their curriculum. Educators must be able to teach students how to use technology and to incorporate it in today's society, and not be used by it.

Economic resources have always been observed from a low to high-income level standpoint, comparing education gaps among students in poor and rich communities. However, schools from a middle income level still face significant challenges in keeping up with the communities of higher income levels. Middle income school districts continue to suffer from low budget demands making less spent on school resources, teacher technology training and over crowded classrooms.

The fact is these economically diverse school districts will greatly affect the learning abilities of students. Let's not demote traditional learning and confuse the difference between the traditional teacher model of instruction and the techno-instructed classroom. It is obvious traditional teaching methods are the foundation of education pedagogy. However, with the rapid technological changes in society, educators and

administrators need to look into improving teaching methods for the future of our children.

The use of educational technology is not only using the computer to take the place of the classroom teacher but also using it as part of the instructional process. Designing lessons in diversified computer techniques can open new doors for students with a variety of learning styles. This will change the learning patterns of students. Utilizing Internet lessons and digital sources, students will learn search strategies that will teach them to evaluate, analyze and synthesize information for oral, written and presentation skills.

The machine-age way of thinking from in the eighteenth century created by Frederick the Great instituted standardization uniformity and drill training. This transitioned into the Industrial Age System of Education from the mid nineteenth century. Educators borrowed designs of the assembly line to create the industrial age school system. This increased education productivity but created operational problems along the way by separating the smart student from the challenged student. Students are not machines they learn at their own pace.

The conclusion that education technology will change learning based on limited resources is proven to greatly affect students from lower income school districts. These students will have limited computers in their classrooms, less frequency accessing diversified computer techniques and educators less likely to be trained to teach these lessons. This will limit the student's creative challenges to explore other sophisticated learning applications.

I am not here to solve the problems of these technological disparities but only to define and bring awareness to educators and school district administrators. This problem must be resolved so those students who endure these educational disadvantages will have the opportunity to succeed in a fruitful and challenging future during the course of their educational pursuits.

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Survey Questions: This research is to determine how education technology is being used in selected school districts based on economic resources.

Guidelines: Survey 300 educators teaching in diverse economic school districts. These schools may acquire more computer technology than others because different economic resources. Educators will answer the first 10 questions and 4 four statements based on their level of experience and their use of technology in the classroom.

1. **How many years have you been an educator?**
   - ❏ 5 years
   - ❏ 6-10 years
   - ❏ 11-15 years
   - ❏ 16+ years

2. **What grade level do you teach?**
   - ❏ Pre-K - Kindergarten
   - ❏ 1-5
   - ❏ 6-8
   - ❏ 9-12
   - ❏ Other, please explain_____

3. **How much computer training have you acquired in the last 5 years?**
   - ❏ No training
   - ❏ Some training
   - ❏ Extensive training

4. **Based on your level of computer training, what is your feeling about teaching lessons using diversified computer techniques?**
   - ❏ Comfortable
   - ❏ Moderate
   - ❏ Not comfortable

5. **What is the approximate total number of students you teach daily?**
   - ❏ 15-20
   - ❏ 21-25
   - ❏ 26-30
   - ❏ 31+

6. **On a daily basis, what is the average total number of computers available in your classroom?**
   - ❏ none
   - ❏ 1-5
   - ❏ 6-10
   - ❏ 11-20
   - ❏ 21+

7. **How frequently do your students access the computer in school on a weekly basis?**
   - ❏ none
   - ❏ 1x/week
   - ❏ 2x/week
   - ❏ 3+x/week

8. **Do you utilize your classroom computer for: (check all that apply)**
   - ❏ Drill & practice
   - ❏ Internet research
   - ❏ Math problem solving
   - ❏ Writing techniques
   - ❏ N/A

9. **Do you give your students computer assignments as a research tool for:**
   - ❏ School projects
   - ❏ Home projects
   - ❏ Both
   - ❏ None of the above

10. **Most students in my class have little or no knowledge of how to use a computer.**
    - ❏ Strongly agree
    - ❏ Agree
    - ❏ Neutral
    - ❏ Disagree
    - ❏ Strongly disagree

11. **There can be educational disadvantages for children who are without access to computers at _school_.**
    - ❏ Strongly agree
    - ❏ Agree
    - ❏ Neutral
    - ❏ Disagree
    - ❏ Strongly disagree
    - ❏ Any comments?_____

    _____

12. **There can be educational disadvantages for children who are without access to computers at _home_.**
    - ❏ Strongly agree
    - ❏ Agree
    - ❏ Neutral
    - ❏ Disagree
    - ❏ Strongly disagree
    - ❏ Any comments?_____

    _____

13. Considering the experience of your teaching career, do you agree that in the next decade educational technology will make significant changes in the learning patterns of children?
    - ❑ Strongly agree
    - ❑ Agree
    - ❑ Neutral
    - ❑ Disagree
    - ❑ Strongly disagree

14. In the course of the next decade, educational technology will radically change the teaching methods of education.
    - ❑ Strongly agree
    - ❑ Agree
    - ❑ Neutral
    - ❑ Disagree
    - ❑ Strongly disagree