PROFESSIONAL DEVELOPMENT ACTIVITIES AS PREDICTORS OF TECHNOLOGY USAGE BY ELEMENTARY PUBLIC SCHOOL TEACHERS

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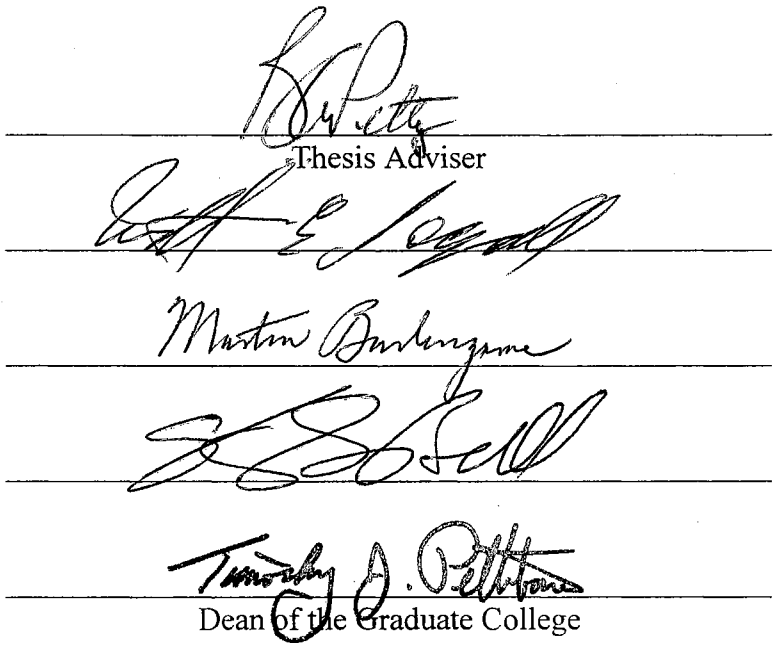

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CHAPTER I

INTRODUCTION

A revolution is commonly defined as a cycle of events, a movement around an axis, or a drastic change. Because of the rapid advances of technology, revolutions are common today, but today's electronic revolutions are not like the revolutions of the past, which centered around our nation's fight for independence and the economic forces of industrialization and agriculture. Today's revolutions are digital, and they center around computers, networks, information, and knowledge. These electronic revolutions are enacted globally not simply nationally or locally. They are more pervasive than their forerunners. They are taking place in our communities, in our work places, in our homes, and in our schools. They seem to affect every nook and cranny of life, and leave us gasping, trying to catch our breath before the next phase spins around us.

American life seems to have been transformed during the past two decades as a direct result of this modern technology revolution. Computers have changed the way we live, the way we communicate, and the way we work. When the requirements of work change, it becomes necessary to evaluate our conceptions of the skills and knowledge children will need to become successful adults and the relevant educational experiences they should encounter while attending school (Smerdon, Cronen, Lanahan, Anderson, Iannotti, and Angeles, 2000). As a result, how we educate is being evaluated in terms of

this electronic revolution. In the article "Bring Life into Learning," Graves (2000) pointed out that

> ...as the rapid growth of computers feeds our hunger for speed and allows us almost unlimited access to infinite amounts of information. The high speed of culture has entered our schools and left our profession panting. We find our energy drained and ourselves dulled, not so much from hard work as from the emotional strain of near impossible instructional expectations . . . (p. 19)

America has focused national, state, and local attention on meeting those expectations. Thornburg (1999) suggested that schools are at a time in the educational technology revolution when how they use technology is more important than if they use it. He further suggested that without transformed thinking about technology in education, the continuing expansion of networks and communication technology into classrooms will fail to live up to its potential.

Background

Technology in education is not new (Saettler, 1990). In fact, educational technology can be traced back to the time when tribal priests systematized bodies of knowledge, and early cultures invented pictographs, or sign writing to record and transmit information (p. 4). Technology in education has evolved from the slate, to the pen, to the pencil, to the keyboard, and what is new to education is this electronic technology of computers and networked telecommunications. In response to the ever-growing presence of technology in schools, there must be attempts to describe what is happening with technology in education today and what will happen in the future because of the computer (Roblyer, Edwards, and Havriluk, 1997).

In 1996, President Clinton and Vice President Gore challenged the nation to assure that all children would be technologically literate by the 21st century. They envisioned new classrooms, new schools, and new learning environments. These new classrooms, schools, and learning environments would be supported by four pillars: modern computers, connected classrooms, educational software, and teachers ready to use and teach with technology (U.S. Department of Education, 1996).

Computers were described as the "new basic" of American education, and the internet was characterized as "the blackboard of the future" in the U.S. Department of Education's report "Getting America's students ready for the 21st Century: Meeting the technology literacy challenge"(U.S. Department of Education, 1996, p. 3). During the last decades, schools in the United States have invested considerable resources in educational technology by purchasing computers, running cables, and building networks in an effort to bring classrooms out of the industrial age and into the information age.

According to newly published data (Quality Education Data, 2000) "Ninety-five percent (95%) of America's public schools were connected to the Internet at the start of the 2000 school year," and "...the number of schools connected to the Internet rose 16% since 1998 and 7% since last year" (p. 16). The National Center for Educational Statistics (2000) confirms increased connectivity with its report that as of 2000, almost all public schools in the United States had access to the Internet: 98 percent were connected. By the Fall of 2000, the ratio of students to instructional computers in public schools had decreased to 5 to 1 (National Center for Educational Statistics, 2000), and a ratio that "many experts consider . . . a reasonable level for the effective use of computers within the schools" had been reached (President's Committee of Advisors on Science and

Technology 1997, p. 14). It would seem that we are approaching what Fatemi (1999) called the "critical mass" of technology in the classroom.

Having availability to computers and the internet, however, does not reflect teachers' and students' use and its influence on the teaching and learning process as was found in the *Teacher's Tools for the 21st Century: A Report on Teachers' Use of Technology* report (Smerdon, Cronen, Lanahan, Anderson, Iannotti, and Angeles, 2000). The report (Smerdon, et al.) concluded that "Approximately half of the public school teachers who had computers or the Internet available in their schools used them for classroom instruction" (p. ii).

In response to the increasing availability of computers for the classroom teachers and administrators, rich resources have become available to help implement the technology. Morrison, Lowther, and DeMeulle, (1999) and Gooden (1966) answer the question of "What do I do with only one computer in the classroom?" with suggested instructional strategies. The International Society for Technology in Education, The National School Boards Association, and the Southern Regional Education Board Education Technology Cooperative have all begun projects that focus on developing technology standards in order to assure that school leaders also develop technology competencies (McLester, 2001).

Statement of the Problem

In December of 1999, the Office of Educational Technology of the U.S. Department of Education convened for a two-day meeting, "The Forum on Technology in Education," for the purpose of exploring the aspects of technology's future role in education. Those aspects included the intersection of technology and content, as well as

technology's potential to transform the teaching and learning process (U.S. Department of Education, 1999).

However important technology may be in the role of education as a transforming factor, teachers make the difference in the final outcome that media and technology have in the classroom (Heinich, Molenda, Russell and Smaldino, 1999). Even though teachers are essential, teaching cannot be the same today as it has been for the past century because learners are different today from any generation before them. According to Tapscott (1998), "New media tools offer great promise for a new model of learning--one based on discovery and participation. This combination of a new generation and new digital tools will cause a rethinking of the nature of education--in both content and delivery" (p. 127).

Today's learners are part of the digital information age, which is powered by dot-com enterprises. These learners will work in a world significantly affected by new knowledge (Means, Olson, and Singh, 1995; Tapscott, 1998) at jobs that may have not been created yet. Tomorrow's knowledge-based workers will need a very different set of skills than the factory worker of the last century. Because of this, "Information literacy must be added to the other literacies because a student must be information literate to stay up-to-date with any subject in the Information Age!" (Breivik, 1998, p. 3).

Thornburg, (1999) in speaking about envisioning a new future for education, stated that staff development should be moved to the number-one position in any dialog of crafting new educational goals. He concluded that unless effective staff development is in place, the only thing that will change when schools incorporate technology is their electric bill. The staff development should be based not just on knowing how to operate computers. The staff development needs to focus on the effective use of technology in

support of pedagogical and curricular issues appropriate to a redefined concept of schooling (p. 9).

Therefore, the question must be asked about whether the teachers of today are prepared to meet the pedagogical and content demands of the new digital learners of today. Do they have the necessary teaching strategies to effectively use digital content to effectively prepare the "net generation" for the 21st century and revolutionize education? Larry Cuban as quoted by Becker (2000) stated the following:

> Are computers really a mismatch with the requirements of teaching? Do teachers have so many students to teach (or in the elementary grades, so many subjects to cover) that, along with the increasing accountability demanded of them, it is just too hard for most teachers to incorporate student computer use as a regular part of their instructional practice? (p. 1)

Therefore, it would appear that despite the increased interest in whether or not technology is being used in schools, there has been little empirical research conducted on the relationship between professional development and teachers' ability to effectively use the computer. (Thornburg, 1999; U.S. Department of Education, 1999; Brevik, 1998; Becker, 2000).

Purpose

The purpose of this study is to assess teachers' use of technology as determined by responses on a survey instrument. This data will be used in determining if there is a relationship between technology professional development and the ability of the teacher to use technology. If there was a relationship, then a goal of the study will be to determine which professional development programs (State or District) were significant

predictors of the teachers' ability to use technology. The study will also provide some additional information concerning the barriers teachers perceive in using technology and participating in professional development programs.

This analysis will assist in answering questions centered around what schools can do to improve teachers' use of educational technology through the professional development opportunities made available to teachers. These answers might be used to improve both pre-service and in-service educational programs for teachers and to establish the need for ongoing professional development that allows for a significant amount of time to be devoted to transform teaching and learning using technology. These insights might serve as models of the best practices for developing technology professional development programs.

The results of this study provide needed information for teachers, administrators, and higher education to use in contemplating what should follow implementation of hardware and cables into schools. This study's findings also assist as teachers integrate technology into the teaching and learning process. The Review of Literature supports the need for additional studies that provide insights related to the future of technology in schools and that identify effective models for the integration of digital content.

Research Questions

This study began with an investigation of technology and its historical applications in education. The majority of the research to date focused on the availability of the educational technology (Smerdon, Cronen, Lanahan, Anderson, Iannotti, and Angeles, 2000, p. 1). Now that access to technology seems to be available (Smerdon, et

al., p. ii), larger questions emerged concerning how technology is being used and whether teachers are prepared to integrate technology into the teaching and learning process.

Although the review of literature indicated that some research had begun to be conducted to answer these questions, further study was warranted. McKenzie (2000) concurred with other researchers (Honey, Culp, and Carrigg, 1999), in suggesting that there existed a "serious lack of credible studies showing how student learning and performance may change as networked technologies are introduced. This lack of research makes it hard for school leaders to know which strategies are worth pursuing" (Honey, et al, p. 22). Thus, the following research question emerged as to what kind of professional development programs for technology need to be in place in order for teachers to be more prepared to use the technology (November, 2000; Becker, 2000; Smerdon, Cronen, Lanahan, Anderson, Iannotti, and Angeles, 2000) and in identifying some of the barriers teachers perceive in using technology and participating in professional development programs.

1. How do teachers who have participated in State-conducted professional development activities in technology integration score on their use of technology as measured by the National Survey of Software/CD-ROM and Internet Usage©?

2. How do teachers who have participated in a minimum of three district-conducted professional development classes in technology score on their use of technology as measured by the National Survey of Software/CD-ROM and Internet Usage©?

3. How do teachers who have not participated in State-conducted, or fewer than three district-conducted professional development classes in technology score on their

use of technology as measured by the National Survey of Software/CD-ROM and Internet Usage©?

4. Is there a relationship between and among the total scores of the three identified groups of teachers on the National Survey of Software/CD-ROM and Internet Usage© as measured by a 3-way ANOVA?

5. What are the barriers for using technology and attending professional development programs as reported by teachers who were identified as having scored in the lower one-third on the National Survey of Software/CD-ROM and Internet Usage©?

Theoretical Perspective

In formulation of a theoretical perspective for studying the integration of technology into the educational process, it was determined that "presently there is no mega-theory which adequately explains all types of learning" (Bull, 2000c, p. 1). Since learning theorists have centered on which strategies will be the most effective in achieving the goals in education, there seems to be no "best" learning theory model, but rather several blended perspectives. Research would, however, indicate that integration strategies based on constructivist models provide the most effective means of integrating technology when the convergence of technology and pedagogy are a part of a larger effort of school reform (Adams, 1999; Becker, 2000; Bothel & Dimock, 1999; Brooks & Brooks, 1999; Girod and Cavanaugh, 2001; Gooden, 1966; Harris & Graham, 1994; McKenzie, 2000; Moshman, 1982; Muffoletto, 1994; Perking, 1999; Rakes, 1999; Robyler, Edwards, & Havriluk, 1977; Sandholtz, Ringstaff, & Dwyer, 1997; Scherer, 1999).

The following statement by Sparks (1998) represented the underlying logic for designing and conducting this study. "If technology is going to be used as a basis for new forms of teaching, then teachers must possess the confidence, understanding, and skills to effectively incorporate technology into their teaching practices (p. 1)."

Assumptions

A major assumption of this study was that there is a need for questions to be answered concerning the role technology will have in education and how teachers can become successful at integrating digital content into the curriculum. A possibility exists that if there were good models that expanded thinking from hardware to instruction, then technology might play a significant role in meeting the educational needs of Oklahoma students to be prepared to live and work in a world where according to Tapscott (1988)

> Technology is completely transparent... It's like the air... it's like using a pencil. Parents don't talk about pencils. They talk about writing. And kids don't talk about technology--they talk about playing, building a web site, writing a friend, ...they are born with technology, they assimilate it... it's just another part of their environment, they soak it up along with everything else. (p. 39-40)

A second assumption of this research was that teachers in the district from which the data is drawn were using digital content in meaningful ways to promote learning, and that their professional development program was providing models for other districts to follow.

Definition of Terms

The following definitions are provided to ensure uniformity and understanding of these terms throughout the study. The researcher developed all definitions not accompanied by a citation.

Connected classrooms -- Classrooms with one or more computers that are attached to a network and allow communications via the Internet and/or Intranet.

Content -- From a traditional non-constructivist approach, content is what should be learned, thought, or acquired in the particular study of a discipline (International Society For Technology In Education, 2000). From a constructivist approach, knowledge is complex and can be interpreted in various ways. Knowledge is conditional and constructed, rather than discovered (Byer & Liston 1996).

Critical mass -- The smallest number of computers necessary to produce the desired instructional results at a consistent level.

Digital -- Representation or storage of information by combination of numbers (a series of 0's and 1's) (Heinich, 1999).

Digital content -- Computer based learning resources (Fatemi, 1999) as well as video and audio resources.

Dot-com enterprises -- Reference to businesses that are conducted via the Internet.

Educational Computing and Technology -- Knowledge about and the use of computer and related technologies for instructional purposes (International Society for Technology in Education, 2000).

In-service -- Professional development offered after a teacher is in service teaching.

Information Literacy -- a process of thinking that "enables one to seek, gather, retrieve, discern, analyze, evaluate, and apply information to solve problems. It enables assimilation and accommodation of information into one's cognitive structure as knowledge and enables future problem solving" (Mendrinos, 1994).

Instructional Delivery Systems -- A group of related things that function together as a whole in order to convey or transport knowledge.

Instructional technology staff development (technology staff development, technology professional development, and technology in service education are used interchangeably) -- the "integration of the emerging technologies into education using a planned, ongoing, and comprehensive approach involving leaders who facilitate other stakeholders actively engaged in acquiring, upgrading or abandoning knowledge, attitudes, and skills related to technology-based learning and technology-infused learning environments" (Bailey and Lumley, 1997, p. 266).

Internet -- a worldwide network of computer networks that enables people to communicate and conduct research online (Bailey & Lumley, 1997).

Net-Generation -- as defined by Tapscott (1998), the Net-Generation represents a population between the ages of 2 and 22 during the year 2000. They are children and grandchildren of the baby boom era, and they have the unique experience of growing up when digital media is emerging. The Net-Generation represents a generation of inquiring and active learners.

Networks -- Communication systems linking computers to computers. This includes the hardware and software necessary to complete Intranets (Local Area Networks) and Internets (Wide Area Networks).

Pedagogy -- The art, science, and technique of instruction (Unger, 1996, p. 617), which includes the kinds of structured activities of students and the various kinds of methods used by teachers/trainers in the teaching/learning process (National Board for Professional Teaching Standards, 1998).

Pre-service -- Prior to or in preparation for the teaching profession.

Technology Integration -- Combination of all technology parts, such as hardware and software, together with each subject-related area of curriculum to enhance learning (Shelly, Cashman, Gunter, & Gunter (1999). The identification of specific school activities where technology can help to improve existing conditions or to create important educational opportunities that did not exist without it. The process of determining where and how technology fits (Roblyer, Edwards, & Havriluk, 1997).

Technology literacy – "Technological literacy is not just knowing how to use technology for word processing, spreadsheets, and Internet access. Fundamentally, it is using the powerful learning opportunities afforded by technology to increase learning in academic subjects and increase students' skills" (U.S. Department of Education, 1996, p. 1).

Telecommunications -- communication over a distance made possible by a computer, telephone, video, or a distance learning system (Roblyer, et al., 1997).

Web -- World Wide Web

Limitations of the Study

One limitation of the study was that the site of the research was clearly not representative of all public school districts; therefore, results are not generalizable beyond

the specific population from which the sample was drawn, although they may have some applicability in other Oklahoma districts.

Another limitation to this study was the somewhat low number of responses and participation by the randomly selected samples. The possibility exists that subjects may have declined to participate in this study for a variety of reasons, including embarrassment at what may be self-perceived as low technology skills. Participation may have been affected because the survey was distributed late in the school year, near the end of school, when teachers have multiple other demands. The possibility exists also that the role of the researcher in the school district's administration may have influenced some teachers to not participate. Other factors which influence teachers' abilities to self-report their technology abilities may not have been discovered.

Organization of the Study

Chapter II introduces a framework through which to view past, present, and future applications of teachers' use of technology. The review of the literature resulted in the formulation of five research questions.

Chapter III describes the methodology and design utilized for this research. Subject selection, the research instrument, data collection, and data analysis are explained.

Chapter IV contains the major results of the study. Significant findings are summarized and recommendations for further research studies are given.

Chapter V offers a summary and conclusions based upon the findings reported in Chapter IV. It further contains practical suggestions for the implementation of findings and offers topics for additional research.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

This study served as a snapshot, a "window" to get a better view of if teachers are using current computer technologies in the classroom and in schools. It also offers suggestions for professional development programs that will facilitate the improvement of how teachers are using technology. This Review of Literature represents what Ausubel (1986) called a "cognitive framework" through which to view all applications--past, present, and future.

By examining the body of existing literature, this review of literature will first focus on what is already known about the convergence of instructional technology and learning theory. It will then focus on what is currently being practiced, and finally the focus will be what the research suggests is a direction for the future.

History of Technology in Education

The terms *educational technology* and *instructional technology* are often confused and used interchangeably (Roblyer, Edwards, and Havriluk, 1997, p. 5; Jones, 1999, Heinich, Molenda, Russell, and Smaldino, 1969). Reiser and Ely (1977) agreed that educational technology is changing definitions as fast as it is evolving.

Educators today often think in terms of computers and all that is associated with computers as being technology. However, the presence of technology as a part of instruction is not new to education, nor is it limited to the use of equipment, even electronic equipment such as computers. Modern tools and techniques are simply the latest developments in a field some believe is as old as education itself (Robyler, Edwards, & Havriluk, 1997). Cuban (1986) reminded us that until only a decade ago, a history of technology in education since 1920 placed the emphasis on radio and television, with computers as an afterthought.

In offering a perspective on the evolution of technology in education, Saettler (1990) noted that

> the historical function of educational technology is a process rather than a product. No matter how sophisticated the media of instruction may become, a precise distinction must be made between the process of developing a technology of education and the use of certain products or media within a particular technology of instruction (p. 4).

E*ducation technology* then is a process, which focuses on the instructional procedures as well as the tools. Eisele and Eisele (1990) viewed technology as the use of both the process of doing and the products developed for doing it. Muffoletto (1994), as quoted in Roblyer, Edwards, & Havriluk (1997), stated "technology. . . is not a collection of machines and devices, but a way of acting" (p. 5). Therefore, in education, the combination of process and product merges instructional procedures with instructional tools into what is referred to as *educational technology*.

It may be helpful to examine *educational technology* from several perspectives. According to Beattie (1999) in his article, *What is Educational Technology*?

> We have the process technology of instructional design and a collection of hardware technologies for delivery and management of instruction. A good balance--and separation--between the process of design and the hardware of delivery is needed for things to work. Even with computers and the Internet so pervasive today, we need to continue to ask the essential questions: What delivery strategy makes the most sense? Does this strategy foster interaction? A good designer of instruction will examine the demands of the instructional situation first and then decide which medium or combination of media will best meet the needs of the situation. So, what is educational technology? It's not the computers, not document cameras, not even whiteboards. The people using these tools, what they do with them and how they do it is educational technology. (p. 1)

In 1970 technology was addressed in the Commission on Instructional Technology's report "To Improve Learning" as follows:

> Instructional technology can be defined in two ways. In its more familiar sense, it means the media born of the communications revolution which can be used for instructional purposes alongside the teacher, textbook, and blackboard . . . The second and less familiar definition of instructional technology goes beyond any particular medium or device. In this sense, instructional technology is more than the sum of its parts. It is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communications, and employing a combination of human and non-human resources to bring about more effective instruction. (p. 19)

Historically, technology in education has been seen as a series of phases or "revolutions" (Eisele & Eisele, 1990, p. 13). By using a similar perspective in defining the revolution of technology in education, Roblyer, Edwards, and Havriluk (1997) framed the history of technology in education into the following four somewhat different phases:

1. Technology in Education as Media and Audiovisual Communication
2. Technology in Education as Instructional Systems
3. Technology in Education as Vocational Training Tools
4. Technology in Education as Computers and Computer-based systems

The first and the earliest view emphasized technology as media and grew out of what Saettler (1990) referred to as the audiovisual movement: a way of delivering information as alternatives or supplements to lectures and books. Between the two World Wars, the term audiovisual was used to "describe technologies for recording, transmitting, and reproducing sound and images" (Willis & Mehlinger, 1996, p. 985). Following World War II, a period of expanded audiovisual instruction occurred due to the success of training films produced during the war.

At that time, the term instructional technology replaced audiovisual education. Along with this change in terminology came a change of emphasis from the equipment to the designing of effective instruction.

During the 1960s and 1970s, the instructional design or instructional systems movement gained popularity. This movement's emphasis and research focused on theories, instructional models, and teaching strategies that improved the effectiveness of instruction (Willis & Mehlinger, 1996, p. 985). According to instructional designers, "learning is evidenced by a change in behavior due to experience," and the goal of the

instructional designer is to "plan the experience that will change current behavior to some new, as yet unlearned behavior" (Seels and Glasgow, 1990, p. 25).

The instructional systems approach looked to solving educational problems by systematic analysis of the conditions of learning. Instructional design was based on the premise that learning should not occur in a haphazard manner but should be in accordance with orderly processes and should have measurable outcomes" (Seels and Glasgow, 1990).

Both the behaviorists' learning theory and the information-processing branch of cognitive learning theory influenced instructional design. B.F. Skinner is considered the grandfather of behaviorism and programmed instruction, which he began to develop in 1953. In 1968, Skinner published The Technology of Learning in which he used his work with human behavior to develop theories of how classroom instruction should reflect behavioral principles. The internal processes involved in learning could be considered a cause-and-effect relationship and could be established by observation Skinner saw teaching as a process of arranging contingencies of reinforcement effectively to bring about learning. Teachers and instructional materials were the stimuli to the response. The skills demonstrated by the students are the responses (Gagne & Briggs, 1985).

Skinner applied his findings to human learning using a technique called "programmed learning" (Seels & Glasgow, 1990). Information was broken into small steps, and with each step, a new term or idea was introduced and older material reviewed. As students progressed through programmed materials, their behavior was gradually shaped until the learning objective was achieved. Technologies such as textbooks,

audiovisual devices, and the computer have been used as delivery devices for programmed learning.

The behavioral approach to learning was questioned by some educational psychologists because they felt it failed to explain mental processes and some of the more complex human performances, such as how children learn grammar. Therefore, a shift in instructional design occurred that focused on the organization of memory and thinking (Seels & Glasgow, 1990; Robyler et al., 1997). This was influenced by the contributions of information-processing theories, which were used for describing the presumed flow of information during cognition as being similar to the way that a computer processes information. The model hypothesizes that the human brain has three kinds of memory stores. The first is the sensory register where all information that is derived from senses is received. The second is the short-term working memory registry where new information is temporarily held until it is either lost or placed in long-term memory. The third is long-term memory which has an unlimited capacity and can hold information indefinitely (Ormrod, 1995).

These two views of learning influenced classroom practices. Gagne & Briggs (1985) and Ausubel (1986) provided instructional guidelines designed to enhance the process of attention, encoding, and storage. Gagne & Briggs (1985) built upon the behavioral and information-processing theorists by translating the principles in their theories to instructional strategies that teachers could employ with directed learning. His learning hierarchies proposed that learning was a building process and that the lowest-level skills provide a necessary foundation for higher-level ones. Ausubel (1986), building upon the earlier research of Burner and Piaget, recommended a "top-down" approach, and he proposed that teachers provide "advance organizers" or overviews of

the way learning will be presented to help students develop mental frameworks on which to "hang" new information (Ormrod, 1995).

The information-processing views are commonplace in many classroom practices. Teachers use a variety of methods to increase the likelihood that students will pay attention to new information. They suggest methods of remembering strategies by linking new information to old information already known.

A third perspective of technology in education is generally referred to as "technology education" and has its origin with industry and vocational educators. "Vocational technology education" often applies to enhancing training in specific job skills. Technology education or vocational technology training often has computers as one of the delivery mechanisms and includes other technologies such as robotics, manufacturing systems, and computer-assisted design (CAD) systems (Roblyer, Edwards, and Havriluk, 1997).

A fourth and final view, educational computing, according to Roblyer, Edwards, and Havriluk (1997), appeared around the 1950's when the power and potential of computers began to emerge. This new technology, which focused on computing applications, was influenced by the input of technical personnel and programmers. By the 1970's, many educators whose focus had been media, audio-visual communications, and instructional systems were directing research in educational computing. According to A. A. Lumsdaine (Morrison, Lowther, and DeMeulle, 1999), "Technology has been viewed by educators as a means to deliver instruction to students" (p. 4).

Lumsdaine (Morrison, Lowther, and DeMeulle, 1999) characterized technology in education as two types. Type I stresses the importance of teaching aids and assumes the technology of the machine is associated with the technology of teaching. For example,

after the launching of the Sputnik in 1957, Congress passed the National Defense Education Act to improve science and math achievement in public schools. One aspect of the plan was to place overhead projectors into classrooms to amplify and extend the message of the teacher.

Computer-based instruction was described as Type II technologies. Type II technology replaced the teacher, as opposed to amplifying the teacher's message. Based on Vygotsky's theory of social constructivism (Vygotsky, 1986), students who construct mental models of work, so that they can interact authentically with the world, will learn more. By the early 1990's educators began to see computers as part of a combination of technology based delivery systems, including media, instructional systems, and computer-based support systems (Morrison, Lowther, and DeMeulle, 1999) which could facilitate more authentic learning models.

Each of the four perspectives made significant contributions to the current body of knowledge about processes and tools that address educational needs. It is from a blending of the four perspectives that a final perspective of educational computing arrived. For the purpose of this study, educational technology will apply to computers and networked communication systems, and the role today's computer technologies can play in instructional systems.

The Present: Pedagogical Delivery Systems

Two emerging forces have affected technology integration. One is shifting beliefs about the fundamental goals and objectives of education (directed instruction vs. constructivism) and the other is the increase in the numbers and types of technology resources available (Roblyer, Edwards, and Havriluk, 1997). Technology and learning

theory have converged in educational research, and attempts are being made to redefine what learning and teaching are and the role educational technologies have in that force. Technology, according to Bull (2000a)

> ...should be used when it enriches the learning environment, when it improves access and when using it does not create new problems. Technology should be used when it can provide additional tools which support learning, when it can provide access to a broader knowledge base, and when it can improve visualization, or when it provides improved visualization tools. Learning with technology should help students in doing, reflecting, deciding, and thinking. The focus in the learning environment should change from one to teaching to one of learning (p. 1).

According to Bull (2000b), "presently there is no meta-theory which adequately explains all types of learning (p. 1)." Early pre-science philosophers based their understandings of learning either in discipline theories or humanism. These two philosophies were of major influence until the middle of the nineteenth century. Following the development of the scientific method, which provided an empirical approach to science and other philosophies, philosophies that are more contemporary emerged. These theories were behaviorism, cognitive field theory, and social learning theory (Bull, 2000d). These theorists were followed by other philosophies, which have affected our understanding of learning but are not grounded in educational theory. They are developmental theory and the work of Jean Piaget; psychoanalysis and the work of Freud; nuerophysiology and neuropsychology; and Information Processing Theory (Bull, 2000d).

As is evidenced by the extensive studies that have taken place to date, learning theorists have long centered on which strategies will be the most effective in achieving the goals of education. In relationship to the use of technology as a delivery system for effective pedagogy, the research currently seems to be divided along the lines of two learning theory models: the directed instruction model and the constructivist model.

Directed instruction can be defined as the more traditional approach and is grounded primarily in behaviorist learning theory and the information-processing branch of the cognitive learning theories (Roblyer, Edwards, and Havriluk, 1997; Rosenshine, 1986). Directed instruction is typified as being a more traditional, systematic, and teacher-directed form of instruction. It has had a profound effect and is deeply rooted in the classroom practices during the past fifty years. Rosenshine (1986) further concluded that effective teaching included presentation of smaller amounts of materials, guided student practice, a means for students to process new materials, checking the understanding of all student, and attempts to prevent students from developing misconceptions.

B.F. Skinner and Edward Thorndike (Sikula, Buttery, & Guyton, 1996) were early behavioral psychologists who were concerned mainly with observable indications of learning and what those observations could imply for teaching. Programmed instruction is commonly identified with Skinner's work (Heinich, Molenda, Russell, and Smaldino, 1999). To Skinner, teaching was a process of arranging reinforcements to effectively bring about learning. Teachers and instructional materials were the stimuli, and the skills demonstrated by students were the response (Roblyer, Edwards, and Havriluk, 1997, p. 60).

Information-processing theorists such David Ausubel (1986) focused on the memory and storage processes tht make learning possible. They saw learning in humans as similar to the way a computer processes information (Roblyer, Edwards, and Havriluk, 1997). Robert Gagne (1985) translated the behavioral and information-processing principles into instructional strategies that could be used with directed instruction. Gagne used the information processing model to derive a guideline that teachers could follow to arrange optimal "conditions of learning" (Roblyer, et al., 1999, p. 62). The development of intellectual skills required learning that amounts to a building process according to Gagne. His list of the building blocks is called a learning hierarchy.

When using a directed teaching model, the instructor tends to focus on teaching sequences of skills that begin with lower-level skills and build to higher-level skills. Objectives are clearly stated, and test items match the objectives. Directed instruction stresses more individualized work than group work and emphasizes traditional methods such as lectures, skill worksheets, activities, and tests with specific expected responses (Roblyer, Edwards, and Havriluk, 1997). For example, the ASSURE model is an example of a procedural guide for planning and conducting instruction (Heinich, Molenda, Russell, and Smaldino, 1999). It was designed to incorporate Gagne's events of instruction into a well-planned lesson that begins with the arousal of students' interest and then moves on to present new material, involve students in practice, assess their understanding, and then go on to follow-up activities.

The constructivist instructional model, as opposed to the directed instruction model, views the world as one that is changing too quickly to confine educational goals to a body of basic skills. Instead, their approach to learning involves "learning how to learn" and includes such skills as acquiring, sorting, and using information.

Constructivism, according to David Perkins (1999), "does not seem to be one thing" (p. 6). It consists of several principles for teaching and learning. Brooks and Brooks (1999) define constructivism as "a theory of learning that describes the central role that learners' mental schemes plan in their cognitive growth" (p. 18) McBrein and Brandt (1997) define constructivism as an approach to teaching based on research about how people learn.

Harris and Graham (1994) suggest that there may be as many definitions of constructivism as there are approaches, however typically constructivists emphasize the importance of active construction of knowledge. Three necessary conditions that are usually present in constructivism are the "creative genius of the teacher (the art and science of teaching), complex tools for instructional excellence (instructional methods), and expansive systems of inter-connectivity to frame these learning experiences" (curricular frameworks) (Fogarty, 1999, p. 76).

Moshman (1982) suggested a classification system of constructivism involving three paradigms in which three roles of the environment and of significant others change the viewpoints. Moshman's paradigms (Harris & Graham, 1994) are: Endogenous Constructivism, Exogenous Constructivism, and Dialectical Constructivism.

Edogenous Constructivism, exemplified by Piagetain theory, emphasizes internal construction of holistic knowledge, or the construction of new knowledge from old. Exogenous Constructivism is reflected in cognitive conceptions of learning such as social learning theory and information-processing theories. Accordingly, knowledge is derived from one's environment and thus can be seen as learned. Dialectical Constructivism, based on premises by Vygotsky, encompasses both endogenous and exogenous perspectives. In this paradigm, knowledge is developed in social contexts as mature

thinkers model thinking and problem solving and provides cues and guidance to learners as needed.

As noted in Mosham's previous paradigms, Constructivism is founded in the theories of cognitive psychologists and neurobiologists such as John Dewey, Jean Piaget, Lev Vygotsky, Reuven Feuerstein, Howard Gardner, and Marian Diamond (Fogarty, 1999).

Dewey (1938), an advocate of field studies and immersion in experiences, was instrumental in the progressive movement in education. Many of his principles are being re-examined as schools begin to explore restructuring efforts and the growing inclusion of community service and civic projects into the educational experience.

Piaget's contributions have been dominant in the cognitive theorists of this century. Piaget's work was originally translated and brought to America by Jerome Bruner. His work extends over six decades, and although he died in 1980, his theories continue to influence current research and practice (Lefrancois, 1995). Piaget theorized that a child passes through a series of stages of cognitive development, which sets their ability to understand the world, and that children progress from stage to stage through experiences in which they adapt to their environment and organize patterns of behavior based on what they learn. According to Piaget, learners' experiences lead to changes in how they think. Assimilation occurs as children fit these new experiences into their existing schemes or patterns. Accommodation occurs when children change their existing schemes to incorporate new experiences. Piaget' s description of development holds that assimilation and accommodation are the means by which an individual interacts with the world and adapts to it. Influences of Piaget in the classroom are seen in the application

of learning activities that are developmentally appropriate and a hands-on approach to learning known as discovery learning.

Papert (1980), one of Piaget's students, profoundly influenced the field of educational technology. He was fascinated with Piaget's way of looking at children as active builders of their own intellectual structures. He began experimenting with Logo, a new programming language and its use with young children. One of his colleagues was also working with children in controlling a robot in the shape of a turtle. The Massachusetts Institute of Technology team, of which Papert was a member, decided to combine the two concepts, integrating an on-screen turtle into the Logo language. This allowed children to move more easily from the concrete operations to ones that are more abstract. His book, *Mindstorms: Children, Computers, and Powerful Ideas* challenged the then-current instructional goals, and it became the first widely recognized constructivist statement on educational practices with technology resources (Roblyer, Edwards, and Havriluk, 1997). Papert felt that children could advance their intellectual abilities with the right kind of environment and assistance. He saw Logo as a wonderful mechanism for encouraging learning by allowing students to create cause-and effect-relationships between the programming language and the computer pictures that resulted. He felt that students should be allowed to teach themselves and that children need great flexibility to develop their own "powerful ideas" (Papert, 1980).

Lev Vygotsky, a Russian psychologist and social constructivist, was considered an important Soviet psychologist in 1924. Although he died in 1934 at the age of 37 (Lefrancois, 1995), he was a human development theorist who has had considerable influence in theoretical pedagogy as well as some of the best teaching practices of today (Fogarty, 1999; Sikula et al., 1996). Vygotsky (1978) emphasized the centrality of

culture in human development, the functions of language, and the relationship of children and their environment, known as the "zone of proximal development." He recognized the importance of culture in shaping a child's development. The culture provides the child with the cognitive tools needed for development, and the quality of those tools determines the pattern and rate of development (Sikula, Buttery, and Guyton, 1996). According to Vygotsky, "What the child is able to do in collaboration today he will be able to do independently tomorrow"(1978, p. 211).

John Seely Brown (1989) and a group of researchers furthered the work of Vygotsky concerning the relationships between what students learn and how they learn it (Brown). His "authentic problem solving" requires students to use knowledge in a given content area as "tools." Activities are referred to in terms such as "situated cognitions" and like Vygotsky, the Brown group felt that learning could best be accomplished through a collaborative effort.

A group of researchers at Vanderbilt's Learning and Technology Center (VLTC) built on the concepts of Brown and Vygotsky and has been critical of many of today's educational practices. They describe anchored instruction or teaching that is "situated" in engaging, problem-rich environments that allow sustained exploration by students and teachers. They refer to this active involvement in problem solving as "generative learning" and point out that video-based technologies have unique qualities to deliver these kinds of problem solving. Their research has established some practical guidelines for integrating technology-based delivery systems on constructivist principles. The first of these technology-based products, the "Jasper Woodbury Problem Solving Series," focused on mathematics problems. Another, the "Young Children's Literacy Series,"

addressed reading and language skills. (Cognition and Technology Group at Vanderbilt, 1995).

Reuven Feuerstein (1980) began his career as a psychologist by working with the Falasha Jews of Ethiopia and with children who were mentally retarded. Feurstein's theories about mediated learning experiences transformed thinking about intelligence and human potential. He refuted the theory of an unchanging IQ and examined how the classroom affects students' metacognition. He believed that every human could reach a higher level of functioning (Fogarty, 1999). In practice, Feuerstein felt that the discovery process required intervention from the teacher to guide learning by leading students to think about their thinking as a process for deeper understanding and reflective transfer.

Howard Gardner's work includes the theory of multiple intelligences which are distinct intelligences instead of a single, global capacity underlying intelligence (LeFrancis, 1995). Gardner (1983) originally identified six realms of intelligence: linguistic, logical, spatial, musical, kinesthetic and interpersonal. Later two additional realms, intrapersonal and naturalist, were added to Gardner's theory. Gardner's work contributes to the multiple ways of knowing and expressing knowledge. In classroom practice, his work has suggested performance assessments as an authentic evaluation of learning.

In 1967, Marian Diamond, a University of California at Berkley neuroanatomist, pioneered research that added to the understandings of the brain and learning (Diamond and Hopson, 1967). Diamond says, "When we enriched the environment, we got brains with thicker cortex, more dendrite branching, more growth spines and larger cell bodies" (Healy, 1990, p. 47). Her studies, and later research by others, changed the way we think about brains (Jensen, 1998). Diamond (Diamond and Hopson, 1967) concluded

that the brain could grow new connections with environmental stimulation. Diamond describes the growth of dendrites in the brain as the development of "magic trees of the mind" (Diamond and Hopson, 1998). Her research on enriched environments "speaks to the same theoretical base as constructivism" (Fogarty, 1999). Enriched environments include sights and sounds that cause dendrites to form the "magic trees of the mind" (Diamond and Hopson, 1998).

Technology Integration

Technology in education has changed during the past 30 years, and consequently, an educational question concerning the role technology has in effective educational strategies has changed (Honey, Culp, and Carrigg, 1999). During the 1970's questions arose about whether computer-based activities improved student learning. According to Honey's studies, researchers did find improvements in student scores on tests closely related to the material covered in computer-assisted instructional packages. During the 1980's, studies examined the impact of technology-based delivery systems that were text-based, locally networked, or stand-alone computer assisted instruction applications. The studies failed to acknowledge that effective technology-based delivery systems need to be embedded in a larger process of school change (Honey, Culp, and Carrigg, 1999). During the 1990's the increase in the number and types of technology in the schools combined with a shift in beliefs to a more constructivist approach for learning has resulted in very different research questions about the strategies teachers use for implementing technology into teaching and learning (Honey, et al., 1999).

John Schacter in his report, *The Impact of Education Technologies on Student Achievement: What Current Research Has to Say,* (1999), extensively examined the

impact of technology on learning. His report examined some large-scale state and national studies as well as some innovative smaller studies that provided vision for new uses of technology in learning and instruction.

> These studies showed that in over 700 empirical research studies, in the study of the entire state of West Virginia, in a national sample of fourth-and eighth-grade students, and in an analysis of new educational technologies that students with access to computer assisted instruction, or
>
> a. integrated learning systems technology, or
>
> b. simulations and software that teaches higher order thinking, or
>
> c. collaborative networked technologies, or
>
> d. design and programming technologies, show positive gains in achievement on researcher constructed tests, standardized tests, and national tests...however evidence in some of these studies that learning technology is less effective or ineffective when the learning objectives are unclear and the focus of the technology use is diffuse. (p. 9-10)

The conclusion of the Schacter report, according to Cheryl Lemke, director of the Milken Family Foundation on Education Technology, as quoted by Karen O'Riordan, is that "how computers are used has a lot more to do with their impact than whether or not they're used" (1999). Schools, she further points out, "should not be trying to figure out ways to use computers rather they should be mapping strategies...and using technology as a tool in the process" (p. 2).

The educator's view of the appropriate role of technology in education likely is dependent upon on their perceptions of the goals of education and the appropriate instructional methods to use (Roblyer, Edwards, and Havriluk, 1997; Morrison, Lowther,

and DeMeulle,1999; Heinich, Molenda, Russell, and Smaldino, 1999; and Honey, Culp, and Carrigg, 1999). Technology integration is very dependent upon which approach, directed or constructivist, an educator chooses to use. The appropriate role of technology depends upon how each teacher perceives the goals of education and the appropriate method to help students obtain those goals. According to Molenda (1991), an either-or stance does little for education. Rather, both sides need to find a way to merge the two approaches in a way that will benefit both learners and teachers. Berieter (1990) suggested that much of what educators want students to achieve in school is sufficiently complex, so that none of the existing learning theories can individually account for what is learned and how it is learned. Instead, he states that an all-inclusive approach to learning theories is necessary because learning is generally "problematic--chancy, susceptible to failure, in need of all the help it can get" (p. 604).

To effectively implement a more all-inclusive and blended approach in their use of teaching strategies, Tennyson (1990) has suggested that a 30/70 split of instructional time should be spent in both areas (directed instruction and constructivism). Thirty percent of the time should be spent acquiring knowledge, and seventy percent should be spent on employment of knowledge. Mauler and Davidson (1999) stated that "schools must change their learning cultures that are steeped in traditional knowledge-transmission to research-based, student-active, teacher-facilitated, developmentally appropriate model of instruction--constructivism and cognitive learning theory" (p. 6). The quality of the technology-based delivery system is not in the system itself, but rather in the quality of what it delivers. In this case, the delivered product is content which becomes knowledge.

In order to address the student's individual requirements, theoretical foundations in both directed instruction and constructivism should be readily available to the

educator. Integration strategies should draw on the unique characteristics of a technology-based delivery system to meet certain kinds of learning needs. Integration strategies which are based on instructional models that incorporate behavioral theories and information-processing theories are helpful when there is a need to remediate identified weaknesses of the learner and to promote the automation of prerequisite skills (Roblyer, Edwards, and Havriluk, 1997; Gagne & Briggs, 1982; Bloom, Beckwith, Capatides, and Hafitz, 1986).

Integration strategies based on constructivist models based on cognitive learning theories have contributed to the research, and they often serve as motivations to learn. For example, the visual and interactive qualities of multimedia resources have been shown to engage learners. Constructivitism also fosters creativity and facilitates self-analysis and reflection (Roblyer, Edwards, and Havriluk, 1997). Constructivist approaches increase transfer of knowledge to problem solving and foster group cooperation.

Technology and Professional Development

Because of what we know thus far, research seems to be ready to ask a new set of questions based on where we have been and what we now know. What's next, (Honey, Culp, and Carrigg, 1999) is that effective technology based delivery systems need to be embedded in the larger process of school change, that understanding the impact of technology integration requires understanding technology-based delivery systems used in a social context, not discrete and isolated. Research supports that technology-based delivery systems can only fully be understood as part of multiple interacting factors in the

complex life of schools (Hawkins and Honey, 1990; Hawkins and Pea, 1987; Newman, 1990).

Instead of asking questions about whether certain kinds of computer-based activities can improve student learning, the larger questions for today must be about the contextual use of technology-based delivery systems. Questions should be asked to gain an understanding of how technology-based delivery systems are mediated by factors such as the organization of the classroom, the pedagogical methods of the teacher, and the socio-cultural setting of the school (Honey, Culp, and Carrigg, 1999).

Can technology deliver an improved education? Pea (1985) wrote that we can think of technology in two ways: as a set of tools that amplify or extend what we currently do (make it better, faster and stronger), or as something with the potential to radically change what we do and how we do it.

Mitchell (2000) whose studies were influenced by the *Report of the President's Committee of Advisors on Science and Technology* (PCAST, 1997) stated that the use of computer technologies by teachers facilitates their adoption of constructivist pedagogy, and found that computer anxiety and computer experience were significant factors affecting elementary school teachers' pedagogical use of computers.

Casey (2000), who investigated the stages of concern levels regarding technology integration among K-12 teachers, found that there were interrelationships between the level of technology professional development and the stages of concern levels regarding technology implementation.

As seen in the current research, studies have already shifted from specific technology-based delivery systems to larger challenges of how the technology-based delivery systems can affect teaching and learning. Today's researchers are focused on the

intersections of design, learning, school culture, and practices, and other factors that shape the impact technology-based delivery systems can have in schools (Collins, 1990; Dede, 1997; Means & Olson, and Singh, 1995). Research is needed that will focus on larger learning in context as part of a system that focuses on improving circumstances of learning and on determining how technology can help that to happen.

Mitchell's (2000) investigations suggested that if teachers are going to use more "appropriate pedagogy through their use of computers, then school districts must offer more professional development that lowers computer anxiety and increases computer experience" (p. 2).

Casey (2000) concluded, "technology training is a long-term process that must focus on changes in individuals rather than groups and must address curriculum integration" (p. 2). This requires viewing the technology-based delivery systems not as a solution in isolation, but as an essential component in enabling schools to strengthen instruction and support instructional improvement (Dede, 1997; Means, Olson, and Singh, 1995; Thornburg, 2000).

Research indicates that technology has the potential to create a new learning environment when combined with constructivist learning theory. Sandholtz, Ringstaff, and Dwyer (1997) state:

> Technology is a catalyst for change in classroom processes because it provides a distinct departure, a change in context that suggests alternative ways of operating. It can drive a shift from a traditional instructional approach toward a more eclectic set of learning activities that include knowledge-building situations for learners. (p. 48)

Students become empowered and spend more time in active construction of knowledge when using technology. Technology provides resources for problem-solving, thinking, and reflecting. Technology provides a means of collaboration with other teachers and students, and supports goals related to increasing complex thinking patterns and authentic tasks in the leaning environment (SEDL, 1999), thus changing how student learn and how teachers teach.

However, according to Dennis Sparks, (1998) as he quotes from *The Learning Connection: Schools in the Information Age*, "Technology alone is no panacea. For it to work well for students and schools, we must build a human infrastructure at the same pace we are installing computers and wiring (p. 23).

The introduction of computer technology demands a tremendous amount of physical and organizational change and restructuring (SEDL,1999). The human infrastructure, the ability of teachers and students to use technology, must be addressed in various aspects of professional development. Teachers need high quality professional development and must be offered the flexibility, support, resources, and time to "carry out the changes required by a technology-rich environment that supports learning" (p. 48).

Brandt (1997) proposed that the increased access to information through new technologies, along with the need to prepare children to compete in an emerging information-based economy promises to fundamentally reshape school practices, but schools are experiencing difficulty in effectively integrating these technologies into existing curricula. Brandt further stated that "if technology is to be used by students, then teachers must possess the confidence, understanding, and skills to effectively incorporate technology into their teaching practices" (p. 6).

The answer does not lie simply for money put into training, according to Fulton (1998). Teachers must be supported in their use of technology, Fulton reported, and they must be provided with enough prompt and dependable technical support to allow the teacher to focus on the pedagogy and not the technology. She supported findings that technology should be used as a lever in shifting the paradigm of teaching because of what it offers in terms of expanded educational resources, tools for collaborating and sharing, and for changing the learning environment to a rich educational environment.

McKenzie (1999) reported that two important ideas have to be considered in order for technology to make a difference. The first is literacy and the primary value of technology's ability to enhance thinking, decision-making, and problem solving skills. It involves showing students how to "think for themselves, how to make up their minds, and how to interpret the information flowing into their classrooms" (p. 21). The second major theme is the importance of marshalling the support, understanding, and enthusiasm of classroom teachers for the frequent use of information technologies. He further suggested that the professional development must focus more on curriculum opportunities and teaching strategies.

Becker (1999) provided findings in his study of "Internet Use by Teachers" that constructivist teachers tended to allow student use of technologies about three times as often as traditional teachers. Rakes (1999) conducted a study of the relationship between teacher style and classroom practice with new technologies. Conclusions were that even though respondents to the study had Internet connections and were able to answer the survey on-line, there still existed a "disappointing level of constructivist practices and a disappointing level of technology use with students" (p. 1).

November (2000) suggested that it is difficult, yet important, to help teachers develop new practices. He suggested that the most powerful staff development models would include such things as:

Teams of teachers and students learning together via distance learning

Teachers managing their own staff development over the web using online curriculum

Opportunities for teachers to identify curricular areas where technology can be integrated

Teachers sharing best practice by postings their lessons on the web or by emailing team members

Real-time staff development conducted by an expert online providing teachers with support while they are teaching via web cameras

DeCoker (2000) emphasized that we not teach technology skills in isolation or elevate the importance of technology and diminish other aspects of the curriculum. "Instead of looking to technology for direction, we should focus on all curricular goals. With the whole curriculum in mind, we can consider ways that technology can assist us and focus on developing uses for technology that will enhance student learning" (p. 62).

Cuban (1999) reports that "out of 10 teachers in this country, fewer than two are serious users of computers and other information technologies in their classrooms (several times a week), three to four are occasional users (about once a month), and the rest...never use computers at all (p. 68). These same teachers, Cuban reports, are not afraid of the computers, in fact they have them at home and use them for lesson preparation, to communicate with colleagues and friends, and to search the Internet. He identifies five areas that he feels must be addressed if teachers are going to move beyond

low-end classroom use. Those areas are: Contradictory advice from experts on how to integrate technology into education, intractable working conditions which leave little time for teachers themselves to learn and create, high demands on their time and stamina, unreliable technology, and disrespect for teachers opinions on the technology purchases.

Girod and Cavanaugh (2001) conclude that teachers are the keys to radical change in education. If teachers are to be successful in integrating technology into their pedagogical practice, they are going to have to "transform the technology" in ways that will make contextual sense for their own students and subject matters. In order to do so, Girod and Cavanaugh conclude, "technology will only be used as a tool to amplify current practice...teachers must be given the time, support, and creative space to use technology in new way that will eventually change their role in the classroom" (p. 7).

Based on the implications and recommendations from existing research, new and larger questions must be asked. For example, how can technology-based delivery systems effectively be integrated into educational settings? How can teachers best match technology with students' learning needs? How can technological changes interact with and support changes in many other parts of the educational process such as assessment, administration, communication, and curriculum development?

Although the review of literature indicates that some research has been conducted to answer these questions, further study is warranted. Professional development about constructivist learning environments, technology, and the interplay between the two is needed. After spending considerable efforts to get the technology to the classroom, questions now need to be asked concerning the extent to which these technologies are being used and for what purposes (Smerdon, Cronen, Lanahan, Anderson, Iannotti, and

Angeles, 2000). Professional development is needed that allows teachers to construct professional knowledge about pedagogy, content, and technology, as well as strategies for managing the changing classroom environments. McKenzie (2000) suggests that the most powerful strategies for promoting staff enthusiasm and competence should match diverse styles, interest, and skill level of teachers. He further suggests that the opportunities should include teams inventing study groups, technology coaching programs, and workplace visits. Birman, Desimone, Porter, and Garet (2000) suggest from their findings on effectiveness of professional development studies activities of longer duration have more subject-area content focus, more opportunities for active learning, and more coherence with teachers' other experiences with shorter activities. Furthermore, they found that "effective professional development that has a meaningful effect on teacher learning and fosters improvements in classroom practice, that districts should focus on high-quality professional development experiences, either by serving fewer teachers or by investing in more resources" (p. 32).

In conclusion, based on the research and evidence from the current body of literature, professional development is a necessary and integral part of teachers' use of technology for instructional purposes. Therefore, further study is warranted regarding the relationship of technology use in the classroom and professional development opportunities.

CHAPTER III

METHODOLOGY

Introduction

Educational research, according to Gay and Airasian (2000) is "the systematic application of a family of methods that are employed to provide trustworthy information about educational problems" (p. 3). Furthermore, they stated that "educational research can be classified by the degree of direct applicability of the research to educational settings or by the methods the research uses to conduct the study".

The purpose of descriptive survey research, is to determine and describe the way things are and to provide "a means to generalize from a sample to a population so that inferences can be made about some characteristic, attitude or behavior of the population" (Creswell, 1994, p. 119).

Surveys are used in educational research to collect information and to provide necessary information to both the schools studied and to various agencies and groups whose operations are school-related (Gay and Airasian, 2000, p. 227).

The use of a questionnaire is an efficient and inexpensive means of gathering data. Survey questionnaires have the advantage of allowing answers to be confidential or anonymous and are easy to score and standardize. A survey allows for data to be collected from larger samples.

Population and Sample

The site of this study was a public independent school district in a Southwestern state. This school district is the third largest in the state and has had a large implementation of technology, which is supported by district as well as state professional development programs.

The population for this single-stage study was limited to the elementary teachers in the district. All elementary teachers (teachers who teach in grades K-5) have a classroom computer with Internet access. Each elementary school has two computer labs, one, which is older and runs an Integrated Software System, and a newer multimedia lab for students. Elementary teachers were chosen for the study because of their unique professional development experiences and because of their access to technology. District and State records indicated that more elementary teachers had participated in both the State and District programs than had secondary teachers from the same district. Elementary schools in this district have had more consistent access to technology for a longer period of time than have other schools in the district.

Elementary teachers in this district have access to a variety of technology professional development opportunities. The district provides extensive training opportunities to all teachers, as does the State Department of Education.

The district has been exemplary with their district technology professional development programs. Each year teachers are asked to complete a self-assessment, which covers technology competencies in 9 instructional technology strands (Appendix D). The assessment places teachers at Level 1, Level 2, or Level 3 in a particular strand. Teachers use the results of their self-assessment in selecting classes. Data from the self-

assessments are not collected by the district. A variety of classes in each of the strands, and at each level, are offered during the summer. The classes cover a range of topics from the basics of technology awareness and troubleshooting to content integration (Appendix D). All classes are free of charge, and they may be selected and taken at the teacher's discretion. There is no mandated technology training requirement in the district; however, participation in training programs is highly supported.

The State Department of Education offers two unique technology professional development programs to teachers. They are OKTechmasters and State Telementors.

OKTechmaster training is provided free of charge. In order to participate, teachers should have mastered the basic computer skills (Level One skills). The OKTechmasters Level One skills are very similar to the district's Level 1 skills. The training is offered across the counties at facilities equipped with telecommunications and distance learning technology. The complete Level 2 training takes approximately 30 hours and is content-rich (Appendix E). Examples used in the training are relevant to educational practices. Participants are given time for hands-on, guided instruction. All training is done by teams of trained and certified *Master Trainers* who are teachers currently integrating technology into their own classrooms.

Funding for OKTechmasters is provided through the telephone companies as specified in House Bill 1815, which established a training fund to provide statewide teacher training in the most effective use of telecommunications and distance learning technology.

The State Telementor project is funded by Title III funds. Teachers who apply are selected for participation based upon an application process. Teachers chosen as a Telementors participate in a 5-day summer institute and attend 6 additional day long

classes throughout the school year. Participants receive a computer, scanner, printer, and video production equipment as well as an expense paid trip to the National Connected Classroom Conference. The Telementor curriculum focuses on classroom use of the Internet as a teaching tool, video conferencing, web page creation, producing Internet lesson plans, and other web-based applications (Appendix F).

For the purpose of this study, the entire population of elementary teachers (n=464) was classified according to whether they had participated in technology professional development programs offered by the State (Group 1), by the district (Group 2), or neither (Group 3). Data from professional development enrollment records allowed the researcher to assign each teacher to one of the three groups. If a teacher qualified for both Group 1 and Group 2, they were assigned to Group 1. The desired sample size was 60 from each group; however, Group 1 consisted of only a total of 28 participants.

Group 1 consisted of only 28 teachers. Therefore, the total population of Group 1 was included in the sample. From Groups 2 and 3, 60 participants were randomly selected from each group by assigning a number to each of the enrollees and then using a random number table. The total sample size was 148.

During the spring of 2000, permission was granted from the district school administration to deliver the surveys to the teachers who had been selected in each group. Delivery of the survey, introductory letter, and permission form was made at each school to the selected teachers. Each survey was anonymously coded in order to assure that the teacher would be able to respond privately.

After two weeks, visits were made to the sites to pick up completed surveys. After three weeks, e-mails were sent to the teachers who had not responded encouraging

them that they could send the survey in the school mail or that a stamped envelope could be delivered to them.

At the end of 4 weeks, 18 teachers had responded from Group 1, 28 from Group 2, and 23 from Group 3. A total of 69 teachers had responded from the 148 surveys sent out, for a total response rate of 47%. The response rate when this same survey instrument was administered nationally was 9.5%

After a month, the 3 teachers who scored the lowest in each of the three groups were selected for follow-up interviews. Of those 9 teachers, 6 agreed to participate in the interviews.

Instrumentation

In September of 1999, *Education Week*, in collaboration with the Milken Exchange on Education Technology, published *Technology Counts '99: Building the Digital Curriculum* (Edwards, 1999). The publication reported that "Digital resources are bursting on the scene, but no one is quite sure how to effectively use them" (p.6). The report based its findings, in part, on data collected from a national survey developed by Education Market Research to gather information on teachers use of and attitudes about digital content. Although the survey, the National Survey of Software/CD ROM and Internet Usage, provided important data on a national level, it also would be beneficial in answering the types of research questions raised in this study and useful in operationalizing the dependent variables. The copyrighted instrument consists of 56 multiple-choice questions.

This self-administered instrument had been validated and replicated, according to Dr. Robert M. Resnick, (Market Data Retrieval, 1999) president and principal researcher

for Education Market Research and author of the national survey. Permission was exclusively given to use the instrument for this study.

The national study was conducted, the data analyzed, and a report was prepared by Dr. Robert M. Resnick. To ensure that the data collected yielded reliable and valid information for the national study, a detailed six-page questionnaire was developed and sent to a segmented sample of 15,000 educators as follows:

TABLE I

DISTRIBUTION TABLE BY GRADE LEVEL/SUBJECT FOR THE NATIONAL SURVEY OF SOFTWARE/CD ROM AND INTERNET USAGE© SURVEY 1999

Grade Level	Pre-1	2-5	6-8	9-12	Total
Subject					
Classroom teacher	1,500	1,500			3,000
English/LA teacher			1,500	1,500	3,000
Mathematics teacher			1,500	1,500	3,000
Science teacher			1,500	1,500	3,000
Social Studies teacher			1,500	1,500	3,000

For the sample, teacher names were randomly drawn from Market Data Retrieval's database of U.S. public schools, specifically in districts with 5,000 or more students, and schools with 300 or more students. (Districts with 5,000+ students contain over half of all public schools, about 65% of all students, and about 60% of teachers.)

The questionnaires were mailed on April 28, 1999. By the response cut-off date of May 21, a total of 1,407 completed questionnaires were returned with a 9.4% response rate. Additionally, 13 questionnaires were received after the cut-off date, bringing the total to 1,420, a 9.5% response rate. (Market Data Retrieval, 1999)

Findings from the Market Data Research report were that more than 60% of K-12 teachers are uncomfortable integrating technology into the classroom and pointed to a lack of teacher training as the key factor hindering the use of technology in K-12 classrooms. The report stated that despite increases in technology spending ($5.5 billion in public schools alone last year), student-to computer ratios were only improved from 6.4:1 in 1998 to 5.9:1. Eighty-eight percent of all schools are connected to the Internet, yet less than 40% of K-12 teachers feel "very well prepared" or "well prepared" to use computers in the classroom (Market Data Research, 1999).

These findings as well as others from the survey gave national indications of how well teachers are using technology into the classroom and what their level of training needs to be. The findings were intriguing, and to the researcher, they invited additional inquiry on a local level.

For the purposes of this study, a means for determining a total score value was developed. Each question's possible answers were rank-ordered (1 to 5, 1 to 7, etc.) with answers that indicate low usage being the lowest numerical value. This allowed for each answer to be scored and the survey to be tallied. The higher scores reflected answers

that indicated higher usage of technology. Scores were recorded in a spreadsheet for each of the 3 groups. Scores falling into the lower one-third percentile were considered as "low-end" scores.

A cluster of seven questions was isolated as a sub scale for the purpose of this study. The researcher identified the following seven questions from the survey as being key indicators of technology use by elementary teachers: (numbers are those on the survey instrument)

5. If you do have computer access, about how frequently do you use computers for professional activities?

For which of the following professional activities do you use your computer(s) and how often?

6. Preparing lessons/classroom materials?

7. Grades/classroom management?

8. Trying out/learning software?

9. Sending/receiving e-mail?

10. Searching the Internet for information and resources to use in the classroom?

56. Taken together, to what extent do you rely on software and the Internet in your classroom?

These questions were selected because of their relevance in indicating how often teachers use technology for classroom activities.

In conducting this study, a cross-sectional survey method was conducted using the National Survey of Software/CD-ROM and Internet Usage. Two scores from the survey were used. One score was a total score, derived from the answers to all 56 questions, and a second score was based on the answers to an island of 7 questions, which were

identified by the author of the study as key indicators of technology use. The remaining questions were not analyzed individually or in groups. The questions not used have value, but not for the purposes of this study. The selected scores were used to answer the following research questions:

1. How do teachers identified as being in "Group 1" (having participated in State-conducted professional development activities in technology integration) score on the answers to Questions 5-10 and Question 56 of the National Survey of Software/CD-ROM and Internet Usage?

2. How do teachers identified as being in "Group 2" (having participated in a minimum of three district-conducted professional development classes in technology) score on the answers to Questions 5-10 and Question 56 of the National Survey of Software/CD-ROM and Internet Usage?

3. How do teachers identified as being in "Group 3" (having participated in neither State-conducted or more than three district-conducted professional development classes in technology) score on the answers to Questions 5-10 and Question 56 of the National Survey of Software/CD-ROM and Internet Usage?

4. Was there a relationship between and among scores of the three identified groups of teachers on the National Survey of Software/CD-ROM and Internet Usage© as measured by a 3-way ANOVA?

5. What were the barriers for using technology and attending professional development programs as reported by teachers who were identified by lower scores on the National Survey of Software/CD-ROM and Internet Usage©?

A pilot study was not conducted since the national survey methodology had already established reliability and validity of the instrument.

The researcher developed the second instrument used for this study, which consisted of the following open-ended interview questions:

1. Please tell me if you use the computer for any of the following:

Preparing lessons/classroom material

Grades/Classroom management

Trying out/learning software

Sending/receiving e-mail

Searching the Internet for information and resources to use in the classroom.

2. What are your reasons for using/not using the computer for the above activities?

3. Please describe your technology professional development activities that you have participated in?

4. Are you aware of the district's summer and after-school professional development activities? If you have not participated in them, what are your reasons?

5. Are you aware of the state department's professional development activities such as OKTechmasters and Telementors? If you have not participated in them, what are your reasons?

6. If you don't use computers very much, what are your reasons?

7. Do you use the Internet? If not, why?

8. What could be done to make you more comfortable using computers, software, and Internet?

9. What do you see as your biggest barrier to computer usage?

10. Can you think of anything that could be done to help you overcome that barrier?

11. Do you think that using computers could make you a better teacher?

12. Do you think that if you used the computers more your students would learn better?

13. Describe how you view yourself teaching. Would you say you are a traditional teacher, or one who is comfortable learning new things?

The questions were designed in order to triangulate the survey data. The questions were designed to ask the same questions as the survey in a more exploratory, open-ended manner. These interviews would serve as a means of debriefing a selection of teachers who had scored in the lower one-third on the instrument (Appendix B). The interview questions were designed to elicit open and honest responses in a less formal manner.

The questions were mailed to 9 teachers who scored in the lower one-third of their group, along with a letter explaining that the researcher would be making follow-up phone calls to arrange a face-to-face or phone interview time. The researcher then followed up within a week with phone calls arranging interview times. The interviews took place within the next two weeks. Interviews were recorded and transcribed. They were then coded according to categories of responses. The interviewer was seeking to discover anecdotal information as to why teachers did not participate in professional development programs.

Variables in the Study

The following chart contains the definition of each of the variables and their correlation to the survey items. The independent variable has three levels, according to each of the three groups. Level one is Group 1, which was a state professional

development program. Level 2 is Group 2, which was district professional development programs, and Level 3 is Group 3, which was neither Group 1 nor Group 2.

The independent variable is the ability of the teachers to use technology, which is represented by a total score from the instrument.

The Mediating variable is representative of barriers to technology use and participation in professional development programs.

TABLE II

DEFINITION OF VARIABLES USED IN THE RESEARCH STUDY

Independent Variable	Research Question	Item on Survey
Level 1: Group 1	How do teachers who attended Group 1 professional development score on their use of technology?	Questions 5-10 and 56
Level 2: Group 2	How do teachers who attended Group 2 professional development score on their use of technology?	Questions 5-10 and 56
Level 3: Group 3	How do teachers who attended Group 3 professional development score on their use of technology?	Questions 5-10 and 56
Dependent Variable	Does the ability to use technology relate to professional development programs?	Total scores of Groups 1, 2, and 3
Mediating Variable	What are the barriers for attending professional development programs as reported by teachers who are low end users.	Debriefing interview questions

Data Analysis

Data was collected by means of a questionnaire containing 45 items and 13 interview questions. The items on the questionnaire were multiple choice, with each answer set arranged so that 1 indicated the lowest use and 5 indicating the highest level of

use. The interview questions were open-ended and designed to elicit informal responses. All information used in the analysis was derived from either the questionnaire or the interviews. The questionnaire had been developed and tested nationally. The interview questions were researcher developed.

The following steps represent the data analysis procedure:

Step One: Information was recorded and reported about the number of returns and non-returns of both the survey and interviews.

Step Two: A descriptive analysis of all three levels of the independent variable was conducted. That analysis included the mean, standard deviation, range of scores, variance, and cross tabs using SPSS and Excel software.

Step Three: A one-way analysis of variance (ANOVA) was used to analyze data of the three sets of scores. The purpose was to compare the means of the three groups in order to decide whether the observed differences between them represent a chance occurrence or a systematic effect. The data was analyzed using separate 3 - way analyses of variance with repeated measures on one factor to compare within group differences and between group differences. All analyses were tested at the .05 significance level.

Step Four: The answers to the interview questions were transcribed. The text was then coded, looking for new information concerning barriers teachers felt in attending professional development.

Limitations

The site of this research may not be representative of all public school districts. Results may not be generalizable beyond the specific population from which the sample was drawn. The possibility exists that subjects may have declined to participate in this

study for a variety of reasons, including embarrassment at what may be self-perceived as low technology skills. Other factors that influence teacher's abilities to self-report their technology abilities may not have been discovered.

CHAPTER IV

PRESENTATION OF RESULTS

Introduction

This chapter presents the results of the study. The purpose of this study was to determine the relationship between professional development and elementary teachers' use of technology. Teachers in the study had participated in three categories of professional development. They completed a survey, which made it possible to score their use of technology for instructional purposes. The instrument provided descriptive data of how teachers were using technology and scores of Group 1, Group 2, and Group 3 was compared. Follow-up interviews with teachers who scored in the lower end of their groups were conducted for anecdotal information concerning teachers participation in professional development opportunities.

Subjects for the study were one hundred forty-eight elementary teachers. Group One (n=28) was comprised of teachers who had participated in State professional development programs. Group Two (n=60) was comprised of teachers who had participated in District offered programs. Group Three (n=60) was comprised of teachers who had not participated in either Group One or Two. Statistical data from the scores of the surveys are presented in a narrative description followed by tables and figures where appropriate.

Six teachers (n=9, three from each group) indicative of lowest technology use, were interviewed one month after taking the survey. Those findings are presented as anecdotal comments following the descriptive statistics.

Answering the Research Questions

Computed statistics were analyzed using two microcomputer statistical packages (SPSS and Excel) in order to determine mean scores for each of the groups. The mean score of each group was as follows: Group 1 (range 46-146), Group 2 (range 49-145), and Group 3 (range 28-133).

The presentation and analysis of the data were reported as they relate to each of the research questions examined. All analysis was completed at the 0.05 significant level.

Question One

How do teachers identified as being in "Group 1" (having participated in State-conducted professional development activities in technology integration) score on the answers to the seven questions isolated on the National Survey of Software/CD-ROM and Internet Useage©?

On Questions 5,6,8,9,10 and 56 of the key indicators of technology use, teachers who have participated in the State professional development programs indicated that at least 88% of them indicated a higher use of computers (Table III).

1. Eighty-eight percent of the teachers who have participated in State professional development programs reported that they use computers for professional activities from

daily to once a week. Twelve percent use computers once a month or not at all for professional activities.

2. Eighty-nine percent of the teachers who have participated in State professional development programs reported that they use their computer from daily to once a week to prepare lessons and classroom materials. Eleven percent uses their computers either once a month or not at all to prepare lessons and classroom materials.

3. Sixty-seven percent of the teachers who have participated in State professional development programs reported that they use their computer from daily to once a week for grades and classroom management. Thirty-three percent reported using the computer once a month or not at all for grades and classroom management.

4. Eighty-eight percent of the teachers who have participated in State professional development programs reported that they use their computer daily to once a week for trying out and learning software. Twelve percent reported that they do not use their computer at all for trying out and learning software.

5. Ninety-four percent of the teachers who have participated in State professional development programs reported that they use their computer from daily to once a week for email. Six percent use their computers once a month or not at all for email.

6. Ninety percent of the teachers who have participated in State professional development programs reported that they use their computer from daily to once a week for searching the Internet for information and resources. Ten percent reported that they did use their computer once a month or not at all for the Internet.

7. One hundred percent of the teachers who have participated in State professional development programs reported that they rely upon software and the Internet in their classroom to a moderate extent.

TABLE III

SUMMARY OF GROUP 1 RESPONSES TO QUESTIONS 5,6,7,8,9,10 AND 56

	Daily to once a week	One time a month or none at all
Q5--Use of computers for professional activities	88%	12%
Q6--Preparing lessons/classroom materials	89%	11%
Q7--Grades/classroom management	67%	33%
Q8--Trying out/learning software	88%	12%
Q9--Sending/receiving email	94%	6%
Q10--Searching the Internet for information and resources to use in the classroom	90%	10%
	To a great or moderate extent	To a minimum extent or not at all
Q. 56 To what extent do you rely upon software and the Internet in your classroom?	100%	0%

Question Two

How do teachers identified as being in "Group 2" (having participated in a minimum of three district-conducted professional development classes in technology) score on the answers to Questions 5-10 and Question 56 of the National Survey of Software/CD-ROM and Internet Useage©?

On Questions 5 and 6 of the key indicators of technology use, teachers who have participated in the district professional development programs indicated that at least 82% of them indicated a higher use of computers (Table IV)

1. Ninety-three percent of the teachers who have participated in district professional development programs reported that they use computers for professional activities from daily to once a week. Seven percent use computers once a month or not at all for professional activities.

2. Eighty-two percent of the teachers who have participated in district professional development programs reported that they use their computer from daily to once a week to prepare lessons and classroom materials. Eighteen percent use their computers once a month or not at all to prepare lessons and classroom materials.

3. Fifty percent of the teachers who have participated in district professional development programs reported that they use their computer from daily to once a week for grades and classroom management. Fifty percent reported using the computer once a month or not at all for grades and classroom management.

4. Thirty-six percent of the teachers who have participated in district professional development programs reported that they use their computer daily to once a week for trying out and learning software. Sixty-four percent reported that they do not use their computer at all for trying out and learning software.

5. One hundred percent of the teachers who have participated in district professional development programs reported that they use their computer from daily to once a week for email.

6. Fifty-eight percent of the teachers who have participated in district professional development programs reported that they use their computer from daily to once a week for searching the Internet for information and resources. Forty-two percent reported that they did use their computer once a month or not at all for the Internet.

7. Sixty-five percent of the teachers who have participated in district professional development programs reported that they rely upon software and the Internet in their classroom to a great or moderate extent. Thirty-five percent reported that they rely upon software and the Internet in their classroom to a minimum extent or not at all.

TABLE IV

SUMMARY OF GROUP 2 RESPONSES TO QUESTIONS 5,6,7,8,9,10 AND 56

	Daily to once a week	One time a month or none at all
Q5--Use of computers for professional activities	93%	7%
Q6--Preparing lessons/classroom materials	82%	18%
Q7--Grades/classroom management	50%	50%
Q8--Trying out/learning software	34%	64%
Q9--Sending/receiving email	100%	0%
Q10--Searching the Internet for information and resources to use in the classroom	58%	42%
	To a great or moderate extent	To a minimum extent or not at all
Q. 56—To what extent do you rely upon software and the Internet in your classroom?	65%	35%

Question Three

How do teachers identified as being in "Group 3" (having participated in neither State-conducted or more than three district-conducted professional development classes in technology) score on the answers to Questions 5-10 and Question 56 of the National Survey of Software/CD-ROM and Internet Useage©?

On Questions 1 and 5 of the key indicators of technology use, teachers who have participated in the district professional development programs indicated that at least 86% of them indicated a higher use of computers (Table V)

1. Eighty-six percent of the teachers who have participated in neither state or district professional development programs reported that they use computers for professional activities from daily to once a week. Fourteen percent use computers once a month or not at all for professional activities.

2. Sixty-eight percent of the teachers who have participated in neither state or district professional development programs reported that they use their computer from daily to once a week to prepare lessons and classroom materials. Thirty-two percent use their computers once a month or not at all to prepare lessons and classroom materials.

3. Forty-five percent of the teachers who have participated in neither state or district professional development programs reported that they use their computer from daily to once a week for grades and classroom management. Fifty-five percent reported using the computer once a month or not at all for grades and classroom management.

4. Twenty-three percent of the teachers who have participated in neither state or district professional development programs reported that they use their computer daily to once a week for trying out and learning software. Seventy-seven percent reported that they do not use their computer at all for trying out and learning software.

5. One hundred percent of the teachers who have participated in district professional development programs reported that they use their computer from daily to once a week for email.

6. Fifty-six percent of the teachers who have participated in neither state or district professional development programs reported that they use their computer from

daily to once a week for searching the Internet for information and resources. Forty-four percent reported that they did use their computer once a month or not at all for the Internet.

7. Fifty-nine percent of the teachers who have participated in district professional development programs reported that they rely upon software and Internet in their classroom to a great or moderate extent. Forty-one percent reported that they rely upon software and the Internet in their classroom to a minimum extent or not at all.

TABLE V

SUMMARY OF GROUP 3 RESPONSES TO QUESTIONS 5,6,7,8,9,10 AND 56

	Daily to once a week	One time a month or none at all
Q5--Use of computers for professional activities	86%	14%
Q6--Preparing lessons/classroom materials	68%	32%
Q7--Grades/classroom management	45%	55%
Q8--Trying out/learning software	23%	77%
Q9--Sending/receiving email	100%	0%
Q10--Searching the Internet for information and resources to use in the classroom	56%	44%
	To a great or moderate extent	To a minimum extent or not at all
Q 56—To what extent do you rely upon software and the Internet in your classroom?	59%	41%

Summary

As seen in Table VI below, on almost every question it is evident that Group 1 had a higher percentage of teachers indicating use from daily to once a week. In contrast, on almost every question it is evident that Group 3 had a higher percentage of teachers indicating use of one time a month or none at all. On the question that summarized their overall reliance upon software and the Internet in the classroom, Group 1 indicated a moderate to heavy reliance and Group 3 indicated a one time or none at all reliance.

TABLE VI

SUMMARY OF GROUPS 1, 2, AND 3 RESPONSES TO QUESTIONS 5,6,7,8,9,10 AND 56

	Daily to once a week			One time a month or none at all		
	G1	G2	G3	G1	G2	G3
Q5--Use of computers for professional activities	88%	93%	86%	12%	7%	14%
Q6--Preparing lessons/classroom materials	89% 68%	82%		11%	18%	32%
Q7--Grades/classroom management	67% 45%	50%		33%	50%	55%
Q8--Trying out/learning software	88% 23%	34%		12%	64%	77%
Q9--Sending/receiving email	94% 100%	100%		6%	0%	0%
Q10--Searching the Internet for information and resources to use in the classroom	90% 56%	58%		10%	42 %	44%

	To a great or moderate extent			To a minimum extent or not at all		
	G1	G2	G3	G1	G2	G3
Q56—To what extent do you rely upon software and the Internet in your classroom?	100% 59%	65%		0%	35%	41%

Question Four

Was there a relationship between and among scores of the three identified groups of teachers on the National Survey of Software/CD-ROM and Internet Usage as measured by a 3-way ANOVA?

A three-way ANOVA was performed to examine whether there were significant differences among and between Groups 1, 2, and 3 on total scores (Appendix B) .

Table VII compares the summation and average scores of Group 1, Group 2 and Group 3. The reports indicate that the average score of Group 1 (State) is 116.06, Group 2 (District) is 108.46, and Group 3 (Neither) is 90.26

TABLE VII

SUMMARY OF SOURCE DATA FOR GROUPS ONE, TWO, AND THREE

Groups	Count	Sum	Average	Standard Deviation
Group 1 (State)	18	2089	116.056	26.87
Group 2 (District)	28	3037	108.46	24.04
Group 3 (None)	23	2076	90.26	31.50

Table VIII indicates that F =4.98, is significant. The probability of F greater than 4.98 with two and 66 degrees of freedom is .01, which is less than the alpha of .05. Therefore, we can conclude that the observed differences between the groups produced a significant treatment effect and that at least two of the means are different.

TABLE VIII

SUMMARY OF ANOVA RESULTS FOR GROUPS 1, 2, AND 3

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	7505.86	2	3752.93	4.98	0.01	3.14
Within Groups	49720.34	66	753.33			
Total	57226.20	68				

According to Howell (2001), it can be assumed that populations are symmetric, or at least similar in shape, if the largest variance is no more than four times the smaller. Since the ratio of the largest variance to the smallest is 1.72 (Table IX) we can assume homogeneity of variance between the samples of the population studied.

TABLE IX

SUMMARY OF VARIANCE FOR GROUPS 1, 2, AND 3

Group 1	722.53
Group 2	577.97
Group 3	992.38
Ratio LG:SM	1.72

Post-hoc t-Tests, assuming equal variance, were used to determine if the groups are different from one another. When Group 1 was compared to Group 3, the two-tailed test resulted in a significance of 0.01. See Table X.

TABLE X

SUMMARY OF T-TEST: (TWO SAMPLE ASSUMING EQUAL VARIANCES)
GROUP 1 TO GROUP 3

	Group 1 State	Group 3 None
Mean	116.06	90.26
Variance	722.53	992.37
Observations	18	23
Pooled Variance	874.75	
Hypothesized Mean Difference	0	
pf	39	
t Stat	2.77	
P(T<=t) two-tail	0.01	
t Critical two-tail	2.02	

When Group 1 was compared to Group 2, the two-tailed test resulted in a significance of 0.32. See Table XI

TABLE XI

SUMMARY OF T-TEST: (TWO SAMPLES ASSUMING EQUAL VARIANCES)
GROUP 1 TO GROUP 2

	Variable 1	Variable 2
Mean	116.06	108.46
Variance	722.53	577.96
Observations	18	28
Pooled Variance	633.82	
Hypothesized Mean Difference	0	
df	44	
t Stat	1.00	
P(T<=t) two-tail	0.32	
t Critical two-tail	2.02	

When Group 2 was compared to Group 3, the two-tailed test resulted in a significance of 0.02. See Table XII

TABLE XII

SUMMARY OF TEST: TWO-SAMPLE ASSUMING EQUAL VARIANCES BETWEEN GROUPS 2 AND GROUP 3

		Group 3	Group 2
Mean		90.26	108.46
Variance		992.38	577.96
Observations		23	28
Pooled Variance		764.03	
Hypothesized Mean	Difference	0	
df		49	
t Stat		-2.34	
P(T<=t) two-tail		0.02	
t Critical two-tail		2.01	

The data in tables indicate that the group with no training (Group 3) had a significantly lower score than the State-trained (Group 1) or the district trained (Group 2) group. However, the State-trained (Group 1) and district-trained (Group 2) group scores were not statistically different from one another.

Question Five

What were the barriers for using technology and attending professional development programs as reported by teachers who were identified by lower scores on the National Survey of Software/CD-ROM and Internet Usage?

The teachers interviewed seem to have short, brief answers. This resulted in somewhat sparse data. This is probably due to the inexperience of the interviewer in

feeling comfortable enough to elicit more lengthy answers. Although the answers were brief, the data revealed some insightful findings (see TABLE XIII).

In the interviews (See Appendix A), all six interviewees felt that they were using the computer for various tasks such as preparing lessons/classroom materials, grades/classroom management, sending/receiving email, and searching for information and resources to use in the classroom. Two felt that they did not use the computer for trying out and learning software.

When asked their reasons for using/not using the computer, four indicated that the computer was convenient and that they liked the looks of documents when completed and that the ability to modify documents was important. One discussed the inability to keyboard as a hindrance to computer usage. One felt that there just wasn't enough time in the day to learn to use the computer.

Each of the teachers said that they had participated in some sort of professional development activities for technology. One teacher mentioned being self-taught for most computer skills.

Three of the teachers had participated in summer and/or after-school professional development; however, they preferred not to have to give up that time. Two mentioned that they did not take summer classes, and one added that if they took summer classes, they were more likely to forget the skill before the next school year. One teacher indicated disappointment in the classes not being what she/he wanted or expected.

Three teachers indicated that they had not heard of the State professional development programs.

All indicated that when they use the Internet it is for their personal use or for curriculum ideas. One indicated that they would not use it with students.

All indicated that with more time they could become more comfortable using computers. One suggested that all workshops be hands-on and that systematic instructions be provided. One indicated a need for additional funding to purchase appropriate software.

All indicated that lack of time and limited access to computers were barriers to more use. Four indicated that hardware and network problems kept them from using computers more. One discussed the difficulty of having only one computer which had her lesson plans and grades on it, and her reluctance to allow students to also use that computer.

When asked to discuss suggestions that would assist them in overcoming the barriers they had to computer use, they all expressed the need for time and more computers. One said that feeling confidant that the computers worked reliably was an important issue to her. One mentioned that having both Mac and Windows machines added to the confusion. They preferred learning one platform. Another barrier to be overcome was the small amount of time they had to use the computer lab.

Three felt that using computers did not make them a better teacher. One indicated that it would help, and two indicated that computers added resources for teachers and did not make them a better or worse teacher.

Three teachers felt that the students would learn more if they were better computer users themselves. Two felt that there was no relationship between being better teachers and using computers more.

When asked their view whether they liked to try new things as teachers, only one responded yes. This teacher was self-described as being more nontraditional than

traditional relative to their teaching style. The others felt more traditional but liked learning new things, if they were presented well, and if they had time to learn them.

Several teachers indicated that one classroom computer (which was intended for teacher usage) per classroom was not conducive to instructional use.

When discussing the barriers they saw to computer use as well as professional development, one teacher commented on his/her lack of ability to keyboard and that this was a hindrance in his/her progress. Others commented that they did not like giving up their summer or after school time for professional development.

TABLE XIII

SUMMARY OF COMMENTS MADE IN INTERVIEWS BY TEACHERSWHO ARE INDICATED AS HAVING LOWER COMPUTER USAGE

Question or comments	Yes	No
Using computers for various tasks	6	0
Use computer for trying out software		2
Find computer convenient	4	
Like looks of finished documents and ability to modify documents	4	
Find lack of keyboarding skills a hindrance	1	
Not enough time in day to learn computer	1	
Have participated in some sort of professional development activities for computers	6	
Self taught computer skills	1	
Have participated in summer and/or after school activities for computer	3	
Do not take summer classes	2	
Found summer classes not be what was expected	1	
Feel taking summer classes is not advantageous because it's too long to remember material	1	
Have never heard of State professional development programs	3	
Use Internet for personal or curricular use	6	
Do not use Internet with students	1	
Given more time I could learn to use computers better	6	
Need additional funding to purchase software	1	
Lack of time and limited access are barriers to computer use	6	
Hardware and network problems keep me from using computer more	4	
One computer is difficult to use for teacher and student needs	1	
Need more time and more computers	6	
Need to feel confidant that the computer works reliable	1	
Having dual platforms is a problem	1	
Need more time in computer lab	1	
Does using computers make you a better teacher?	3	1
Having computers helps with added resources	1	
If I were better with computers, my students would learn more.	3	2
Do you like to try new things as a teacher?	1	
Are you a "traditional" teacher who likes to learn new things if they are well presented, and if you have time to learn?	4	

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

The purpose of this study was to determine if there was a relationship between technology professional development and the elementary teachers' use of technology in a large suburban school district. The indicators of technology usage were measured by the National Survey of Software/CD-ROM and Internet Usage©, whose results were published in *Education Week's Technology Counts '99: Building the Digital Curriculum September, 1999.*

A second purpose of this study was to provide some additional information concerning barriers teachers see to using technology and barriers to their participation in technology professional development programs.

The subjects (n=148) for this study were elementary teachers from a large suburban school district. All subjects could be categorized into one of three groups. Group 1 subjects had participated in one of the two technology professional development programs offered by the State Department of Education. Group 2 subjects had participated in technology professional development programs offered by the school district, and Group 3 subjects had participated in neither Group 1 programs or Group 2 programs.

Data analyses was determined by examining scores on a core group of questions on the instrument which were highly indicative of how much technology is being used by the teachers from each group as well as the total score from the instrument. Personal interviews were conducted with six teachers identified as lower-end users of technology in order to obtain anecdotal information on their use of technology and their views on participation in technology professional development programs.

Five research questions were answered using a combination of qualitative and quantitative analysis in order to triangulate the various data. As reported in Chapter IV, descriptive statistical analyses were used to answer three research questions. A three-way analysis of variance (ANOVA) was used to answer one question. Interview questions followed by an analysis of themes provided data to answer one question.

This analysis assisted in answering questions centered around what schools can do to improve teachers' use of educational technology through professional development opportunities made available to teachers. These answers might be used to improve both pre-service and in-service educational programs for teachers and to establish the need for ongoing professional development. These insights might serve as suggestions for models of best practices when developing technology professional development programs.

The results of this study provided needed information for teachers, administrators, and higher education to use in contemplating what should follow the implementation of hardware and cables into schools in order to assist teachers in using technology. The *Review of Literature* supported the need for additional studies that would help define the future use of technology in schools.

Major Findings

The results of this study were presented in detail in Chapter IV. The major findings were:

1. When examining the seven key indicators of technology use, a greater percentage of the teachers who had participated in Group 1 (State) professional development programs indicated that they used technology for professional activities more than the teachers from Group 2 or Group 3.

2. When examining the seven key indicators of technology use, a greater percentage of the teachers who had participated in Group 2 (District) professional development programs indicated that they used technology for professional activities more than the teachers from Group 3.

3. There was a significant difference in the total scores of teachers in Groups 1 (State) and 3 (None) as well as Groups 2 (District) and 3 (None). The difference in scores of Groups 1 (State) and 2 (District) was not significantly different.

4. Interviewed teachers whose total scores placed them into the lower-end usage category each perceive that they have taken "some" technology classes and that they "use" their computers and the Internet. A theme of computers being "convenient" emerged, and noticeably, themes related to curriculum or student learning did not. There seemed to be conflicting perceptions about computers and time. On one hand they remarked that the computers saved them time on tasks and were convenient, however they also remarked that computers required time to learn to use. An overwhelming "lack of time" issue resonated throughout their interviews. The majority of the interviewees were reluctant to invest or give up time for training during the summer, which is when

the majority of the district professional development classes are offered. Two of the interviewees had participated in the State training; one was a Telementor, and one an OKTechmasters. The State Telementor was the only interviewee who indicated that they train other teachers and who responded positively to the question concerning whether technology make them a better teacher. Interestingly, that respondent also mentioned the lack of keyboarding skills and offered some insight as to how that is a hindrance in his/her use of technology.

Discussion

The time has arrived in education to carefully examine the use of technology in education. Arrival at this critical point has been precipitated by the fact that we have begun to approach creating a "critical mass" of technologies into our nation's schools. Research to this point has indicated that in order for those technologies to be used effectively, teachers must be prepared. This preparedness must be addressed by providing teachers with professional development that focuses on the building of a human infrastructure. As noted by Oates (2001), "Without adequate professional development for teachers and support for their ongoing learning, however, the investment in hardware, software, and infrastructure may not be very well used" (p. 4).

Administrators and teachers are looking for solutions to questions centered on what they can do to improve teachers' use of educational technology. They seek answers regarding what can be done to improve both pre-service and in-service educational programs in order to develop good models for technology professional development programs that result in teachers increased use of the technology.

This study provides some information to use in contemplating what should follow the implementation of hardware and cables into schools in order to assist teachers in using technology.

This study was designed to add to the body of knowledge regarding the relationship between technology professional development and technology use in the classroom. The findings seem to suggest that whether or not teachers participate in professional development programs may be influential in their use of technology. Notably, teachers in this study who participated in state or district professional development programs scored higher on overall usage of technology than did teachers who reported not having attended either program.

Group 1 (State) teachers have made a commitment to attend training beyond their school day and participated in a minimum of 40 hours instruction. No consideration was given as to how much district training the teachers in Group 1 had participated in, so there is reason to believe that they may have participated in some district training as well. Statistical findings (ANOVA) would confirm that there is a relationship between professional development and the teacher's ability to use the technology. The scores of teachers from Group 1 (State) were significantly higher than the scores from Group 3 (none).

Group 2 (District) teachers have also made various commitments to attend training beyond their school day. They have participated in at least three classes offered by the district. These classes are available on a number of subjects, and there was no designation given to which classes the teachers had attended or to the exact number of classes they attended. The teachers in Group 2 scored significantly higher than the teachers in Group 3, but not as high as the teachers in Group 1.

This indicates that professional development programs that are not as lengthy, not sequential, and are compacted into a shorter span of time may not be as affective as the state-offered programs, but they are certainly more effective than having attended neither set of programs.

Teachers in Group 3 (none) indicated that they were "using" technology, just to a lesser extent. They may be self-taught or may have attended professional development programs other than the ones included in the study. Their use of technology was significantly lower than those in Groups 1 and 2.

Finally, the study provided better understandings of the views regarding technology and professional development of teachers who did not score high on the survey.

All of the teachers interviewed indicated that they use technology for routine administrative and email purposes; however, they did not largely indicate that the computers were used for students and instruction. Since these teachers scored lower on the survey, this might indicate that "using" technology for teacher-centered tasks is occurring with or without professional development. These lower-level technology tasks perhaps are learned easily and without extensive formalized instruction.

The majority of teachers interviewed indicated that they were not certain that using technology increased their effectiveness as teachers, nor did they feel that students would learn more if they (the teachers) were better technology users. In this school district there is no mandated technology professional development, nor is technology integration evaluated as a part of the formal teacher evaluation process. Therefore, it is possible that these comments indicate that they have yet to see the larger benefits of

technology on the instructional process and therefore have not voluntarily attended a substantial amount of technology professional development.

Furthermore, the teachers interviewed expressed that the lack of computers available for student use in the classroom was a hindrance to them being used instructionally. They indicated that one classroom computer intended for teacher usage was not conducive to student use. However, since they all report using computers for teacher-tasks and convenience, the computer available to them would seem to be viewed as more for the teacher than for the students.

Implications

The major findings indicate that there is a relationship between professional development and the teachers' use of technology. Teachers who do not participate in technology professional development programs to a greater extent may not use technology beyond required administrative tasks and for personal use. Since teachers who attended the state professional development programs scored higher on the survey, there seem to be some indications that professional development programs that are longer, single units of instruction may be slightly more conducive to technology usage This would also lead to the possible conclusion that professional development programs that have basic skill attainment as a prerequisite may be more effective towards meeting the goal of greater usage.

This study confirms the previous findings of Birman, Desimone, Porter, & Garet (2000); Girod and Cavanaugh,(2001); and Cuban (1999), in concluding that if teachers are going to integrate technology at a level indicative of educational reform in the teaching and learning process, it won't be by chance. It will be through professional

development programs that incorporate a wide set of opportunities for teacher learning and development,

Evidence from this study suggest that teachers must be convinced that learning to use technology will reap benefits to the instruction and learning process, otherwise they are not willing to invest their time in the process. Furthermore, if reluctant teachers are going to make instructional use of the computers, there must also be enough access to technology for students. It is evident from this study, and in agreement with Cuban (1999) that teachers may be "using" technology without "integrating" technology into the teaching and learning process. This study adds to the argument also made by Cuban that if we are to solve the "technology puzzle" barriers of too little time for professional development and unreliable hardware and software must be minimized.

Recommendations

The following recommendations for future research are proposed:

1. Studies that look beyond technology use to linking technology usage to integration skills.

2. Studies that examine at the convergence of pedagogy, content, and technology to facilitate greater student achievement.

3. Studies that suggest effective professional development strategies for teaching technology integration.

4. Studies that develop models for overcoming the challenges of technology access for students and ease-of-use for teachers, including providing adequate technical support for teachers.

5. Studies on the relationship between keyboarding skills and technology usage in teachers and administrators.

6. Studies which offer models for professional development programs that are time-efficient and convenient for teachers.

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APPENDIXES

APPENDIX A

INTERVIEW QUESTIONS

Transcripts

1. Please tell me if you use the computer for any of the following:
   - ❑ Preparing lessons/classroom material
   - ❑ Grades/Classroom management
   - ❑ Trying out/learning software
   - ❑ Sending/receiving email
   - ❑ Searching the Internet for information and resources to use in the classroom.

Teacher 1	I use the computer to prepare lessons and some class materials, I put my grades into a grade book program, I don't know what class management exactly is. I don't get to try out much software, but I do send out email a lot. I search the Internet some, too.
Teacher 2	I really do all the things listed. I guess class management might be taking attendance? I do lesson plans, grades, my class letters home to parents, and newsletters on the computer. I use the email a lot, and I am pretty good with Internet searches.
Teacher 3	I don't use the computer to try out software, because I never buy any new programs that I don't know about. I am not very good at answering email, I forget to check it, and I'm a slow typist, so I hate to answer emails. I only check when my principal sends a memo. I would search for more on the Internet if I had time.
Teacher 4	I use the computer for all of the items listed. I also keep my attendance on the computer. I would use the Internet more if I had more time during the day. I am learning how to search better.
Teacher 5	I do some lesson plans on the computer, when I have time. I don't keep grades on the computer, but I think we will have to soon. I like to try out new software, and email if great for keeping in touch with my friends and other teachers. I can search on the Internet pretty well.
Teacher 6	I do everything except trying out software. I don't have that opportunity. I would do more if I had time and if I had a computer at home.

2. What are your reasons for using/not using the computer for the above activities?

Teacher 1	It is so much easier and convenient to use the computer. It helps cut down on management work and gives more time for curriculum.
Teacher 2	I wish more computers were available for us to use, and it would be more convenient if I had one both places. I like the appearance of completed projects that I do on the computer and the ability to save then modify, etc. and reproduce. This saves time.
Teacher 3	I really can't type, and that makes it hard for me to use the computer to do word processing. It's somewhat embarrassing to use two fingers to type in front of the kids, so I avoid doing that. I should be so self-conscious but I am. Guys didn't take keyboarding in high school because it conflicted with

	other courses, like sports and band.
Teacher-4	The computer is a terrific resource, my work looks so nice when done on a computer, and it is much easier to change and correct mistakes later. I like the convenience of having a computer.
Teacher-5	I am in the media center, and I do not need to do grades or use the computer for management purposes. I love to use it for Internet and for resources and lesson materials because there is so much information and ideas. Email is very convenient to correspond in a timely manner.
Teacher-6	TIME! That's it. I just don't have time.

3. Please describe your technology professional development activities that you have participated in?

Teacher-1	I have taken a few workshops, but at the district and when they have something special here, like GroupWise or Class XP after school
Teacher-2	I have taken computer classes to learn basic skills and then for more advanced skills like Excel. I took those when they were offered at the Admin. Center during the summer.
Teacher-3	I was a State Telementor, so I took looks of classes at the State Department on using my multimedia and art software. Oh, I have also taken the Marco Polo class at the State Department. All Telementors had to participate in it. I can use that software more easily because it doesn't involve typing.
Teacher-4	I have taken Word, Works, email, and I taught myself PowerPoint
Teacher-5	The classes I took have given me basic computer skills, internet training, and software training. I think I they were good for problem solving and I took OKTechmasters training.
Teacher-6	I have taken a lot of classes. I can't remember them all.

4. Are you aware of the district's summer and after-school professional development activities? If you have not participated in them, what are your reasons?

Teacher-1	I would rather do them during the school year. I don't want to take my summer to take the classes.
Teacher-2	I have taken classes when they were offered after school, but I hate to give up my summers. I have also taken some that were not what I wanted them to be. You know, they didn't cover what I expected.
Teacher 3	I am aware of the summer classes. I haven't taken very many, but I have taught the multimedia classes.
Teacher-4	I am usually doing other things during the summer, but I have participated in the ones that are after school. I don't mind those.
Teacher-5	I have taken some. I prefer those during the year because I will forget if I don't use a new skill immediately.
Teacher-6	Yes I am aware of the classes, but I haven't taken them. I wasn't interested

5. Are you aware of the state department's professional development activities such as OKTechmasters and Telementors? If you have not participated in them, what are your reasons?

Teacher-1	I have never heard of those programs. Were we told about them?
Teacher-2	No, I didn't know about them. I wasn't aware of them.
Teacher-3	Yes, I was a Telementor--I think I already told you that. I applied to be one because they knew I liked computers and would like getting into to video and multimedia. It's been a great experience.
Teacher-4	Yes I knew about them, but I really wasn't interested. They take more time.
Teacher-5	I went to OKTechmasters Level 1.
Teacher-6	I knew about them, but I wasn't interested.

6. If you don't use computers very much, what are your reasons?

Teacher-1	I think I use it a lot.
Teacher-2	I use it a lot.
Teacher-3	Like I said, I can't type, also I need more computers in my classroom. I think more teachers would use their computers if they could do some of the jobs easier. If they knew how to scan things, they wouldn't have to pay to have them (their art work that is photographed) photocopied at Kinkos.
Teacher-4	I use computers.
Teacher-5	I don't think this applies to me.
Teacher-6	I use them some.

7. Do you use the Internet? If not, why?

Teacher-1	I use the internet for personal and curriculum ideas
Teacher-2	I use the internet.
Teacher-3	I use it for things like Art History information. I think it is easy to use the web for information gathering. It is lots easier to find information on the web than to have to look it up.
Teacher 4	Yes, I use the Internet for my personal use, but I don't use it with students. I don't have enough computers in my room for that.
Teacher 5	Yes, I use it almost daily.
Teacher 6	Yes, I use it a lot.

8. What could be done to make you more comfortable using computers, software, and Internet?

Teacher 1	I wish there were more hands-on-step-by-step workshops when I need them. I like after school.
Teacher 2	I need time to experiment and more class money for specific software related to my field so that I could use it with students.
Teacher 3	I guess if I could find things faster on the Internet--and if I could keyboard.
Teacher 4	I need to have time to learn the software. I have lots of projects going, so my time is limited.
Teacher 5	Nothing, I'm very comfortable
Teacher 6	If we could have more computers with Internet available to the Media center.

9. What do you see as your biggest barrier to computer usage?

Teacher 1	Only having one computer in my classroom. I don't like for my students to use my computer because of my lesson plans and grades being on it.
Teacher 2	Time--and computers that work consistently. That's a big one.
Teacher 3	Well the hardware is difficult for some to use, and if we only had one platform, it would be easier. I think it's too hard to learn both Macs and PCs in schools. I think one platform would simplify things.' It is a barrier for me to not have more computers for the classroom.
Teacher 4	Time! I just don't have time to do computers in addition to everything else I have to do.
Teacher 5	The network and its instability. It always crashes and that is really discouraging.
Teacher 6	Time. I don't have enough as it is. And then when you add something else, its overwhelming.

10. Can you think of anything that could be done to help you overcome that barrier?

Teacher 1	More student computers in the classroom! That would make a huge difference.
Teacher 2	I guess we need to replace them more often. Maybe if they were newer they'd be more reliable and work better.
Teacher 3	More computers, but only one platform. I think left brain teachers like PCs and us right brain teachers like Macs. Macs have that funny mouse, though. And another thing is that the Macs don't have floppy drives, that makes it hard to use them for storage.
Teacher 4	No I learn programs that I need to know for the classroom.
Teacher 5	I don't know enough about all the problems to offer a solution. Maybe someone else would
Teacher 6	I wish we could find curriculum that teaches media skills. That would really help me.

11. Do you think that using computers could make you a better teacher?

Teacher 1	Maybe in some ways, but not all around. They won't make me a better teacher by themselves.
Teacher 2	Not necessarily, I don't want to rely on computers and then miss actual child contact. I think connecting with the children is more important.
Teacher 3	Yes, because I am in art and because of all the things we can do on the computer for art. I also like making videos of my lessons. That way students can practice a lesson on their own, or if they are absent, it's easier for them to get caught up.
Teacher 4	I am a better teacher because of how I use the computer.
Teacher 5	No, it more of a convenience. It can help make the job easier.
Teacher 6	No, but it gives us more resources.

12. Do you think that if you used the computers more your students would learn better?

Teacher 1	Yes, I think if the student used them more it would make a lot of difference.
Teacher 2	No, not necessarily. Considering the area I teach, they need more individual instruction than computer time.
Teacher 3	Yes, students like it when you, as a teacher, don't know how to do something, but they do. It empowers them. Also, kids respond to a variety of things, and sometimes they learn more when we change the dimensions of the learning. Computers allow that.
Teacher 4	No
Teacher 5	Yes, if you use them in the right way.
Teacher 6	Some would, but some wouldn't. It varies.

13. Describe how you view yourself teaching. Would you say you are a traditional teacher, or one who is comfortable learning new things?

Teacher 1	I like a little of both--if I find something that works, I stick to it. I am willing to try new things if they are explained very well, and if they work.
Teacher 2	I am definitely comfortable learning new things.
Teacher 3	I am not a traditional teacher, I don't do things in a real traditional manner, but then that's Art. I really like changing things, and trying things, and computers let me do that. They make things possible. I like to do new things.
Teacher 4	I am a traditional teacher (lecture, hands-on, manipulatives) and I also use the Imac lab for software, classroom computer use for small group learning.
Teacher 3 -1	I am comfortable with new things, but I feel like computers are being over emphasized in the elementary schools when reading, writing, and math are the most important.
Teacher 6	I'm comfortable with new things, I enjoy finding different ways to present materials.

APPENDIX B

TOTAL TEST SCORES

TABLES OF TEST SCORES

Group 1

Total Scores Reported
Shaded Scores = Lowest Six (1/3) Scores

Group 1		
	Coded Name	Score
1	3	146
2	7	142
3	8	139
4	17	137
5	15	135
6	11	132
7	14	129
8	5	122
9	9	122
10	12	122
11	16	122
12	13	115
13	6	114
14	10	113
15	18	106
16	1	83
17	4	64
18	2	46

Group 2
Total Scores Reported
Shaded Scores = Lowest Nine (1/3) Scores

Group 2		
	Coded Name	Score
1	16	145
2	12	143
3	13	136
4	17	127
5	22	124
6	14	123
7	18	123
8	25	123
9	2	122
10	27	120
11	26	119
12	10	118
13	20	117
14	1	116
15	19	115
16	7	112
17	11	105
18	5	104
19	15	104
20	4	103
21	3	101
22	24	101
23	23	100
24	9	90
25	8	88
26	28	57
27	21	52
28	6	49

Group 3 Teachers

Total Scores
Shaded Scores = Lowest 8 (1/3) Scores

Group 3		
1	6	133
2	12	127
3	15	127
4	2	122
5	19	115
6	13	111
7	10	107
8	20	107
9	9	106
10	1	104
11	11	103
12	23	103
13	17	101
14	22	98
15	16	92
16	21	88
17	4	69
18	7	52
19	18	49
20	14	47
21	3	46
22	5	41
23	8	28

APPENDIX C

NATIONAL SURVEY OF SOFTWARE/CD/ROM

AND INTERNET USAGE©

DATA RESULTS

NATIONAL SURVEY OF SOFTWARE/CD-ROM AND INTERNET USAGE©
EDUCATION MARKET RESEARCH
Rockaway Park, New York

Place answer questions in the space provided.

_____1. Which of the following most closely describes your position?

1. Classroom teacher (all subjects) 2. English teacher
3. Math teacher 4. Science teacher
6. Social Studies teacher 7. Other

	Group A	Group B	Group C
1	8	19	16
2			
3			
4			
5			
6			
7	10	9	7

_____2. What grade(s) do you currently teach?

1. Grades Pre K-2 2. Grades 3-5
3. Grades 6-8 4. Grades 9-12

	Group A	Group B	Group C
1	6	16	14
2	11	12	9
3			
4			
N/a	1		

_____3. How many total years of teaching experience do you have?

1. 1 year
2. 1-2 years
3. 3-5 years
4. 6-10 years
5. 11-20 years
6. Greater than 20 years

	Group A	Group B	Group C
1			2
2		2	4
3	4	3	3
4	6	5	5
5	3	6	3
6	5	11	6
N/a		1	

_____4. Do you have regular access to a computer at home and/or at your school that you use for professional activities?

1. No If you answered No, Please skip to QUESTION #11 2. Yes

	Group A	Group B	Group C
1			
2	18	28	23

_____5. If you do have computer access, about how frequently do you use computers for professional activities?

1. Not at all
2. Once a month
3. Once a week
4. 2 or 3 times a week
5. Daily

	Group A	Group B	Group C
1	1		
2	2	2	3
3		1	1
4	2	1	6
5	13	24	12
N/A	1		1

For which of the following professional activities do you use your computer (s) and how often? For each question, mark a number 1 to 5, where 1= Not at all and 5 =Daily

Not at All | Once a Month | Once a Week | 2-3 times a week | Daily

_____6. Preparing lessons/classroom materials

1 2 3 4 5

	Group A	Group B	Group C
1	1	2	2
2	1	3	4
3	4	8	7
4	8	12	7
5	4	3	2
N/A			1

_____7. Grades/classroom management

1 2 3 4 5

	Group A	Group B	Group C
1	5	9	11
2	1	5	1
3	3	5	1
4	3	1	2
5	6	7	7
N/A		1	1

_____8. Trying out/learning software

1 2 3 4 5

	Group A	Group B	Group C
1		17	5
2	4	1	12
3	9	5	3
4	3	4	2
5	2	1	1
N/A			

_____9. Sending/receiving e-mail

1 2 3 4 5

	Group A	Group B	Group C
1			
2			
3	1		
4			2
5	17	28	21
N/A			

_____10. Searching the Internet for information and resources to use in the classroom

1 2 3 4 5

	Group A	Group B	Group C
1		1	3
2	1	11	7
3	2	10	5
4	9	1	6
5	6	5	1
N/A			1

_____11. About how many hours of basic technology skills training (for example, word processing, searching the Internet, etc.) did you receive within the past 12 months?

1. None 2. 1-5 hours
3. 6-10 hours 4. 11-20 hours
5. More than 20 hours

	Group A	Group B	Group C
1			2
2	2	14	17
3	4	6	4
4	3	4	
5	9	3	
N/A		1	

____12. About how many hours of training did you receive on integrating technology into the curriculum within the past 12 months?

1. None
2. 1-5 hours
3. 6-10 hours
4. 11-20 hours
5. More than 20 hours

	Group A	Group B	Group C
1		4	4
2	5	15	18
3	5	6	1
4	2	1	
5	6	1	
N/A		1	

_____13. Do you feel better prepared today to integrate technology into your classroom lessons than you did a year ago?

1. No better prepared
2. Somewhat better prepared
3. Much better prepared today

	Group A	Group B	Group C
1	2	2	6
2	5	20	13
3	11	6	3
N/A			1

_____14. How many of the computers in your classroom are used for instruction?

1. 0
2. 1-2
3. 3-5
4. 6-10
5. 11-20
6. More than 20

	Group A	Group B	Group C
1	2	4	6
2	6	20	13
3	6	3	2
4	2	1	
5			1
6	1		
N/A	1		1

____15. How many of the computers in your classroom have Internet access?

1. 0
2. 1-2
3. 3-5
4. 6-10
5. 11-20
6. More than 20

	Group A	Group B	Group C
1	2		1
2	10	26	22
3	2	1	
4	1	1	
5	1		
6	1		
N/A	1		

16. How many of the computers in your classroom have a CD-ROM Drive?

1. 0
2. 1-2
3. 3-5
4. 6-10
5. 11-20
6. More than 20

	Group A	Group B	Group C
1	2	1	2
2	5	22	19
3	4	4	2
4	4	1	
5	1		
6	1		
N/A	0		

_____17. On an average, how many hours per week do your students spend using computers in your classroom?

1. None
2. 1 hour
3. 2 hours
4. 3-5 hours
5. 6-10 hours
5. More than 10 hours

	Group A	Group B	Group C
1	1	3	6
2	4	13	3
3	4	4	4
4	4	7	5
5	4	1	4
N/A	1		1

_____18. Including this year, how many years have you been using computer technology in your classroom lessons?

1. Have not started
2. 1 year
3. 2 years
4. 3-5 years
5. More than 5 years

	Group A	Group B	Group C
1		1	
2	3	4	6
3	4	9	6
4	7	8	7
5	4	6	3
N/A			1

_____19. Do you personally use software/CD-ROM to enhance instruction in your classroom?

1. No
2. Yes..If you answered Yes, skip to QUESTION # 21

	Group A	Group B	Group C
1	2	4	6
2	15	24	16
N/A	1		1

_____20. If you don't use software/CD-ROM for instruction, why not?

1. I don't have enough computers in the classroom
2. Haven't had enough training on computers
3. Haven't had enough training on instructional software
4. Don't have enough time to fit it into the school day
5. Not enough time to prepare or try out software
6. Not the best way to help students master skills
7. Not enough quality/relevant product available

H. OTHER

	Group A	Group B	Group C
1	1	1	2
2			2
3		2	1
4			
5	1		
6			
7		1	1
OTHER			

IF YOU DON'T USE SOFTWARE/CD-ROM FOR INSTRUCTION, PLEASE SKIP TO QUESTION #48.

_____21. Do you use productivity software (for example, word processing, spread sheet, or presentation software) for instruction?

1. No If you answered No skip to QUESTION # 24 2. Yes

	Group A	Group B	Group C
1		12	9
2	16	12	8
N/A			

_____22. If Yes, what is the primary reason you use productivity software for instruction?

1. It helps students master the skills and knowledge they need
2. It is interesting and motivating for students
3. It provides some variety or a break from normal classroom activities
4. Other

	Group A	Group B	Group C
1	4	4	3
2	10	5	1
3	1	3	3
4	1		1
5			
N/A			

_____23. If Yes, which of the following best describes your use of productivity software for instruction?

1. As a primary resource related to my classroom instruction
2. As a supplementary resource related to my classroom instruction
3. As a bonus time or quiet time activity for students

	Group A	Group B	Group C
1	2	3	3
2	14	21	12
3			2
N/A			

_____24. Do you use reference software (for example encyclopedias, atlases, etc. on CD-ROM) for instruction?

1. No If you answered No, skip to QUESTION #272. Yes

	Group A	Group B	Group C
1	4	7	10
2	12	17	7
N/A			

_____25. If Yes, what is the primary reason you use reference software for instruction?

1. It helps students master the skills and knowledge they need
2. It is interesting and motivating for students
3. It provides some variety or a break from normal classroom instruction

	Group A	Group B	Group C
1	9	10	2
2	4	7	3
3			2
N/A			

_____26. If Yes, which of the following best describes your use of reference software for instruction?

1, As a "bonus time" or "quiet time" activity for students
2. As a supplementary resource related to my classroom instruction
3. As a primary resource related to my classroom

	Group A	Group B	Group C
1			
2	6	14	5
3	7	3	2
N/A			

_____27. Do you use instructional software specifically developed for certain K-12 subjects/topics or grade levels for instruction?

1. No If you answered No, skip to QUESTION #48 2. Yes

	Group A	Group B	Group C
1	1		1
2	15	24	16
N/A			

____28. If Yes, what is the primary reason for using software specifically designed for K-12 subjects for instruction?

1. It helps students master the skills and knowledge they need
2. It is interesting and motivating for students
3. It provides some variety or a break from normal classroom activities

	Group A	Group B	Group C
1	11	15	5
2	3	9	6
3	1		5
N/A			

_____29. If Yes, which of the following best describes your use of software specially designed for K-12 subject for instruction?

1. As a primary resource related to my classroom instruction
2. As a supplementary resource related to my classroom instruction
3. As a bonus time or quiet time activity for students

	Group A	Group B	Group C
1	6	3	
2	10	19	11
3		2	6
N/A			

THE FOLLOWING QUESTIONS PERTAIN ONLY TO INSTRUCTIONAL SOFTWARE DEVELOPED SPECIFICALLY FOR CERTAIN K-12 SUBJECTS/TOPICS OR GRADE LEVELS.

_____30. In what subject areas do you use software for instructional purposes?

1. English/language arts
2. Mathematics
3. Science
4. Social Studies

	Group A	Group B	Group C
1	6	17	7
2	3	2	4
3	1	1	3
4	2	2	0
N/A	3	2	2

SKIP_31. Please list the title of the two or three software/CD_ROM titles you and your students use most frequently in your classroom

_____

_____

_____

Thinking again about the software/CD-ROM you currently have available for instruction in your classroom, please rate those products in terms of how good they are in each of the following categories. Mark a number from 1 to 5 in each of the following categories where 1 = Poor and 5 = Excellent, or leave blank if you are not sure.

	Poor				Excellent
_____32. Matching with state/district curriculum	1	2	3	4	5

	Group A	Group B	Group C
1			
2			1
3	4	9	2
4	5	10	4
5	6	5	5
N/A			4

_____33. Helping students master basic skills 1 2 3 4 5

	Group A	Group B	Group C
1			
2		11	1
3	3	6	2
4	6	1	4
5	6	6	5
N/A			4

_____34. Matching with state/district tests 1 2 3 4 5

	Group A	Group B	Group C
1			1
2		2	
3	8	9	4
4	3	7	4
5	4	4	3
N/A	1	2	4

_____35. Fostering higher level thinking skills 1 2 3 4 5

	Group A	Group B	Group C
1	1		
2	3	3	1
3	4	8	3
4	4	10	5
5	3	3	3
N/A			4

_____36. Overall product quality 1 2 3 4 5

	Group A	Group B	Group C
1			
2		1	2
3	2	7	2
4	10	11	4
5	3	5	4
N/A			4

_____37. Are there any instructional software/CD-ROM titles that you want to use but cannot because your computers are not powerful enough or not compatible?

1. Yes 2. No

	Group A	Group B	Group C
1	4	4	1
2	11	20	14

N/A			1

Some people say teachers would make greater use of instructional software/CD-ROM if that software could be improved in certain ways. Please indicate the extent to which the following are problems for you.

	Big Problem	Moderate Problem	Slight Problem	Not a Problem
_____38. Overall quality	1	2	3	4

	Group A	Group B	Group C
1			1
2	2	2	
3	4	9	3
4	9	13	11
N/A			1

_____39. Expense	1	2	3	4

	Group A	Group B	Group C
1	2	8	3
2	6	5	7
3	5	6	2
4	2	5	3
N/A			1

_____40. Match with state/district curriculum	1	2	3	4

	Group A	Group B	Group C
1		1	
2	3	3	4
3	9	9	4
4	3	11	8
N/A			

_____41. Ease of use 1 2 3 4

	Group A	Group B	Group C
1		1	
2	2	7	4
3	5	7	6
4	8	9	6
N/A			

_____42. Amount of preparation time necessary 1 2 3 4

	Group A	Group B	Group C
1	3	5	3
2	2	8	1
3	8	8	6
4	2	3	6
N/A			

_____43. Amount of class necessary 1 2 3 4

	Group A	Group B	Group C
1	1	3	4
2	3	7	1
3	5	4	8
4	6	10	2
N/A			1

_____44. For the most part, who selects the software/CD-ROM you use for instruction?

1. State level administrator 2. District level administrator
3. School level administrator 4 . Left up to the individual teacher

	Group A	Group B	Group C
1		1	
2	7	10	5
3	2	2	1
4	7	11	10
N/A			

_____45. How much influence do you feel you have in the selection process for software/CD-ROM?

1. A great deal 2. A moderate amount 3. Very little
4. None

	Group A	Group B	Group C
1	8	4	5
2	2	10	5
3	4	9	3
4	1	1	3
N/A			

_____46. For the most part, who pays for the software/CD-ROM you use for instruction?

1. The State
2. District budget
3. School budget
4. Library/Media budget
5. PTA/fund raising
6. Teacher out of pocket

	Group A	Group B	Group C
1			
2	7	14	7
3	4	4	4
4	3	3	2
5	1	2	1
6		1	1
N/A			

_____47. If you personally spend time searching for instructional software/CD-ROM, how difficult is it to find the kinds of products you want to fill your specific classroom needs?

1. Very difficult 2. somewhat difficult 3. Fairly easy
4. Very easy 5. I don't search for software

	Group A	Group B	Group C
1	1	1	1
2	5	6	4
3	6	6	6
4	3	1	1
5		10	4
6			
N/A			

_____48. Does your state or district provide:

1. Lists of approved or recommended software/CD-ROM titles
2. List of software/CD-ROM titles that match curriculum standards
3. Opportunities for previewing software/CD-ROM
4. Don't know

	Group A	Group B	Group C
1	1	2	1
2		3	
3	5	1	3
4	10	18	19
	2		

_____49. Do you personally use the Internet/Web sites to enhance instruction in your classroom?

1. Yes If Yes, skip to QUESTION # 51 2. No

	Group A	Group B	Group C
1	16	15	13
2	2	11	9
N/A		2	1

_____50. If you don't use Web sites for instruction, why not?

1. Not enough net-connected computers in the classroom
2. Haven't had enough training on computers
3. Haven't had enough training on Internet basics
4. Don't have enough time to fit it into the school day
5. Not enough time to prepare or try out Web sites
6. Not the best way to help students master skills
7. Not enough quality/relevant Web sites available

	Group A	Group B	Group C
1		1	2
2	1	1	1
3		1	
4		1	4
5	1	6	1
6		3	1
7			1
N/A			

IF YOU DON'T USE INTERNET/WEB SITES FOR INSTRUCTION, PLEASE SKIP TO QUESTION # 56.

_____51. Do you have to "dial-in" to get access to the Internet in your classroom?

1. Yes 2. No 3. I don't know

	Group A	Group B	Group C
1	3	3	1
2	11	10	8
3	1	2	4
N/A	1		

_____52. Among the Web sites you incorporate into classroom instruction, do you use sites developed specifically for certain K-12?

1. No If No, Please skip to QUESTION # 56 2. Yes

	Group A	Group B	Group C
1	2	4	4
2	14	11	9
N/A			

THE FOLLOWING QUESTIONS PERTAIN ONLY TO WEB SITES DEVELOPED SPECIFICALLY FOR CERTAIN K-12 SUBJECTS/TOPICS OR GRADE LEVELS.

_____53. What is your primary reason for using Web sites for instruction?

1. It gives students a valuable research/reference tool
2. It provides some variety or a break from normal classroom activities
3. It is interesting and motivating for students
4. It helps students master skills and knowledge they need

	Group A	Group B	Group C
1	7	3	3
2	2	3	3
3	1	3	3
4	4	2	
5			
6			
N/A			

_____54. Which of the following best describes your use of Web sites for instruction?

1. As a "bonus time" or "quiet time" activity for students
2. As a supplementary resource related to my classroom instruction
3. As a primary resource related to my classroom instruction

	Group A	Group B	Group C
1			2
2	10	10	6
3	4	1	1
N/A			

____55. If you personally spend time searching for Web sites to use for instruction, how difficult is it to find the kinds of sites or services you want to fill you specific classroom needs?

1. I don't search for Web sites 2. Very difficult 3. Somewhat difficult
4. Fairly easy 5. Very easy

	Group A	Group B	Group C
1		1	1
2	2		2
3	5	6	1
4	3	3	4
5	4	1	1
N/A			

_____56. Taken together, to what extent do you rely on software and the Internet in your classroom?

1. Not at all 2. To a minimal extent
3. To a moderate extent 4. To a very great extent

	Group A	Group B	Group C
1		1	2
2	18	16	11
3		6	8
4		5	1
N/A			1

THE END

I really do appreciate you taking the time to complete this survey. If you have any questions, you can reach me by calling X1262 or by email at lparsons@putnamcityschools.org

You may return this survey directly to me, or you may place it in your Site Tech's mailbox at your school. Be sure to return survey within one week to be eligible for the prize drawings! Free movie passes to be given to the winners.

Have a very nice summer, Linda

APPENDIX D

DISTRICT TRAINING CURRICULUM

Where Am . Now?
Self-Assessment

VII. Desktop Publishing

_____ Level 1: I do not use any publishing software such as Publisher or PageMaker, or I can use them for limited purposes.

_____ Level 2: I can create simple documents using publishing software, and I want to learn to graphically enhance layouts. I also want to begin publishing documents on the web.

_____ Level 3: I want to create professional looking documents for myself and help students improve their communications through print and electronic publishing.

VIII. Instructional Software

_____ Level 1: I do not use instructional software as part of my instructional program, or I use a few computer programs as an instructional supplement.

_____ Level 2: I use several programs (drill and practice, simulations, tutorials, etc.) to help my students meet specific learning objectives. I want to learn how software allows me to teach and/or reinforce concepts more effectively than traditional methods.

_____ Level 3: I want to try new approaches suggested by research or observation to discover the most effective means of using technology to engage my students and meet curricular goals. I want to work with teams of fellow teachers to gather, process, and report information.

IX. Video

_____ Level 1: I don't know how to use a camcorder and I'm basically a novice at video production.

_____ Level 2: I understand basic production techniques and have a little experience taping and editing video productions. I want to integrate more video into my curriculum development and/or delivery. I want to learn more about planning, writing and executing video production. I want to work with my students to produce video.

_____ Level 3: I'm ready to fully integrate video into my curriculum. I want to learn more about graphics, audio and advanced video production techniques. I want to work with my students to produce video.

My Goals for 2000-2001

Review the Self-Assessment and reflect on your current technology skills. Ask yourself the following questions: Where am I? Where do I want to be? How do I get there? As you answer these questions, think about what kind of skills you already have and what are some further needs for training during the upcoming summer and 2000-2001 school year. List your personal technology training goals below.

Goal #1 _____

_____

_____

_____

Goal #2 _____

_____

_____

_____

Goal #3 _____

_____

_____

_____

Goal #4 _____

_____

_____

_____

Survey

Select three or four technology training classes that you realistically would enroll in this summer.
Return survey to the designated person in your building.

Training Curriculum Strand	Training Classes	✓
I. General Tech		
Level 1	Windows Operating System	
	Introduction to Mac Operating System	
	GroupWise Basics	
Level 2	One Computer Classroom	
	GroupWise II	
Level 3	Troubleshooting for Hardware & Software (Windows)	
II. Word Processing		
Level 1	Basic Keyboarding	
	Word I for Teachers	
	Word I for Office Personnel	
Level 2	Word II for Teachers	
	Word II for Office Personnel	
Level 3	Extending the Writing Process	
III. Spreadsheets		
Level 1	Excel I for Teachers	
	Excel I for Office Personnel	
Level 2	Excel II for Teachers	
	Excel II for Office Personnel	
Level 3	Excel III for Teachers	
IV. Databases		
Level 1	Microsoft Access I	
	FileMaker Pro I	
Level 2	Microsoft Access II	
	FileMaker Pro II	
Level 3	Microsoft Access III	

Training Curriculum Strand	Training Classes	✓
V. Internet		
Level 1	Internet Basics	
Level 2	Teaching and Learning With the Internet	
	Internet for Administrators	
Level 3	Integrating the Internet into Your Curriculum (Elementary)	
	Integrating the Internet into Your Curriculum (Middle School)	
	Integrating the Internet into Your Curriculum (High School)	
VI. Multimedia		
Level 1	PowerPoint I	
	HyperStudio I	
Level 2	Picture Magic (Digital Cameras & Scanners)	
	Photo Shop	
Level 3	Advanced Presentations	
VII. Desktop Publishing		
Level 1	Publisher I (Windows)	
Level 2	Publisher II (Windows)	
	PageMaker (Macintosh)	
Level 3	Introduction to Web Page Development	
	Advanced Web Page Development	
	Web Publishing for Classroom Instruction	
VIII. Instructional Software		
Level 1	Installing and Using Instructional Software	
Level 2	iMac Bundles for Elementary	
Level 3	Advanced Software Integration	
IX. Video		
Level 1	Video Production I	
Level 2	Video Production II	
Level 3	Video Production III	

Where D Want To Be?
Individualized Training Plan
(ITP)

Directions: Mark the classes you have already taken with an X. Mark classes you plan to take this summer with a √. Keep this chart to record your progress.

	Level 1			Level 2			Level 3		
I. General Tech	Windows Operating System	Introduction to Mac Operating System	GroupWise Basics	One Computer Classroom	GroupWise II		Trouble shooting for Hardware & Software		
II. Word Processing	Basic Keyboarding	Word I for Teachers	Word I for Office Personnel	Word II for Teachers	Word II for Office Personnel		Extending the Writing Process		
III. Spread-sheets	Excel I for Teachers	Excel I for Office Personnel		Excel II for Teachers	Excel II for Office Personnel		Excel III for Teachers		
IV. Data-bases	Microsoft Access I	FileMaker Pro I		Microsoft Access II	FileMaker Pro II		Microsoft Access III		
V. Internet	Internet Basics			Teaching and Learning With the Internet	Internet for Administrators		Integrating the Internet into Your Curriculum (Elementary)	Integrating the Internet into Your Curriculum (Middle School)	Integrating the Internet into Your Curriculum (High School)
VI. Multi-media	PowerPoint I	HyperStudio I		Picture Magic (Digital Camera & Scanners)	Photo Shop		Advanced Presentations		
VII. Desktop Publishing	Publisher I (Windows)			Publisher II (Windows)	PageMaker (Macintosh)		Introduction to Web Page Development	Advanced Web Page Development	Web Publishing for Classroom Instruction
VIII. Instructional	Installing and Using Instructional Software			iMac Bundles for Elementary			Advanced Software Integration		
IX. Video	Video Production I			Video Production II			Video Production III		

June 2000

CLASS SCHEDULE

Putnam City Administration • 5401 NW 40th Oklahoma City, OK 73122 • Fax: 491-7568

√ Mark the Classes in which you wish to enroll	Class Title	Date(s) and Location of Class
	OKTechMasters- (Must enroll online at www.oktechmasters.org)	June 5-8, (Monday-Thursday) 8:00a.m.-8:00p.m. Compaq Lab
	Making Technology Work for You (iMac—Elementary Teachers)	June 6 (Tuesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Productivity Tools for Instruction (iMac—Elementary Teachers)	June 7 (Wednesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Implementing Productivity Tools (iMac—Elementary Teachers)	June 8 (Thursday) 8:00a.m.-3:00p.m. Central Intermediate
	Internet Basics Level 1	June 10 (Saturday) 8:00a.m. - 11:00a.m. Compaq Lab
	Windows Operating System Level 1	June 10 (Saturday) 12:00p.m. - 3:00p.m. Compaq Lab
	PowerPoint I, Part 1 & Part 2 Level 1	June 12 &14 (Monday & Wednesday) 8:00a.m. - 11:00a.m. Compaq Lab
	Word I for Teachers, Part 1 & Part 2 Level 1	June 12 & 14 (Monday & Wednesday) 8:00a.m. - 11:00a.m. Central Intermediate
	Integrating the Internet into your Curriculum Level 3 (Elementary) Part 1 & Part 2	June 12 & 14 (Monday & Wednesday) 12:00p.m. - 3:00p.m. Compaq Lab
	MAC Operating System Level 1	June 12 (Monday) 12:00p.m. - 3:00p.m. Central Intermediate
	Troubleshooting Essentials (iMac—Elementary Teachers)	June 13 (Tuesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Publisher I, Part 1 & Part 2 Level 1	June 13 & 15 (Tuesday & Thursday) 8:00a.m. - 11:00a.m. Compaq Lab
	Excel I for Teachers, Part 1 & Part 2 Level 1	June 13 &15 (Tuesday & Thursday) 8:00a.m. - 11:00a.m. Central Intermediate
	Windows Operating System Level 1	June 13 (Tuesday) 12:00p.m. - 3:00p.m. Compaq Lab
	Word I for Office, Part 1 & Part 2 Level 1	June 13 & 15 (Tuesday & Thursday) 12:00p.m. - 3:00p.m. Central Intermediate
	Excel I for Teachers, Part 1 & Part 2 Level 1	June 13 &15 (Tuesday & Thursday) 5:30p.m. - 7:30p.m. Compaq Lab
	Advanced Troubleshooting (iMac—Elementary Teachers)	June 14 (Wednesday) 8:00a.m. - 3:00p.m. Central Intermediate
	SASIxp Basic Apps. (Overview of SASI)	June 14 (Wednesday) 12:00p.m. - 3:00p.m. Central Intermediate
	Internet Basics Level 1	June 15 (Thursday) 12:00p.m. - 3:00p.m. Compaq Lab

√ Mark the Classes in which you wish to enroll	Class Title	Date(s) and Location of Class
	Using Digital Cameras (iMac—Elementary Teachers)	June 15 (Thursday) 8:00a.m. - 3:00p.m. Central Intermediate
	Troubleshooting for Hardware & Software (Windows) Level 3	June 19 (Monday) 8:00a.m. - 11:00p.m. Compaq Lab
	Installing and Using Instructional Software Level 1	June 19 (Monday) 12:00p.m. - 3:00p.m. Compaq Lab
	Word II for Teachers, Part 1 & Part 2 Level 2	June 19 & 21 (Monday & Wednesday) 8:00a.m. - 11:00am.
	Excel I for Office Personnel, Part 1 & Part 2 Level 1	June 19 & 21 (Monday & Wednesday) 12:00p.m. - 3:00p.m. Central Intermediate
	PowerPoint I Level 1	June 20 (Tuesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Basic Keyboarding, Part 1 & Part 2 Level 1	June 20 & 22 (Tuesday & Thursday) 8:00a.m. - 11:00a.m. Compaq Lab
	One Computer Classroom, Part 1 & Part 2 Level 2	June 20 & 22 (Tuesday & Thursday) 12:00p.m. - 3:00p.m. Compaq Lab
	FileMaker Pro I Level 1	June 21 (Wednesday) 8:00a.m. - 3:00p.m. Compaq Lab
	Multimedia (Video) Production I Enrollment Limit: 6	June 21 (Wednesday) 8:00a.m. - 3:00p.m. Studio
	Multimedia (Video) Production I Enrollment Limit: 6	June 22 (Thursday) 8:00a.m. - 3:00p.m. Studio
	Word I for Teachers Level 1	June 22 (Thursday) 8:00a.m. - 3:00p.m. Central Intermediate
	Word II for Teachers Level 2	June 24 (Saturday) 8:00a.m. - 3:00p.m. Compaq Lab
	Picture Magic Level 2	June 26 (Monday) 8:00a.m. - 3:00p.m. Compaq Lab
	Extending the Writing Process Level 3	June 26 (Monday) 8:00a.m. - 3:00p.m. Central Intermediate
	Integrating the Internet into your Curriculum (High School) Level 3, Part 1 & Part 2	June 27 & 29 (Tuesday & Thursday) 8:00a.m. - 11:00a.m. Compaq Lab
	Access I, Part 1 & Part 2 Level 1	June 27 & 29 (Tuesday & Thursday) 12:00p.m. - 3:00p.m Compaq Lab
	Integrating Reading (iMac—Elementary Teachers)	June 27 (Tuesday) 8:00a.m. - 3:00p.m. Central Intermediate
	PowerPoint I, Part 1 & Part 2 Level 1	June 27 & 29 (Tuesday & Thursday) 5:30p.m. - 8:30p.m. Compaq Lab
	Troubleshooting for Hardware & Software (Windows) Level 3	June 28 (Wednesday) 8:00a.m. - 11:00a.m. Compaq Lab
	Installing and Using Instructional Software Level 1	June 28 (Wednesday) 12:00p.m. - 3:00p.m. Compaq Lab
	Math Activities with Technology (iMac—Elementary Teachers)	June 28 (Wednesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Multimedia for Instruction (iMac—Elementary Teachers)	June 29 (Thursday) 8:00a.m. - 3:00p.m. Central Intermediate

July 2000

CLASS SCHEDULE

Putnam City Administration • 5401 NW 40th Oklahoma City, OK 73122 • Fax: 491-7568

√ Mark the Classes in which you wish to enroll	Class Title	Date(s) and Location of Class
	Teaching & Learning with the Internet Level 2	July 5 (Wednesday) 8:00a.m. - 3:00p.m. Compaq Lab
	Excel II for Teachers Level 2	July 5 (Wednesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Picture Magic Level 2	July 6 (Thursday) 8:00a.m. - 3:00p.m. Compaq Lab
	HyperStudio (iMac—Elementary Teachers)	July 6 (Thursday) 8:00a.m. - 3:00p.m. Central Intermediate
	Publisher I Level 1	July 8 (Saturday) 8:00a.m. - 3:00p.m. Compaq Lab
	FileMaker Pro I, Part 1 & Part 2 Level 1	July 10 & 12 (Monday & Wednesday) 8:00a.m. - 11:00a.m. Compaq Lab
	Windows Operating System Level 1	July 10 (Monday) 12:00p.m. - 3:00p.m. Compaq Lab
	Integrating the Internet into Your Curriculum Middle School Level 3	July 10 (Monday) 8:00a.m. - 3:00p.m. Central Intermediate
	Word I for Office Personnel, Part 1 & Part 2 Level 1	July 11 & 13 (Tuesday & Thursday) 8:00a.m. - 11:00a.m. Compaq Lab
	Access I, Part 1 & Part 2 Level 1	July 11 &13 (Tuesday & Thursday) 12:00p.m. - 3:00p.m. Compaq Lab
	Making Technology Work For You (iMac—Elementary Teachers)	July 11 (Tuesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Excel I for Teachers, Part 1 & Part 2 Level 1	July 11 &13 (Tuesday & Thursday) 5:30p.m. - 7:30p.m. Compaq Lab
	Advanced GroupWise Level 2	July 12 (Wednesday) 12:00p.m. - 3:00p.m. Compaq Lab
	Productivity Tools for Instruction (iMac—Elementary Teachers)	July 12 (Wednesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Implementing Productivity Tools (iMac—Elementary Teachers)	July 13 (Thursday) 8:00a.m. - 3:00p.m. Central Intermediate
	Publisher II Level 2	July 17 (Monday) 8:00a.m. - 3:00p.m. Compaq Lab
	Advanced GroupWise Level 2	July 17 (Monday) 8:00a.m. - 11:00a.m. Central Intermediate
	Advanced GroupWise Level 2	July 17 (Monday) 12:00p.m. - 3:00p.m. Central Intermediate
	Troubleshooting Essentials (iMac—Elementary Teachers)	July 17 (Monday) 8:00a.m. - 3:00p.m. Central Intermediate

√ Mark the Classes in which you wish to enroll	Class Title	Date(s) and Location of Class
	Advanced Troubleshooting (iMac—Elementary Teachers)	July 18 (Tuesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Teaching & Learning with the Internet Level 2	July 18 (Tuesday) 8:00a.m. - 3:00p.m. Compaq Lab
	Excel II for Teachers, Part 1 & Part 2 Level 2	July 18 & 20 (Tuesday & Thursday) 8:00a.m. - 11:00a.m. Central Intermediate
	Word II for Teachers, Part 1 & Part 2 Level 2	July 18 & 20 (Tuesday & Thursday) 12:00p.m. - 3:00p.m. Central Intermediate
	Integrating the Internet into your Elementary Curriculum Level 3	July 19 (Wednesday) 8:00a.m. - 3:00p.m. Compaq Lab
	Using Digital Cameras (iMac—Elementary Teachers)	July 19 (Wednesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Multimedia (Video) Production II Level 2 Enrollment Limit: 4	July 19 & 20 (Wednesday & Thursday) 8:00a.m. - 3:00p.m. Studio
	Web Page Development Level 3	July 20 (Thursday) 8:00a.m. - 3:00p.m. Compaq Lab
	Movies & Sounds for the Classroom (iMac—Elementary Teachers)	July 20 (Thursday) 8:00a.m. - 3:00p.m. Central Intermediate
	One Computer Classroom Level 2	July 22 (Saturday) 8:00a.m. - 3:00p.m. Compaq Lab
	Teaching & Learning with the Internet Level 2, Part 1 & Part 2	July 25 & 27 (Tuesday & Thursday) 5:30p.m. - 8:30p.m. Compaq Lab
	Integrating Reading & Technology (iMac—Elementary Teachers)	July 25 (Tuesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Math Activities with Technology (iMac—Elementary Teachers)	July 26 (Wednesday) 8:00a.m. - 3:00p.m. Central Intermediate
	Writing Lessons (Primary) (iMac—Elementary Teachers)	July 27 (Thursday) 8:00a.m. - 3:00p.m. Central Intermediate

Class Descriptions

Training Curriculum Strand	Classes	Description
I. General Tech		
Level 1	Windows Operating System	Learn basic Windows terminology and concepts. Explore the elements of the operating system. This class will provide necessary information for effective computer use and is the foundation course for all Windows applications.
Level 1	Introduction to Mac Operating System	Participants will receive a complete overview of the Macintosh, including creating a file, formatting a diskette, creating a new word processing document, and copying/pasting graphics into a word processing document.
Level 1	GroupWise Basics	This fun and easy class will prepare you to use GroupWise e-mail.
Level 2	One Computer Classroom	Participants will use Microsoft Word 97 to create calendars, certificates, and letters. Participants will also learn to develop a PowerPoint presentation.
Level 2	Advanced GroupWise	Participants will study advanced features of GroupWise e-mail.
Level 3	Troubleshooting for Hardware & Software (Windows)	Participants will learn to install and set up teacher workstations. Participants will also gain experience in troubleshooting log-in and printing problems.
II. Word Processing		
Level 1	Basic Keyboarding	Learn the touch method of the computer keyboard. Upon completion of this class, participants will be given a self-paced tutorial.
Level 1	Word I for Teachers	An introductory course where participants learn the basics of producing a word-processing document. Participants will use the built-in wizards to create, edit, format, print, and store high quality documents such as letters and calendars.
Level 1	Word I for Office Personnel	An introductory course where participants learn the basics of producing a word-processing document. Participants will use the built-in wizard to create, edit, format, print, and store letters, reports, and forms.
Level 2	Word II for Teachers	Continue your study of Microsoft Word. Participants will learn to set up tables, columns, and use advance editing tools for classroom purposes.
Level 2	Word II for Office Personnel	Continue your study of Microsoft Word. Participants will learn to set up tables, columns, and use advance editing tools.
Level 3	Extending the Writing Process	Teachers will explore the use of writing tools to enhance the collaborative writing process.
III. Spreadsheets		
Level 1	Excel I for Teachers	An introductory course to familiarize participants with Excel 97. Learn to create spreadsheets, edit a cell, and utilize the chart wizard.
Level 1	Excel I for Office Personnel	An introductory course to familiarize participants with Excel 97. Learn to create spreadsheets, edit a cell, and utilize the chart wizard.
Level 2	Excel II for Teachers	Continue your study of Excel. Participants will learn to perform special mathematical functions, develop charts, and incorporate graphics for classroom purposes.
Level 2	Excel II for Office Personnel	Continue your study of Excel. Participants will learn to perform special mathematical functions, develop charts, and incorporate graphics.
Level 3	Excel III for Teachers	Teachers will have the opportunity to work with other teachers to develop classroom activities for students to use Excel. Excel is a powerful program, which allows students to gather, analyze, and chart data.

Class Descriptions

Training Curriculum Strand	Classes	Description
VII. Desktop Publishing		
Level 1	Publisher I (Windows)	Participants will learn the basics of Microsoft Publisher and have the opportunity to produce a calendar, banner, and certificates.
Level 2	Publisher II (Windows)	Continue your study of Publisher. Participants will learn to add design effects to enhance publications and to produce a newsletter.
Level 2	PageMaker (Macintosh)	Users will be introduced to PageMaker software.
Level 3	Introduction to Web Page Development	This class will take you step by step in developing a basic Web page using FrontPage 98.
Level 3	Advanced Web Page Development	Participants will learn to combine text, images, color, and graphics for a visually compelling Web page.
Level 3	Web Publishing for Classroom Instruction	This class takes you through very practical ways in which you can put your classroom online. Take advantage of the Internet's power for class settings while adding pizzazz and online interactivity to the learning environment.
VIII. Instructional Software		
Level 1	Installing and Using Instructional Software	Participants will learn to install instructional software such as the Compaq Learning Paqs.
Level 2	iMac Bundles for Elementary	Elementary teachers will be given an opportunity to explore and integrate various titles from the iMac Bundles. (See attached class descriptions.)
Level 3	Advanced Software Integration	CD software is used to work with teams of fellow teachers and students to gather, process, and report information.
IX. Video		
Level 1	Multimedia (Video) Production I	This class is designed for faculty and staff interested in learning the basics of video production including lighting, shooting and editing video in a hands-on environment. Participants will learn production techniques that can be used in a variety of settings with students and staff.
Level 2	Multimedia (Video) Production II	This hands-on class is designed for faculty and staff who know the basics of video production and want to further their skills and knowledge by planning and producing a video from conceptualization to presentation using digital cameras and non-linear editing.
Level 3	Multimedia (Video) Production III	This class is designed for faculty and staff who want to further their knowledge in graphics, audio, and advanced shooting and editing techniques.

Class Descriptions

Training Curriculum Strand	Classes	Description
IV. Databases		
Level 1	Microsoft Access I	An introductory course to familiarize participants with database use. Learn to set up a database and run queries using Access.
Level 1	FileMaker Pro I	An introductory course to familiarize participants with database use. Learn to set up a database and run queries using FileMaker Pro.
Level 2	Microsoft Access II	Continue your study of Access. Learn to make Access work with other software applications to perform such tasks as creating form letters, envelopes, and printing address labels.
Level 2	FileMaker Pro II	Continue your study of FileMaker Pro and its advanced features.
Level 3	Microsoft Access III	Teachers will learn to use Access along with other Microsoft applications to share, gather, analyze, chart, and present data.
V. Internet		
Level 1	Internet Basics	There's a world of excitement at your fingertips when you connect to the Internet. Participants will first learn to master browser basics and locate resources quickly by using keyword searches and specialized search tools.
Level 2	Teaching and Learning With the Internet (Prerequisite: Internet Basics)	Participants will learn to access, evaluate and use information found on the Internet. Online safety on the information highway will be discussed.
Level 2	Internet for Administrators (Prerequisite Internet Basics)	Administrators will learn to access, evaluate, and use educational information found on the Internet that supports special administrative needs. Online safety on the information highway will be discussed.
Level 3	Integrating the Internet into your Curriculum (Elementary)	Do you feel "Lost in Space" when surfing the Web? If you answered yes, this course is for you! This course will provide teachers with direct source materials, lesson plans, and classroom activities to integrate the Internet into the curriculum and the instructional process. Learn to facilitate cooperative learning and critical thinking activities using Web resources.
Level 3	Integrating the Internet into your Curriculum (Middle School)	Do you feel "Lost in Space" when surfing the Web? If you answered yes, this course is for you! This course will provide teachers with direct source materials, lesson plans, and classroom activities to integrate the Internet into the curriculum and the instructional process. Learn to facilitate cooperative learning and critical thinking activities using Web resources.
Level 3	Integrating the Internet into your Curriculum (High School)	Do you feel "Lost in Space" when surfing the Web? If you answered yes, this course is for you! This course will provide teachers with direct source materials, lesson plans, and classroom activities to integrate the Internet into the curriculum and the instructional process. Learn to facilitate cooperative learning and critical thinking activities using Web resources.
VI. Multimedia		
Level 1	PowerPoint I	Interested in using PowerPoint to build a student generated project or an innovative way to showcase your grade level or school to patrons? If so, then this course is for you! Participants will learn to use the preformatted templates as well as to create exciting presentations from scratch.
Level 1	HyperStudio I (Windows)	What's all the hype? HyperStudio can be used in the classroom in a variety of ways. This class introduces how to create stacks and begin implementing the use of HyperStudio in your curriculum.
Level 2	Picture Magic (Digital Camera and Scanner)	Learn how simple it is to transpose photographs into your computer using a digital camera. Ideas for integrating the use of a digital camera and scanner into your curriculum will be presented. Learn to enjoy using the computer to create meaningful projects by inserting photographs into programs such as PowerPoint.
Level 2	Photo Shop	Participants will learn to use Photo Shop to enhance digital images.
Level 3	Advanced Presentations	Teachers will use presentations for collaborative learning. Technology based tools will be used for sharing, discovering, and producing student projects.

School Vision Course Offerings for Elementary Teachers (iMac Bundles)

Classes	Description
Making Technology Work for You	Prerequisite: basic word processing skills. Use technology for routine tasks such as record keeping, gradebook, parent communications, and developing instructional materials.
Productivity Tools for Instruction	Prerequisite: word processing, draw, and spreadsheet skills. Use basic productivity tools to develop activities, such as timelines, Venn diagrams, charts and graphs, and slide shows.
Implementing Productivity Tools for Instruction	An extension of Productivity Tools for Instruction, this course describes ways to maximize technology throughout the curriculum. Participants develop lesson plans, design innovative student projects, and examine classroom management techniques.
Troubleshooting Essentials	Learn to troubleshoot your Macintosh.
Advanced Troubleshooting and Maintenance	Prerequisite: Troubleshooting Essentials course content. Use utilities, such as Norton Utilities, TechTool, FileBuddy and DiskCopy.
Using Digital Cameras, Video Cameras, and Scanners	Use peripherals with a Macintosh computer to enhance multimedia presentations. Create and capture images and import them into presentations.
Integrating Reading & Technology	Use technology to support literacy development.
Math Activities with Technology	Use technology in the math classroom to develop math games and sponge activities.
Multimedia for Instruction	Prerequisite: basic word processing skills. Learn to develop innovative student projects with multimedia.
HyperStudio I	Build stacks, using tools, buttons, transitions, graphic objects and movies, and recording sounds.
Writing Lessons to Include Technology (K-2)	Develop student-centered units to incorporate varied technology tools and resources.

APPENDIX E

OKTECHMASTERS TRAINING CURRICULUM

Course Objectives

The primary objective of OKTechMasters' Lead Technology Teacher training is to prepare a core group of teachers with the skills, competencies and materials to use a variety of instructional technologies to improve instruction and learning in the classroom.

Your training is comprised of a full and rigorous curriculum that spans 4 days during which you will work with a variety of educational technologies. Through training you will become comfortable, capable and confident in using new skills in the technology environment, and be prepared to serve as a local information source to your colleagues.

Specific Course Objectives (also known as "The Level 2 Competencies")

Specifically, by the end of these four days, you will be able to:

1. Develop techniques for integrating technology and Internet usage into existing curriculum
2. Develop an interactive web page for instructional purposes for students to access on their own time and location, and also for administrative or management functions
3. Convert learning modules to multimedia format which may be used in classroom presentations, Internet, and other distance education media
4. Adapt content from existing courses to design an effective instructional format for distance delivery
5. Integrate multimedia and visual tools into curriculum delivery, including video, presentation graphics, and the Internet
6. Teach search skills and evaluation of on-line material to identify information for use in the classroom
7. Provide hands-on training in the effective use of technology being deployed in OneNet and other IETV interactive video classrooms, including an overview of distance learning and design, planning, and management of distance learning courses
8. Develop a basic understanding of the distance education environment, specifically OneNet and other IETV classroom environments, and its capabilities and limitations
9. Use multiple delivery strategies effectively
10. Provide experiences that emphasize collaboration among peers, teams, or cadres
11. Produce multimedia components for integration into instruction
12. Promote learning processes that engage learners in the use of technology

OKTechMasters

Lead Technology Teacher Training

Agenda

Day 1	
7:30 - 8:00 a.m.	Check-in
8:00 - 9:00 a.m.	Opening Session
	Welcome
	Introductions
	Course overview
	Goals and objectives
	Assignments
9:00 - 9:15 a.m.	Break
9:15 - 10:15 a.m.	Introduction to Distance Learning
	Terms and definitions
	Understanding the IETV Environment
	Roles of a Facilitator
	Teletechniques
10:15 - 10:30 a.m.	Break
10:30 - 10:45 a.m.	Get Acquainted
10:45 a.m. - noon	Try it Out
	Introduction to the instructor's console
	Hands-on scripted video exercise
noon - 1:00 p.m.	Lunch on your own
1:00 - 2:30 p.m.	Using Technology in Your Classroom
	Suggested models for technology classroom presentations
	Re-purposing existing curriculum units for use in the technology-rich classroom
	Mad Libs
2:30 - 2:45 p.m.	Break
2:45 - 3:15 p.m.	Creating Great Graphics
	Basic guidelines for visuals and graphics
3:15 - 5:00 p.m.	Web Page Design
	Using FrontPage 98
	Time to create your own class web site
5:00 - 6:00 p.m.	Dinner on your own
6:00 - 8:00 p.m.	Open Lab Time

Day 4	
8:00 - 8:30 a.m.	Review of Day 3
8:30 a.m. - noon	Presentations
noon - 1:00 p.m.	Lunch on your own
1:00 - 4:30 p.m.	Presentations
4:30 - 5:00 p.m.	Wrap up and Evaluation

APPENDIX F

STATE TELEMENTOR TRAINING

OKLAHOMA STATE TELEMENTORS

Telementors are required to attend a 5-day summer institute and 6 classes throughout the academic year where they will be given instruction in the classroom use of the Internet as a teaching tool, the use of e-mail, desktop video conferencing, Internet relay chat, the creation of web pages, web resourcing and validation, producing Internet lesson plans and projects, and more. These well-trained teachers will conduct schoolwide and districtwide in-service training sessions, participate in monthly group teleconferences, serve as a resource to other members of the group and other educators in the state, submit web instructional "products", and help conduct next year's summer institute which begins the training of the next group of telementors.

To participate in the program, the telementor's school district is given Title III funds to purchase a state-of-the-art computer, flatbed scanner, color printer, desktop video conferencing camera, software, and an Internet connection to the telementor's classroom. Title III funds are also provided to cover the expenses of the telementor's training incurred by the district. The connectivity requirement limits program participation to teachers in schools with building Internet connection.

APPENDIX G

INSTITUTIONAL REVIEW BOARD APPROVAL FORM

Oklahoma State University
Institutional Review Board

Protocol Expires: 5/10/02

Date: Friday, May 11, 2001 IRB Application No ED01121

Proposal Title: PROFESSIONAL DEVELOPMENT ACTIVITIES AS PREDICTORS OF EFFECTIVE INTEGRATION OF TECHNOLOGY BY ELEMENTARY PUBLIC SCHOOL TEACHERS

Principal Investigator(s):

Linda J. Parsons
400 Woodbury Circle
Edmond, OK 73034

Bruce Petty
261 Willard
Stillwater, OK 74078

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Dear PI :

Your IRB application referenced above has been approved for one calendar year. Please make note of the expiration date indicated above. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved projects are subject to monitoring by the IRB. If you have questions about the IRB procedures or need any assistance from the Board, please contact Sharon Bacher, the Executive Secretary to the IRB, in 203 Whitehurst (phone: 405-744-5700, sbacher@okstate.edu).

Sincerely,

Carol Olson

Carol Olson, Chair
Institutional Review Board

VITA

LINDA JORDAN PARSONS

Candidate for the Degree of

Doctor of Education

Thesis: PROFESSIONAL DEVELOPMENT ACTIVITIES AS PREDICTORS OF EFFECTIVE TECHNOLOGY USAGE BY ELEMENTARY PUBLIC SCHOOL TEACHERS

Major Field: Curriculum and Instruction

Biographical:

Education: Graduated from Coronado High School, Lubbock, Texas in May 1967; received Bachelor of Business degree in General Business from Texas Tech University, Lubbock, Texas in 1971; received Master of Education from the University of Central Oklahoma, Edmond, Oklahoma in 1992. Completed the requirements for the Doctor of Education degree in Curriculum and Instruction at Oklahoma State University, Stillwater, Oklahoma in May, 2002.

Experience: Self employed and small business owner; employed as a secondary business education teacher; a middle school teacher; a middle school Library Media Specialist; a District Technology Coordinator; a District Educational Services Coordinator; and a District Technology Integration Specialist. Professional Memberships: Phi Kappa Phi, Oklahoma State University; Oklahoma Technology Association; American Library Association; Oklahoma School Library Media Specialists; Association American School Library.