

CURRENT AND FUTURE TRENDS IN COMPUTER USE IN
ELEMENTARY SCHOOL SETTINGS

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The study examined current and future trends in computer use in elementary school settings. A survey instrument was developed and validated for distribution to a random sample of 200 technology coordinators in the public school districts in the state of Texas from whom 95 responses were received. The survey instrument was used to obtain information about five areas of computer use in elementary schools. These areas are: physical configurations, instructional uses, implementation issues, training and staff development, and Internet use. The study found that all public school districts that participated in the study have acquired computer hardware in their elementary schools. In addition, some other advanced computer technology components are starting to be found in elementary schools, such as teacher workstations, CD-ROM, interactive video, computer multimedia, LCD panels, and laser printers.

Respondents reported that elementary school teachers in their districts have incorporated computers into their classrooms as an instructional tool and many changes have occurred in teachers' teaching styles due to computers. However, there are some problems that hinder the effective use of computers. The major problem is lack of training. A high percentage of respondents, 81.3%, indicated that the majority of their elementary school teachers had completed less than 30 hours of technology related professional development. Another problem was lack of funding which prevents most school districts from acquiring computer hardware and software.

Currently, elementary schools in 87% of districts that participated in the study are connected to the Internet and the plan is that by the year 2001 all elementary schools will be connected.

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CHAPTER I

INTRODUCTION

There may be no other topic in education today that gets the attention of so many educators as computer technology. Since the early 1980s, a huge investment has been made in purchasing hardware and software for public schools. In its recent report to the President on the use of technology to strengthen K-12 Education in the United States, the President's Committee of Advisors on Science and Technology (PCAST) (1997) reported that "public elementary and secondary schools in the United States spent somewhere between \$3.5 and \$4 billion on computing and networking hardware, wiring and infrastructural enhancements, software and information resources, systems support, and technology-related professional development during the 1995-96 school year."

For the year 2000, the presidential commitment in the United States is to connect every classroom to the information superhighway. This goal can be accomplished by providing access to modern computers for all teachers and students, and by providing good software and high quality training programs for teachers (Becker & Ravitz, 1997). Some of the new federal legislation such as the Goals 2000: Educate America Act that was passed by the U.S. Senate and signed by the President, are considered major initiatives to integrate technology into the content standards and plans of the American schools (Barron & Orwig, 1997). Today, as The Northwest Regional Laboratories for Research and Development reported, educational technology is considered one of the top issues in school planning (Roberts, 1996). The U.S department of education now has an

office of educational technology that is engaged in national planning strategies for integrating technology into American public schools (Johnson, 1997).

In the early 1980s, Johnson predicted three phases of educational computing: “familiarization, acquisition, and integration.” The educational computing movement started out as an effort to simply familiarize educators with the potential of the microcomputer as an educational tool. The acquisition phase, as Johnson predicted, was the movement of acquiring the necessary hardware and software to do the job of turning the computer into an educational tool that could fulfill the promises made by educational computing pioneers. The integration phase pertained to the challenge of demonstrating very specifically how the computer and related technology can be used in everyday teaching and learning situations inside ordinary classrooms (Johnson, 1997). While phases one and two (familiarization and acquisition) are not totally complete, some significant steps have been made, and we appear to be moving at an incredible pace toward the integration phase. This movement came as a result of a strong belief that has emerged from the findings of some educational research. These findings state that computers will not be an effective tool in educational settings unless they are integrated into everyday classroom practice and into the subject matter curricula (Hadly & Sheingold, 1993).

Currently, integration of technology is considered one of the top priorities in most of the districts and the states. Each school district in the state of Texas has a technology coordinator and each school has a technology facilitator. The main duty of these

personnel is to provide assistance and support to teachers in integrating computers into their classrooms.

Available data on computers usage in American schools has shown a tremendous increase. From 1983 to 1992, the number of computers in schools increased 600 percent (Lockard, Abrams, & Many, 1997) and the average number of students per computer nationwide fell from 125 in 1983 to 9 in 1997 (QED, 1997). The increase in the number of computers being used in schools is concurrent with the increase in the number of teachers using computers with young children.

Over the past five years, the technological components of computers and software have advanced considerably.

Computer-based tools, resources, and facilities are now present that were rarely found as recently as 1992: modestly-priced high-speed personal computers; local-area-network for storing and distributing software and student work; CD-ROMs and Internet's World Wide Web for giving students easy and rapid access to voluminous multimedia information; electronic mail for asynchronous written communication to anyone, anywhere, anytime; and a variety of components that together enable students to produce, demonstrate, and communicate their own understandings visually as well as verbally, to other people anywhere in the world (Becker, 1998).

The demand to incorporate computers into education has increased. Society has accepted computers as an essential tool that could enable education to move full force toward meeting the high educational expectations of the society for the 21st century (Johnson, 1997).

Using computers well is not merely a matter of obtaining suitable hardware and software, but is also a matter of designing an environment to maximize the benefits that computers may bring to education. Like any other technological innovation, computers need to be correctly implemented and properly supported to achieve their maximum potential. In the educational realm, the success of computer education depends on how schools use computers (Jo, 1996).

The number of teachers who use computers in elementary schools has increased dramatically. Clements and Swaminathan, as cited by Haugland (1997), reported that “in the mid-eighties, 25 percent of licensed preschools had computers, today almost every preschool has a computer”. The present study sought to determine how these computers are being used in elementary schools

Statement of the Problem

The problem of this study was to examine current and future trends in computer/technology use in elementary school settings.

Purposes of the Study

The purposes of this study were:

- 1- To describe current physical configurations of computer usage in elementary classrooms.
- 2- To describe current instructional uses of computers/ technology in elementary schools.

- 3- To examine implementation issues of computers/technology use in elementary schools.
- 4- To describe the use of the Internet in the elementary schools.
- 5- To examine the training and professional development procedures that are used to prepare teachers to use computer/technology in the elementary classrooms.
- 6- To examine the future trends of using computer/technology in elementary schools.

Research Questions

After a review of the literature and experts' opinions, this study attempted to answer the following major questions: -

- 1- What are the current physical configurations of computers in elementary schools?
- 2- What are the current instructional uses of computer/technology in elementary schools?
- 3- What are the issues related to computer/ technology use in elementary schools?
- 4- What kinds of training and staff development activities are provided to teachers to use computer/technology in their classrooms?
- 5- How and to what extent is the Internet being utilized in the elementary schools?

- 6- What are the future trends of using computer technology in elementary schools?

Summary of the methods and the procedures

A survey instrument was developed and distributed to a random sample 200 of technology coordinators. Those technology coordinators represented public school districts of different sizes in the state of Texas. A total of 95 responses were received representing a rate of 47.5%. All data gathered through the survey were recorded and reported in the form of frequencies, percentages, means, and amounts.

Importance of the Study

This study is important because it provides a description of the ways computers are used in school settings in one of the most developed countries in the world, the United States. Therefore, other countries that have not started using computers in their schools can look at the way computers are used in the American schools as a model that can be followed.

CHAPTER II

LITERATURE REVIEW

Since computers were introduced into education in the early eighties, different kinds of research have been conducted to provide evidence regarding the efficacy and the cost effectiveness of computers. This research has focused on different issues that are associated with using computers in schools.

In this chapter, a review of relevant literature is provided as a theoretical framework for the current research. This review addresses four major concerns with the use of computers in elementary schools. These concerns are: the computer availability in elementary schools, instructional use of computers, training and professional development for teacher to use computers, and Internet use in schools.

Computer Availability

Over the past two decades research has focused on the development of computer hardware and software, and the rate and the number at which schools acquired computers. The majority of this research is out of date today; however, it can provide some valuable clues to educational computing trends from the early eighties to the present times.

Henry Becker is one of the pioneer researchers who has conducted large scale descriptive studies in computer use in school settings. His research from the early 1980s until now has provided useful insights into what is actually happening in schools

(Thompson, Simonson, & Hargrave, 1992). In 1983 and again in 1985, Becker conducted two surveys. Each one of the surveys involved 10,000 teachers and principals in over 2,300 elementary and secondary schools. These surveys showed the tremendous growth of the number of instructional computers in schools (Maddux, Jason, & Wills, 1997). Becker's 1985 survey revealed that the number of instructional computers in use in schools increased dramatically between 1983 and 1985. This number jumped from 250,000 to over one million. Meanwhile the percentage of elementary schools with five or more computers jumped from 7 percent to 54 percent. Approximately 500,000 teachers used computers as part of their school's instructional program with about 15 million students. He also found that the typical elementary school with computers increased its holding from two computers to six computers and by the spring of 1985, there was approximately one computer for every forty children in the schools (Becker, 1986).

The U.S. Office of Technology Assessment (OTA) produced a report in 1988, entitled Power on: New Tools for Teaching and Learning. It was intended to provide an in-depth description of the past, present, and future impact of technology in education. This report showed a dramatic growth of the number of computers in schools. Between 1981 and 1987 the percentage of American schools with one or more computers intended for instruction grew from about 18 percent to 95 percent. (OTA, 1988).

Providing schools with the most advanced hardware and software continues during the nineties. Personal computers have become widely available in schools. During the 1991-1992 school year, more than 2.5 million instructional computers were

used in schools (Kinnamon, 1992). The national ratio of students to computers has dropped significantly from 125 students per computer in 1983-84 to 9 students per computer in 1997 (Quality of Education Data, 1997). In addition, some schools have acquired more advanced computer technology. Hadley and Sheingold (1993) reported that 65 percent of schools have hard disk drives, 37 percent have laser printers, 23 percent have optical scanners, 30 percent have voice synthesizers, and 33 percent have videodisk players.

As the number of computers in schools grows more and more rapidly, the total amount of computer usage has increased sharply. Becker (1986) found that the typical school computer was used for about twenty hours per week. This was 50 percent more than what he found two years earlier in a previous survey. He also found that during any given week, a typical student using a school computer logged on for about fifty minutes. The time per student user varied considerably from school to school, but the average time increased significantly in two years. The typical student in a K-6 school who used computers during a five-day period spent thirty-five minutes on them. A high school computer user typically spent one and three-quarters hours a week (Becker, 1987).

In the nineties, after providing schools with even more computers, the amount of time a student uses a computer has continued to increase. In 1995, Becker used data provided by technology coordinators to estimate student computer use in schools. He found that student computer use in elementary schools was about 1.7 hours per week for each student, and 3.0 per week hours at high schools (Glennen & Melmed, 1998). This

demonstrates that amount of time of computer usage by elementary students has increased about five times over what it was in 1987.

In spite of this high rate of growth in the number of computers and the increase of students' time using computers, many experts believe that this growth is still below an adequate level and does not meet the needs of students. Students access to computers is still limited and for a short duration. It has been recommended that the number of computers in schools be doubled to meet the sufficient level which is a ratio of four to five students per computer (QED, 1995).

Further research indicated that computers are not equally distributed among schools and their number varies by the size and the grade level of the schools. The Quality of Education Data (QED) census (1994) showed that small schools are better equipped than large schools, while secondary schools are better equipped than elementary schools. The typical elementary school has 39 computers on average, while middle school has 53 and high school 83 computers. In 62 percent of these schools, students have access to computers in both labs and classrooms, while 25 percent have computers in labs only, and 13 percent in classrooms only.

To increase students' access to computers, the federal government has made a commitment to allocate more funds for this purpose. In its recent report to the president of the United States concerning the use of technology in the schools, the President's Committee of Advisors on Science and Technology (PCAST) reported that at least five percent of all public K-12 educational spending in the United States should be allocated for technology related expenditure. This would increase the current level of spending,

about \$13 billion, by approximately 1.3 percent. Furthermore, the panel emphasized that “access to knowledge-building and communication tools based on computing and networking technologies should be made available to all of our nation’s students, regardless of socioeconomic status, race, ethnicity, gender, or geographical factors, and special attention should be given to the use of technology by students with special needs.”

This review illustrates the trend toward acquiring computer technology at a high rate in the schools. This rate of growth in the number of computers has increased dramatically in the last two decades and it is continuing to increase. All efforts now are focused on accomplishing the ultimate goal regarding computers in schools, which is to provide each elementary school student with sufficient access to computers.

Instructional Use of Computers

While the widespread availability of modern computing and networking will indeed be necessary if technology is to realize its pledge, the adaptation of curricula to make effective use of computers in classrooms is likely to be a more challenging task. Over the past two decades, a great number of school districts have reconsidered their K-12 curriculum in terms of students’ learning experience with computer (Geisert & Futrell, 1995).

After a review of research in technology integration, Ellis & Fouts (1994) found that integrating computers into traditional instruction procedures leads to higher academic achievement than does traditional instruction alone. They also found that computers help

students learn faster with greater retention and computers can be a very effective tool that helps elementary students and low achievers to gain greater learning. Not only does computer use have a positive effect in increasing the academic benefits for students, but also a positive effect in students' attitude toward learning and school.

In 1988, the Office of Technology and Assessment (OTA) conducted a report of computer use in education. The report described the current state of technology use in schools. One of the findings of the report was that “although new interactive technologies cannot alone solve the problems of American education, they have already contributed to important improvement in learning. These tools can play an even greater role in advancing the substance and process of education, both by helping children acquire basic skills and by endowing them with more sophisticated skills so they can acquire and apply knowledge over their lifetime”. The report suggested the following areas as the most promising current uses of computers in education:

- 1- Drill and practice to master basic skills.
- 2- Development of writing skills
- 3- Problem solving
- 4- Understanding abstract mathematics and science concepts
- 5- Simulation in Science, mathematics, and social studies
- 6- Manipulation of data
- 7- Acquisition of computer skills for general purposes, and for business and vocational training
- 8- Access and communication for traditionally unserved populations of students
- 9- Access and communication for teachers and students in remote locations
- 10- Individualized learning
- 11- Cooperative learning

12- Management classroom activities (p.13)

Research on instructional uses of computers has shown that these uses have changed significantly at various times from the early eighties until now. These changes have been roughly from computer programming, to mastery of basic skills in drill and practice, to computer "tool" applications of different types (Becker, 1993). Through a nationwide survey of teachers experienced at integrating computers into their teaching, Hadley and Sheingold (1993) indicated that some teachers have tried applications in the past that they are no longer using. The result of the survey showed that at least 30 percent of teachers in the sample indicated they no longer use Logo programs. Other teachers, about 15 percent, indicated that they no longer use keyboarding, drill and practice, programming, tutorial programs, the calculator (as part of the computer), computer authoring, and recreational programs and games.

In the early years when schools had only a few computers for the entire student population, the plan was to put those computers in a lab and schedule a time for each class to use them. As a result, only about one eighth of the students in elementary schools that owned microcomputers had an opportunity to use one. This affected the quality of the instructional process of using computers and made teachers' plans to use them very limited (PCAST, 1997). The results of Becker's survey in 1985 showed that students who did use computers spent on the average only 20 minutes at the computer during the week, and some of this time was in a paired or group situation. Only one out of 50 elementary school students who used a microcomputer for practicing math or

language skills during the week spent more than one hour at the task meaning only 12 minutes each day (Mehlinger, 1996).

The 1983 “School Uses of Microcomputers” survey showed that a few schools that provided a computer experience to their students could do so only by limiting the number of students who got any opportunity to use them. Most schools did not have enough computers to serve the large number of students (Becker, 1983). However, in most cases the equity principle prevailed, and schools spread computer time among as many students as possible, giving most children just a little experience of using computers. In spite of the fact that students experienced computers through drills and playing games in math computation and language arts or by writing very simple programs in the computer language BASIC, they were not given a sufficient time to master curriculum content skills. They were learning more about the nature of primitive computer equipment and software (Becker, 1991).

In 1985, the second National Survey of instructional Uses of School Computers reported that teachers rarely used computers as a regular means of providing students with instruction or practice in traditional school subjects. Instead, computers were used as sources of enrichment and provided variety to the classroom routine. In secondary schools, computers were used for teaching students about the computers themselves. This use was primarily in general-purpose “computer literacy” classes and in more narrowly defined computer programming classes. The major curriculum was teaching the syntax of the BASIC programming language, rather than larger principles of programming and problem solving (Becker, 1991).

The high growth in the number of computers allows teachers to extend their integration of computers into their classrooms. The computer has become an essential tool to provide a variety of activities and teachers have started building their curriculum goals based on different computer applications. The 1992 International Educational Association's (IEA) survey of school computer coordinators found that about 41 percent of the use of computers by American K-12 students involved the acquisition of keyboarding skills. It also involved instruction in the use of word processing, database management, spreadsheet, and other software tools; and the study of computer programming. Academic subjects accounted for 54 percent of all usage at the elementary school level, but only 31 percent within the nation's high schools.

At the elementary school level, computers were often employed for teaching isolated basic skills and for playing educational games. Word processing was used to a significant extent at all levels. However, in most cases word processing was a part of an effort to teach computer skills, and not as a tool for writing in connection with English, social studies, or other academic classes. The situation would appear to be similar in the case of spreadsheet use, which is generally treated as an aspect of computer literacy, and is less commonly integrated into, for example, the math or science curriculum (IEA, 1992).

In a nationwide survey of teachers experienced at integrating computers into their teaching, Hadley and Sheingold (1993) found that exemplary practitioners directly addressed curricular goals by having students use a wide variety of computer software. This software included simulation, programming languages, spreadsheets, database

programs, graphing programs, logic and problem-solving programs, writing tools, and electronic bulletin-board communications software. Word processors and other text processing tools seemed to have a major role in the classroom. They seemed to have the broadest use across the curriculum. Sixty percent of the teachers in the sample of this study indicated that they used word processors in their classrooms. Instructional software ran a close second to word processing in teachers use. This instructional software included problem-solving programs, tutorial programs, and drill and practice. These more structured programs were used to some extent in all curricular areas except art. They were used heavily in mathematics, where 67 percent of those who taught mathematics used drill and practice, in foreign language (62 percent), and in remedial work (77 percent). Databases were used most by social teachers (52 percent). Other analytic tools (e.g. spreadsheet, chart/graphing programs, and lab interface) were used in science, mathematics, and to some extent computer literacy classes.

Further findings by Hadley and Sheingold (1993) in the previous study revealed that the three most frequent used applications or types of software in schools were word processors ranked first by 75 percent of the respondents. Drill and practice programs ranked second by 37 percent, and tutorial programs ranked third by 24 percent. Overall, word processors are used much more frequently in these classrooms than the drill and practice and other types of programs. The most frequent use is students' creating their own products. More than sixty percent of teachers in the sample indicated that they do this most weeks or every week, and less than 10 percent reported not doing it at all. About 40 percent reported that they use computers for each of the following: enrichment,

remediation, and the teacher's explanation or demonstration of ideas or skills.

Approximately 30 percent of teachers directed students to use computers for exploring instructional programs on their own during class time and for receiving direct instruction by computer.

The PCAST (1997) reported that some of the American schools have integrated computers extensively within many aspects of the learning process, in many cases relying on information technology as an essential element of educational reform. Such schools, however, would thus far appear to represent a very small fraction of K-12 institutions.

This historical review indicates that instructional use of computers has taken two different approaches. One approach has been teaching about computers and the other is teaching with computers. In PCAST's recent Report to the President on the Use of Technology in the United States (1997), the Panel on Educational Technology emphasized the instructional approach of using computer technology. They recommended that learning should be with technology not about it. "Although both are worthy of attention, it is important to distinguish between technology as a subject and the use of technology to facilitate learning about any subject area." Another recommendation is that the emphasis should be on content and pedagogy, and not just hardware.

Training and Professional development

The massive investment in computer hardware and software will be essentially worthless if teachers are not provided with the preparation and the support they need to effectively integrate computer technologies into their teaching (Glennan & Melmed,

1998). Acquiring more computers in schools does not mean that teachers are necessarily going to use them. Research cited by Picciano (1994) found that there was no correlation between having computers in schools and their use for instructional purposes by teachers. Using computers in the classroom requires a high degree of knowledge and expertise; therefore, an optimal use of computers in schools will not occur unless teachers become proficient computer users on a personal level and have skills and abilities to utilize these computers. This has required schools to provide teachers with role models, encouragement, ongoing training, time to explore the capabilities of computer technology, and a supportive environment. In general, to ensure an effective implementation of any educational innovation, we should gain teachers' interests in the permutation (Caldwell, 1989). They must gain a clear vision concerning the purposes and the educational outcomes that guide the uses of computers in classrooms. Teachers should be involved in decision making as to how the computers are going to be implemented and then should be given control over the resource allocations and curriculum materials that directly affect their utilization of computers (Siegal, 1995). They should see the computer as a tool that will make their work easier, not a challenge to their professional roles (Hope, 1997).

Ross (1991) found that one of the main reasons that teachers reported they do not use computers in their instruction is due to a lack of training and experience. Glennan and Melmed (1996) reported that currently the majority of teachers have had little formal training in using computers in a learning environment. Colleges do not provide future teachers with sufficient capabilities to integrate computers into their teaching practices.

Some authors have noted reluctance among teachers toward computer integration (Vermette, Orr, & Hall, 1986). This resistance was the result of lack of familiarity, preparation, and time (Medsen & Sebastian, 1987). Many teachers indicated that the computer has increased their workload. They have struggled to justify the computer existence in their classrooms.

Peck (1994) stated that teachers will integrate computers into their classrooms only if a paradigm shift occurs. When teachers start justifying the existence of computer in their classrooms and start asking “How can these new tools contribute to more powerful educational experience?” Research cited by Anglin (1995) indicated that teachers currently receive little preparation for the use of computers and few colleges of education adequately prepare their graduates to use information technologies in their teaching. The office of Technology Assessment (OTA) (1995), reported that new teachers in the United States graduate with no experience in using computer to teach, and little knowledge of available software and content. Lack of time also has been noticed as a problem that teachers have struggled with. In a study conducted by Hadley and Sheingold (1993), teachers indicated that one of the major barriers of computer use in schools is the lack of time devoted to teachers to prepare computer based lessons and time in the schools schedule for computer based instruction.

The consequence of lack of training and preparation is that most teachers have experienced a struggle to integrate technology into their classrooms. This struggle is due to lack of knowledge and interest in using computers (Hadley & Sheingold, 1993). The office of Technology Assessment (OTA) (1995), reported that teachers commonly

indicated that they have not received adequate preparation in the effective use of computers within the classroom. The problem is that school districts frequently purchase hardware and software without allocating sufficient funds to help teachers learn to use the new equipment within an educational context. Becker (1993) urges that 30 percent of a district's technology budget should be spent on hardware and software. The remaining 70 percent devoted to staff development and other forms of personnel support including technology coordinators, time reserved for teachers to redesign their lesson plans, and a reduction in class size. Becker's suggestion is still far away from the actual proportion of the budget that has been devoted to staff development. The 1993 survey by Market Data Retrieval found that only 15 percent of the typical computer systems budget is earmarked for staff development.

A nationwide survey of 608 teachers involved in integrating computers into their teaching, Hadley and Sheingold (1993) found that the majority of elementary teachers could be categorized as "Enthusiastic Beginners." Although they do not have as great a sophisticated knowledge of technology as their secondary-level peers, this group of teachers indicated that they are more likely to believe that computers are the future for improving the quality of education. They were also more likely to feel that their own teaching has been affected by their use of computers.

In a study that underscores the need for excellent faculty preservice and in service at all levels, the Office of Technology Assessment (OTA) (1995) found that practicing teachers do not have the expertise to use educational technology wisely. In addition, the school districts are not increasing spending for in-service training to keep up with

spending for new hardware and software. Teachers in training see very little technology used in their education courses or in their student-teaching placements.

In a survey about “ The State of Teacher Training”, Siegal (1995) found that 46 percent of all educational technology courses are given as half-day workshops, and 79 percent of these courses focus on hardware, Internet usage, or a specific piece of software. This kind of training, as the President’s committee of Advisors on Science and Technology (1997) indicated, “ leave much to be desired.” “ Teachers often have a negative reaction to the narrowly technical orientation of most technology-related courses, which show them how to operate a computer, but not how to use computers to enhance their teaching.”

Research has indicated that the kinds and the forms of training that teachers get vary. Self-taught is the most common way among teachers to acquire knowledge about computers. Ross (1991) found that 25 percent of the teachers who participated in his study gained knowledge of using computers on their own. Hadley and Sheingold (1993) found that around 90 percent of the teachers in their sample indicated that they were to some degree self-taught. They also found that approximately 80 percent have attended conferences and workshops on their own time. About sixty percent have taken in-service courses offered by the school and the district.

Lack of training is a major barrier for an effective utilization of computers in schools. It hinders the accomplishment of the main goals for having computers in schools. The literature suggests that any plan for adding more computer software and hardware in

schools should be accompanied a plan to prepare teachers to utilize this equipment within the curriculum.

Internet Connection and Use

Since 1992, Internet connections in schools have been proliferating at a rapid pace. As a result, The Internet in schools and its application in educational settings have become the major focus of recent research. Research has indicated the availability of Internet connection in schools, the educational gains that each party of the educational process is going to get, and the barriers to the successful use of the Internet.

Through the Internet, schools have become part of the worldwide network which enables schools to receive up to date information from communities all over the globe. This information comes in different formats: text, graphics, and video (Jones et al, 1998). Wide Area Networks (WAN) can provide teachers and students with access to data and other resources greater than what would typically be available locally. It provides the opportunity for students and teachers to collaborate widely with students and teachers at other schools, and to interrogate experts and access remote databases. The (WAN) also allows students to participate in scientific activities as they elaborate. This makes the learning experience more resplendent and relevant (Glennan & Melmed, 1998).

Harris (1994) divided educational telecommuting activities into three general categories: Interpersonal exchanges, information gathering, and problem-solving projects. Interpersonal Exchange involves talking to others via telecommunication. The talk may be from one person to one other person using standard e-mail or one to many

communications such as participation in one of the thousands of special newsgroups, forums, or lists available today. Six different types of interpersonal exchanges are popular today: special interest groups such as lists and newsgroups, keypals; global classrooms; electronic appearances; electronic mentoring; and impersonations.

Information gathering is another activity that can be used by students and teachers. There are several methods of information gathering through the Internet. Students can access the libraries and data archives of many universities, as well as many real-time information services such as weather data NASA video broadcast and news on current events. Furthermore, Students can randomly brows the internet for information, use search engines and keywords to look for related information, and use specific sites that teachers select for research (Oliver, 1997). The search engines enable students and teachers to find information easily and quickly about any educational topic. The Internet also can be a very effective tool to conduct Problem-Solving activities. Harris (1994) describes several types of problem-solving projects that can be done using telecommunication activities. Electronic process writing involves students publishing their work on the Internet and receiving feedback from others. In addition, students in several classrooms can work collaboratively to produce papers, poems, and reports. Students also can work with students in several schools in simulation activities and social action projects that involve them in “collaborative, meaningful social action.”

Woodruff, Brett, & Chakravorty (1998) conducted a study during a two-year pilot teacher education program that ran from 1995-1997 at Ontario Institute for studies in Education/University of Toronto. The data from the preservice teachers attested to a rich,

varied personal use of technology in order to support their teaching. When given access, the preservice teachers were quick to make personal use of the Internet for preparing their lessons. The Internet provided them with a wide range of background information for their lessons, as well as providing the actual lessons themselves. The Internet is also used to collect lesson plans, clip art, and short stories.

In spite of all the benefits that Internet use can provide students as part of the instructional process, it is still not been used advantageously (Maddux, 1998). There are many barriers that hinder this use. Although a considerable number of schools with Internet connection reported that their teachers had access to the Internet; the quality of using the Internet by teachers is still below the level that it is intended to be. A survey commissioned by the National Education Association (1996) and other education groups found that only 16 percent of all teachers actually make use of the Internet or online services. Even among schools having access to the Internet, 72 percent of teachers in these schools reported that they either never used the Internet or they used it only to a limited extent. In cases where the Internet is made available for student use, access is often provided only within a centralized library, media center, or computer lab rather than within individual classrooms, where it might be more extensively utilized as part of the process of day-to-day learning (PCAST, 1997).

The 1995 NCES survey provides some interesting indications about the precise ways in which wide area networks are currently being used within ordinary American schools. Among schools with access to the Internet (about half of all public schools as of fall 1995), electronic mail was the most popular Internet application. It was available in

93 percent of all such schools. However, the majority of schools with Internet e-mail capabilities did not make this facility available to students. In general, e-mail in these schools was available only to administrators and teachers. A majority of such schools also had access to Internet news groups, resource location applications (such as Gopher, Archie, and Veronica). Once again, such applications are more commonly accessible to teachers and administrators than to students.

Lack of training has impeded the effective utilization of the Internet in classrooms. Some schools still do not require teachers to acquire any training in the use of the Internet. Only 13 percent of public school teachers required schools teachers to have a mandatory training in the use of the Internet. Around 31 percent of schools have provided incentives to attend training sessions and about 51 percent of schools left it up to the teachers. They can to choose whether to obtain training or not (National Center for Education Statistic, 1997).

Other barriers that are reported with the use of the Internet are the lack of high quality web sites and the fear of pornography. Most of the web sites are not well designed. Some web sites have links that do not function, lack of basic principles of web design, and unfinished pages (Maddux, 1998).

Pornography seems to be the major reason that makes schools reluctant and less enthusiastic to use the Internet in classrooms or limit students access. Educators still strive to find a way to ensure that students will use the Internet in an appropriate manner. Some schools have tried to impose some kinds of censorship, but these attempts do not seem to succeed. Since the Internet can be reached in an infinite variety of ways,

ensorship seems less feasible. Some schools have adopted another method to control the use of the Internet. They use a "written fair-use" document that is signed by students and parents. This document stipulates acceptable and unacceptable uses and the severe consequences for students' future access to the Internet in schools if they engage in unacceptable uses (Maddux, 1998).

Summary

This chapter summarized the research in the major concerns related to computer use in educational settings. These concerns are computer availability in elementary schools, the instructional uses of computers, implementation issues, and professional development. This review addresses the trend of research about these concerns from the first microcomputer era until 1999. It shows the trend of computer use over the past two decades, the efficacy and the effectiveness of this use, the sufficiency of computers, how computers are used and not used, the opinions of educational experts about the methods of computer integration into the curriculum, and the conditions for successful integration. It also emphasizes the importance of staff development and describes the current status of staff development.

While this review of related research provides an in-depth understanding of computer use in schools, it also indicates that there is still a need for further research to be done. Most of this research focused on the present, not future. Computer utilization in schools is an ongoing process. The need for an updated research is very crucial and the future seems to arrive quicker than expected.

CHAPTER III

METHODS AND PROCEDURES FOR THE STUDY

The purposes of this study were to examine the current and future trend of computer use in elementary school settings. It sought to answer the following questions:

- 1- What are the current physical configurations of computers in elementary schools?
- 2- What are the current instructional uses of computer/technology in elementary schools?
- 3- What are the issues related to computer/ technology use in elementary schools?
- 4- How and to what extent is the Internet being utilized in the elementary schools?
- 5- What kinds of training and staff development activities are provided to teachers to use computer/technology in their classrooms?
- 6- What are the future trends of using computer technology in elementary schools?

Sample

The sample of this study was drawn from the population of the technology coordinators in the (1061) public school districts in the State of Texas. Because school

districts vary in size, a stratified sampling technique was used. The school districts were stratified by size as the Texas Education Agency (TEA) classified them, (Over 50,000; 25,000-49,999; 10,000- 24,999; 5,000-9,999; 3,000-4,999; 1,600-2,999, 1,000-1,599; 500-999; under 500). To ensure an adequate representation of each subgroup, a random proportional stratified sample was drawn from each stratum. The proportion of each subgroup in the sample was the same as its proportion in the population. Table 1 displays a breakdown of the sample size.

Table 1

A breakdown of the sample

Number of Students	Number of districts	Percent	Size of the Sample
Over than 50,000	9	1%	2
25,000- 49,999	24	2%	4
10,000 – 24,999	48	5%	10
5,000 –9,999	69	7%	14
3,000 – 4,999	86	8%	16
1,600 – 2,999	135	13%	26
1,000 – 1,599	118	11%	22
500 – 999	211	20%	39
Under 500	361	34%	67
Total	1061	100%	200

Data gathering Instrument

In order to conduct this study, the researcher constructed and validated a survey instrument which was designed to collect the desired data. Instruments used for studies similar in some respects to this study served as a basis for design of the survey. The areas that were covered in this survey were based on what educational technology experts think was important to be covered as well as what related literature has recommended to be studied. The survey covered five major areas of computer use in schools: physical configurations of computers, instructional uses of computers, implementation issues, training and professional development, and Internet use. The questions on the survey address the research questions to be answered. A panel consisting of three experts in the field of computer education at the University of North Texas was to determine the validity of the survey instrument. The survey was revised according to the suggestions and the comments made by the panel. After revision and completion, the survey was mailed to a randomly selected sample of the technology coordinators in the public school districts in the state of Texas. A copy of the survey is provided in Appendix B.

Data Collection

The following procedures were used for the collection of data. A database of all the technology coordinators in all the public school districts in the state of Texas was obtained from the Texas Education Agency. The list of the school districts was divided into nine subgroups based on size. As shown in Table 1, a sample then was selected from

all the subgroups. The proportion of each subgroup in the sample was the same as its proportion in the population. For example, there were nine school districts that had over 50,000 students, which equals one percent of the total populations of 1,061 school districts. Therefore, a sub-sample of two school districts was randomly selected from this subgroup to participate in the study. This sub-sample equals one percent of the total sample size of 200 school districts. In addition, there were 361 school districts that had less than 500 students, which equals 34% of the population. Therefore, a sub-sample of 67 school districts was randomly selected from this subgroup to participate in the study. This sub-sample equals 34% of the total sample size of 200 school districts. To ensure a sufficient number of returns, a plan of different procedures was made. The cover letter explained the purpose of the study to persuade the respondents that the study was significant and that their answers were important. The cover letter also emphasized the importance of the respondents' professional affiliation and the value of information that only this affiliation can supply. All participants were offered a copy of the results. A stamped and self-addressed envelope was included with the survey so that the individuals would respond with a minimum of convenience. A copy of this letter is included in Appendix A. For those who did not respond, a letter of reminder was sent. A copy of this letter is included in Appendix C. Two weeks later, follow up e-mail messages along with copies of the questionnaire were e-mailed to them.

Districts' web sites were used to acquire more information and to confirm some responses that participants provided.

A total of 95 responses were received representing a rate of return of 47.5%. This return rate is considered a common rate in this kind of research. Kerlinger (1964) indicated that in this kind of study, 40% to 50% returns are common and researchers rarely receive higher than 50% returns.

Procedures for Data Analysis

Data gathered through the survey were analyzed through multiple strategies. These strategies included organizing, transcribing, coding, categorizing, clustering, and computer analysis of data. An appropriate statistical format were used in order to refine the data. Data was entered into two databases. The first database was used to categorize data by themes and patterns, and to develop metaphors to explain relations. The second database was created with the assistance of the (SPSS) statistical program. This database was used to run numerical calculations, frequencies, percentages, means, and amounts based on specific keywords and categories extracted from the data itself.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

This research was guided by a survey of 51 questions concerning the current and future trends of computer use in elementary school settings. The survey was sent to a random sample of technology coordinators in the public school districts in the state of Texas. This chapter provides data regarding the respondents and an overview of the responses to the survey items in a narrative and tabular form. Each table presents the data in both actual numbers and percentages for each item and for each group category when applicable.

The data presented pertain to five broad areas of computer use in elementary schools: (1) physical configuration, (2) instructional uses, (3) implementation issues, (4) training and professional development, and (5) Internet uses. These areas plus future trends provided the source of the six research questions which were:

- 1- What are the current physical configurations of computers in elementary schools?
- 2- What are the current instructional uses of computer/technology in elementary schools?
- 3- What are the issues related to computer/ technology use in elementary schools?
- 4- What kinds of training and staff development activities are provided to teachers to use computer/technology in their classrooms?

- 5- How and to what extent is the Internet being utilized in the elementary schools?
- 6- What are the future trends of using computer technology in elementary schools?

For each broad research question, there were a number of specific survey questions the answers to which are provided below.

Response to the Survey

From the initial mailing and follow up mailing of the survey to 200 technology coordinators in the public school districts in Texas, 95 technology coordinators responded to the survey consisting of a return rate of 47.5% of the sample. The school districts ranged in number of students from less than 500 to over 200,000 students. Districts were divided into size groupings to aid in determining if there were any differences among districts of different sizes. Table 2 shows the size of each group of districts, the number of surveys sent to the technology coordinators in each group of districts, number of technology coordinators who responded, and their percentage of the sample. For example, 67 copies of the survey were sent to technology coordinators in districts that had less than 500 students. Twenty-seven people returned the survey which is equal to a return rate of 40.3%.

Table 2

Size of respondents

District Size	Sent	Returned	Percentage
Less than 500	67	27	40.3%
500-999	39	18	46.2%
1,000 - 1,599	22	13	59.1%
1,600 - 2,999	26	11	42.3%
3,000 - 4,999	16	9	56.3%
5,000 - 9,999	14	6	42.9%
10,000 - 24,000	10	1	10.0%
25,000 - 49,000	4	3	75.0%
more than 50,000	2	2	100.0%
Unknown	0	5	
Total	200	95	47.5%

Research question 1: What are the current physical configurations of computers in elementary schools?

This broad research question was broken down into a set of related but more specific questions that were asked in the survey instrument.

Survey Question 1: Approximately what percent of the elementary teachers in your district have a computer on their desks devoted for teacher use?

To determine the percentage of elementary teachers who have one or more computers on their desks devoted solely for teacher use, technology coordinators were asked to mark one of five different ranges of percentages that best applies to their districts. The percentages that were given in the question were 0% -20%, 21% -40%, 41% -60%, and More than 80%. Table 3 shows that 57.9% of the technology

coordinators reported that more than 80% of the elementary school teachers in their districts had computers on their desks devoted for teacher use. However, percentages varied among districts of different sizes. Table 4 shows that 85.2% of the respondents in districts that had less than 500 students indicated that more than 80% of the elementary teachers in their districts had computers on their desks devoted for their use. The percentage of elementary teachers who had computers on their desks devoted for teacher use in larger sized districts was generally less than the percentage in smaller districts. The only respondent from districts that had from 10,000 to 24,999 students indicated that less than 20% of teachers in his districts had computers on their desks devoted for their use. One of the two technology coordinators in districts that had more the 50,000 students indicated that less than 20% of the elementary teachers in his district had computers on their desks devoted solely for teachers' use. The other technology coordinator indicated that 21%-40% of elementary teachers in his district have computers on their desks devoted for teacher use.

Table 3
Computers on Teachers desks in elementary schools

Percentage Elementary school teachers with computers on their desks	Total of Districts	Percentage of districts
0% - 20%	28	29.5%
21% - 40%	2	2.1%
41% - 60%	4	4.2%
61% - 80%	6	6.3%
More than 80%	55	57.9%
Total	94	100.0%

Table 4

Computers on teachers' desks in school districts of different sizes

Size of the districts	Percentage of Elementary school teachers with computers on their desks				
	0% - 20%	21%-40%	41%- 60%	61%-80%	More than 80%
Less than 500 (n = 27)	14.8%				85.2%
500 –999 (n = 18)	22.2%		11.1%	11.1%	55.6%
1,000 – 1,599 (n = 13)	46.2%			7.7%	46.2%
1,600 – 2,999 (n = 11)	16.7%	8.3%	8.3%	8.3%	58.3%
3,000 – 4,999 (n = 9)	50.0%		12.5%	12.5%	25.0%
5,000 – 9,999 (n = 6)	16.7%			16.7%	66.7%
10,000 – 24,999 (n = 1)	100%				
25,000 – 49,000 (n=3)	33.3%				66.7%
More than 50,000 (n = 2)	50%	50%			

Responses to this question show that the current trend in elementary schools is to provide more teachers with computers on their desks that will be devoted solely for their use.

Survey question 2: Approximately what percent of elementary teachers in your district have one or more computers in their classrooms for use by students?

Technology coordinators were asked to mark one of five different ranges of percentages that best applies to their districts. The percentages that were given in the question were: 0%-20%, 21%-40%, 41%-60%, and more than 80%. Table 5 shows that the majority of the technology coordinators, 59.1%, indicated that more than 80% of the elementary teachers had one or more computers in their classrooms for use by students. This percentage varied among districts of different sizes. Table 6 shows that only one technology coordinator from districts that had from 10,000 to 24,999 students responded

to the survey and he indicated that 21% - 40% of the elementary teachers in his district had one or more computers in their classrooms for use by students. Table 6 also shows that school districts with student populations between 1 and 999 had higher percentages of elementary teachers who had computers in their classrooms for student use than in districts with student populations between 1,000 and 24,999.

Table 5

Computers in elementary classrooms for use by students

Percentage of elementary teachers who have computers in their classrooms for students use	Total of the districts	Percentage of schools districts in the sample
0% - 20%	7	7.5%
21% - 40%	10	10.8%
41% - 60%	13	14.8%
61% - 80%	8	8.6%
More than 80%	55	59.1%
Total	93	100.0%

Table 6

Computers in elementary classrooms in districts of different sizes

Size of the districts	Percentage of Elementary school teachers with computers in their classrooms for use by students				
	0% - 20%	21%-40%	41%- 60%	61%-80%	More than 80%
Less than 500 (n = 27)	3.8%	7.7%	7.7%	3.8%	76.9%
500 –999 (n = 18)	5.0%	11.1%	11.1%	11.1%	61.1%
1,000 – 1,599 (n = 13)	7.7%	7.7%	23.1%	7.7%	53.8%
1,600 – 2,999 (n = 11)	8.3%		33.3%	8.3%	50.35
3,000 – 4,999 (n = 9)	25.0%	12.5%	12.5%	12.5%	37.5%
5,000 – 9,999 (n = 6)		33.3%		16.7%	50.0%
10,000 – 24,999 (n = 1)		100.0%			
25,000 – 49,000 (n=3)				33.3%	66.7%
More than 50,000 (n = 2)		50.0%	50.0%		

The responses to this question show that the current trend is to provide elementary teachers with more computers in their classrooms for use by students.

Survey question 3:How many computers on average do you have in each elementary classroom for student use?

Technology coordinators were asked to mark the corresponding number that represents the average number of computers in each classroom. The choices that were given were 0, 1, 2-5, 6-10, and over 10. Table 7 shows that 58.5% had 2 to 5 computers in their classrooms. The second most common configuration was one computer to a classroom. Across districts of different sizes, the average number of computers in the elementary classrooms varies from 0 to 10.

Table 7

The average number of computers in each elementary classroom

Average Number of Computers in each classroom	Total of districts	Percentage of school districts in the sample
0	3	3.2%
1	31	33.0%
2-5	55	58.5%
5-10	3	3.2%
Over 10	2	2.1%
Total	94	100.0%

Table 8

The average number of computers in elementary classrooms in districts of different sizes

Size of the districts	The average number of computers in elementary classroom				
	0	1	2-5	6-10	More than 10
Less than 500 (n = 27)	7.4% (n = 2)	18.5% (n = 5)	70.4% (n = 19)	3.7% (n = 1)	
500 – 999 (N = 18)		38.9% (n = 8)	55.6% (n = 10)		
1,000 – 1,599 (N= 13)	7.7% (n = 1)	30.8% (n = 4)	61.5% (n = 8)		
1,600 – 2,999 (N= 11)		16.7% (n = 2)	58.3% (n= 6)	16.7% (n =2)	8.3% (n = 1)
3,000 – 4,999 (N= 9)		87.5% (n = 8)	12.5% (n = 1)		
5,000 – 9,999 (N= 6)		33.3% (n = 1)	66.7% (n = 5)		
10,000 – 24,999 (N= 1)		100.0% n = 1			
25,000 – 49,000 (n=3)			100.0% (n = 3)		
More than 50,000 (n = 2)		50.0% (n =1)	50.0% (n = 1)		

Responses to this question indicate that the current trend is to provide each elementary classroom with an average number of computers from 2-5.

Survey question 4: What is your current student -to-computer ratio?

To answer this question, the technology coordinators were asked to mark the category that applies to their districts from four different categories of ratios. The categories that were given were greater than 25:1, between 25:1 and 10:1, between 9:1 and 5:1, and lower than 5:1. The vast majority of the respondents, 62.7%, indicated that the current student to computer ratio in their districts is lower than 9:1. Table 9 shows that 34.0% of the technology coordinators indicated that the current student- to – computer ratio was between 9:1 and 5:1 in most schools. Other technology coordinators, 34.0%, indicated that the current ratio of student to computer in their districts was between 25:1 and 10:1. A considerable percentage of the districts in the sample, 28.7%, had lower than a 5:1 student computer ratio. It is clear that large districts are better equipped than small districts. Table 10 shows that none of the large districts had a ratio greater than 25:1. Most of large districts had a ratio lower than 9:1.

Table 9
Ratio of students to computer in elementary schools

Current student – to – computer ratio	Total number of districts	Percentage of schools districts in the sample
Greater than 25:1	3	3.2%
Between 25:1 and 10:1	32	34.0%
Between 9:1 and 5:1	32	34.0%
Lower than 5:1	27	28.7%
Total	94	100%

Table 10

Ratio of students to computer in elementary schools in districts of different sizes

Size of the District	Current student – to – computer ratio			
	Greater than 25:1	Between 25:1 and 10:1	Between 9:1 and 5:1	Lower than 5:1
Less than 500 (n = 27)		22.2%	25.9%	51.9%
500 –999 (n = 18)	5.6%	88.9%	44.4%	11.1%
1,000 – 1,599 (n = 13)	7.7%	38.5%	23.1%	30.8%
1,600 – 2,999 (n = 11)		41.7%	50.0%	8.3%
3,000 – 4,999 (n = 9)	12.5%	50.0%	25.0%	12.5%
5,000 – 9,999 (n = 6)		33.3%	50.0%	16.7%
10,000 – 24,999 (n = 1)				100.0%
25,000 – 49,000 (n=3)		33.3%	33.3%	33.3%
More than 50,000 (n = 2)			50.0%	50.0%

Survey question 5: What is the current ratio of student – to – computers with multimedia capabilities?

Technology coordinators were given different categories of ratios which were: greater than 25:1, between 25:1 and 10:1, between 9:1 and 5:1, and lower than 5:1. Table 11 reveals that the highest percentage of school districts, 31.5%, indicated that in their districts the current ratio of student to computer with multimedia capabilities in the elementary schools was between 25:1 and 10:1. The differences in the ratio of student-to - computers with multimedia in districts of different sizes are displayed in Table 12. Large districts, in general, had a higher ratio of student to computer with multimedia than the small districts. It can be seen from this table that the school districts that did not have computers with multimedia were the small districts.

Table 11

Student to computer with multimedia

Current Ratio of student – to – computer with multimedia capabilities	Total of number of districts	Percentage of school districts in the sample
No multimedia computers	11	12.0%
Greater than 25:1	18	19.6%
Between 25:1 and 10:1	29	31.5%
Between 9:1 and 5:1	18	19.6%
Lower than 5:1	16	17.4%
Total	94	100%

Table 12

Student to computer with multimedia in districts of different sizes

Size of the District	Current Ratio of student – to – computer with multimedia capabilities				
	No Multimedia Computers	Greater than 25:1	Between 25:1 and 10:1	Between 9:1 and 5:1	Lower than 5:1
Less than 500 (n = 27)	15.4%	11.5%	15.4%	19.2%	38.5%
500 –999 (n = 18)	16.7%	33.3%	38.7%	5.6%	5.6%
1,000 – 1,599 (n = 13)	15.4%	15.4%	30.8%	23.1%	15.4%
1,600 – 2,999 (n = 11)	16.7%	8.3%	41.7%	25.0%	8.3%
3,000 – 4,999 (n = 9)		28.6%	42.9%	28.6%	
5,000 – 9,999 (n = 6)		16.7%	50.0%	33.3%	
10,000 – 24,999 (n = 1)				100.0%	
25,000 – 49,000 (n=3)		33.3%	33.3%	33.3%	
More than 50,000 (n = 2)			50.0%		50.0%

Survey question 6: What percentage, if any, of your elementary teachers have teacher workstations in their offices or workrooms?

Technology coordinators were asked to mark from five choices the one that best applies to their district. The choices that were given were: 0, 1, 2-5, 6-10, and greater than 10. Table 13 shows that 43.0% of the technology coordinators indicated that less than 25% of the elementary teachers had teacher work stations in their offices or workrooms. Moreover, 41.9% of the technology coordinators indicated that over 75% of the elementary teachers had teacher work stations in their offices or workrooms. It appears that most districts had either less than 25% or greater than 75% teachers workstations. This percentage seems to be slightly higher in districts of small sizes than in districts of large sizes. From Table 14 it can be seen that the percentage of small districts that provided their elementary teachers with workstations in their offices or workrooms was higher than the percentage of large districts. More than half of the respondents in districts that had less than 3,000 students indicated that over 75% of the elementary teachers in their districts had teacher workstations in their offices or workrooms. On the other hand, the majority of respondents in districts that had over 3,000 students indicated that less than 25% of elementary teachers in their districts had teacher workstations in their offices or workrooms.

Table 13

Teachers who have workstations in their offices or workrooms

Percentage of elementary teachers who have teacher work stations in their offices or workrooms	Total number of the districts in the sample	Percentage of school districts in the sample
0% - 25%	40	43.0%
26%-50%	6	6.5%
51%-75%	8	8.6%
75%-100%	39	41.9%
Total	93	100%

Table 14

Teachers who have workstations in their offices or workrooms in districts of different sizes

Size of the district	Percentage of elementary teachers who have teacher work stations in their offices or workrooms			
	0% - 25%	26%-50%	51%-75%	76%-100%
Less than 500 (n = 27)	40.7%	3.7%		55.6%
500 –999 (n = 18)	55.6%	5.6%	5.6%	33.3%
1,000 – 1,599 (n = 13)	25.0%		25.0%	50.0%
1,600 – 2,999 (n = 11)	41.7%			58.3%
3,000 – 4,999 (n = 9)	37.5%	12.5%	25.0%	25.0%
5,000 – 9,999 (n = 6)	33.3%	33.3%	16.7%	16.7%
10,000 – 24,999 (n = 1)	100.0%			
25,000 – 49,000 (n=3)	33.3%	33.3%		33.3%
More than 50,000 (n = 2)	50.0%		50.0%	

Survey question 7: What percentages of your workstations have a large screen display in the classrooms?

Technology coordinators were instructed to choose the percentage that best applies to their schools. The choices were: none, 1%-25%, 26%-50%, 51%-75%, 76% to 100, and not applicable. Table 15 shows that 40.4% of the respondents indicated that none of the workstations in the elementary classrooms in their districts had a large screen display. The table also shows that 38.3% of the technology coordinators indicated that between 1% and 25% of the elementary schools in their districts had a large screen display in the classrooms. Table 16 shows that small size districts are less provided with this kind of technology than large districts. In districts with student populations less than 10,000, many technology coordinators indicated that none of the elementary classrooms in their districts had workstations with a large screen display in the classrooms. The percentage of those technology coordinators in each group of districts varies from 12.5% to 59.3%.

Table 15

The workstations that have a large screen display in the classrooms

The percentage of the work stations that have a large screen display in the classrooms	Total number of districts	Percentage of schools districts in the sample
None	38	40.4%
1% to 25%	36	38.3%
26% to 50%	6	6.4%
51% to 75%	7	7.4%
76% to 100%	5	5.3%
Not Applicable	2	2.2%
Total	94	100%

Table 16

The workstations that have a large screen display in the classrooms in districts of different sizes

Size of the district	The percentage of the work stations that have a large screen display in the classrooms				
	Non	0% - 25%	26%-50%	51%-75%	76%-100%
Less than 500 (n = 27)	59.3%	14.8%	3.7%	7.4%	7.4%
500 –999 (n = 18)	38.9%	55.6%			5.6%
1,000 – 1,599 (n = 13)	30.8%	38.5%	23.1%	7.7%	
1,600 – 2,999 (n = 11)	58.3%	41.7%			
3,000 – 4,999 (n = 9)	12.5%	50.0%	12.5%	12.5%	12.5%
5,000 – 9,999 (n = 6)	16.7%	50.0%		16.7%	16.7%
10,000 – 24,999 (n = 1)		33.3%	66.7%		
25,000 – 49,000 (n=3)			100.0%		
More than 50,000 (n = 2)		100.0%			

The responses to this question show that workstations with a large screen display were not common in elementary schools.

Survey question 8: What percentage of your workstations have a projection panel in the elementary classrooms?

In the survey, technology coordinators were directed to mark the percentage that corresponds to their elementary schools from the following ranges of percentages: none, 1%-25%, 26%-50%, 51%-75%, 76% to 100, and not applicable. It appears from Table 17 that workstations with a projection panel were still not available in more than half of the elementary schools. Only about 6.4% of the respondents indicated that more than 25% of the elementary classrooms in their districts had workstations with a projection panel. Table 18 shows that all of the schools that did not have workstation with a

projection panel in their elementary classrooms were schools in districts that had student populations less than 25,000.

Table 17

Workstations that have a projection panel in the classrooms

Percentage of schools in the district	Total of districts	Percentage of the work stations that have a projection panel in the classrooms
None	50	53.2%
1% to 25%	38	40.4%
26% to 50%	2	2.1%
51% to 75%	1	1.1%
76% to 100%	1	1.1%
Not applicable	2	2.1%
Total	94	100.0%

Table 18

Workstations that have a projection panel in the classrooms in districts of different sizes

Size of the district	Percentage of the work stations that have a projection panel in the classrooms				
	None	0% - 25%	26%-50%	51%-75%	76%-100%
Less than 500 (n = 27)	77.8%	14.8%		3.7%	3.7%
500 –999 (n = 18)	61.1%	27.8%			11.1%
1,000 – 1,599 (n = 13)	53.8%	46.2%			
1,600 – 2,999 (n = 11)	16.7%	83.3%			
3,000 – 4,999 (n = 9)	25.0%	75.0%			
5,000 – 9,999 (n = 6)	33.3%	50.0%	16.7%		
10,000 – 24,999 (n = 1)	33.3%	33.3%			
25,000 – 49,000 (n=3)		50.0%	50.0%		
More than 50,000 (n = 2)		50.0%	50.0%		

Survey question 9: What percentage of your computers have CD-ROM drives?

The survey question included five different ranges of percentages and respondents were asked to choose the one that best applies to their elementary schools. The percentages given were: 0%-20%, 21%-40%, 41%-60%, and more than 80%. The responses to this question indicated that the current trend is to provide elementary schools with computers that have CD-ROM drives. Table 19 shows that 40.4% of the technology coordinators indicated that over 76% of the elementary schools in their districts had computers with CD-ROM drives. Another 21.3% of the respondents indicated that between 51% and 75% of their computers in the elementary schools had CD-ROM drives. The fact that more than 60% of the respondents indicated that over half of their computers had CD-ROM drives, suggests that their schools had fairly new computers.

Table 20 shows that in districts of 5,000 to 9,999, two thirds of the technology coordinators indicated that over 76% of the computers in their elementary schools had CD-ROM drives. Furthermore, a high percentage of technology coordinators in district that had less than 500 and districts that had from 1,600 to 2,999 indicated that 76%-100% of the elementary schools in their districts had computers that had CD-ROM drives.

Table 19

Computers that have CD-ROM drives

Percentage of schools in the district	Total of Districts	Percentage of districts in the sample
0% to 25%	14	14.9%
26% to 50%	22	23.4%
51% to 75%	20	21.3%
76% to 100%	38	40.4%
Total	94	100.0%

Table 20

Computers that have CD-ROM drives

Size of the district	Percentage of computers that have CD-ROM drives			
	0% - 25%	26%-50%	51%-75%	76%-100%
Less than 500 (n = 27)	11.1%	22.2%	3.7%	63.0%
500 –999 (n = 18)	11.1%	27.8%	44.4	16.7%
1,000 – 1,599 (n = 13)		23.1%	15.4%	61.5%
1,600 – 2,999 (n = 11)	50.0%	8.3%	25.0%	16.7%
3,000 – 4,999 (n = 9)	25.0%	12.5%	37.5%	25.0%
5,000 – 9,999 (n = 6)		33.7%		66.7%
10,000 – 24,999 (n = 1)		100.0%		
25,000 – 49,000 (n=3)		66.7%	33.3%	
More than 50,000 (n = 2)			100.0%	

Survey question 16: What percentage of elementary classrooms are connected to the central office through a network?

To determine the percentage of elementary classrooms connected to the central office through a network, technology coordinators were provided with four percentages to choose from and asked to mark the one that best applies to the elementary schools in their districts.

Table 21 shows that 49 of the 94 districts responding, 52.1%, indicated that more than 80% of their elementary classrooms were connected to the central office. Table 22 shows the difference in the percentages of elementary schools that are connected the central office in districts from different sizes. The total range of districts with 80% of the elementary classrooms connected to the central office varies across districts from 38.5% to 100%. The table clearly indicates a trend to networking with smaller districts lagging behind mid-size to larger districts.

Table 21

Elementary classrooms connected to the central office

The percentage of elementary classrooms connected to the central office	Total number of districts	Percentage of the districts in the sample
0%	32	34.0%
1% to 20%	6	6.4%
21% to 40%	3	3.2%
41% to 60%	1	1.1%
61% - 80%	3	3.2%
More than 80%	49	52.1%
Total	94	100.0%

Table 22

Elementary classrooms connected to the central office in districts of different sizes

Size of the districts	Percentage of classrooms connected to the central office through a network					
	0%	1%-20%	21%-40%	41%- 60%	61%-80%	More than 80%
Less than 500 (n = 27)	25.9%			3.7%		70.4%
500 –999 (n = 18)	44.4%	5.6%			5.6%	44.4%
1,000 – 1,599 (n = 13)	53.8%				77.7%	38.5%
1,600 – 2,999 (n = 11)	41.7%		8.3%		8.3%	41.7%
3,000 – 4,999 (n = 9)	25.0%	12.5%	12.5%			50.0%
5,000 – 9,999 (n = 6)	16.7%	16.7%				66.7%
10,000 – 24,999 (n = 1)						100.0%
25,000 – 49,000 (n=3)		33.3%				66.7%
More than 50,000 (n = 2)		50.0%	50.0%			

Survey question 11: What Percentage of your elementary schools have computer labs?

Technology coordinators were given five different ranges of percentages and were asked to mark the one that best applies to the elementary schools in their districts. Table 23 shows that 78.5% of the technology coordinators showed that more than 80% of the elementary schools in their districts had computer labs. However, Table 24 shows that

the percentage of elementary schools with computer labs in large districts is higher than the percentage of elementary schools in small districts. It can be seen from the same table that all elementary schools that did not have computer labs are located in districts that had student populations less than 5,000.

Table 23

Elementary schools that have computer labs

Percentage elementary schools that have computer labs	Total of number of districts	Percentage of the districts in the sample
0%	12	12.9%
1% to 20%	4	4.3%
21% to 40%	0	
41% to 60%	3	3.2%
61% - 80%	1	1.1%
More than 80%	73	78.5%
Total	93	100.0%

Table 24

Elementary schools that have computer labs in districts of different sizes

Size of the districts	Percentage of schools that have computer labs					
	0%	1%-20%	21%-40%	41%- 60%	61%-80%	More than 80%
Less than 500 (n = 27)	22.2%	3.7%				74.1%
500 –999 (n = 18)	17.6%	5.9%				76.5%
1,000 – 1,599 (n = 13)	7.7%		7.7%	7.7%		76.9%
1,600 – 2,999 (n = 11)	8.3%				8.3%	83.3%
3,000 – 4,999 (n = 9)	12.5%					87.5%
5,000 – 9,999 (n = 6)			16.7%			83.3%
10,000 – 24,999 (n = 1)						100%
25,000 – 49,000 (n=3)		33.3%				66.7%
More than 50,000 (n = 2)				50.0%		50.0%

Survey question 13: What percentage of the computer labs have an integrated learning system?

In the survey, technology coordinators were given five different ranges of percentages and were directed to mark the one that best applies to the elementary schools in their districts. Table 25 shows that over than half of the districts indicated that 60% or

less of their labs had Integrated Learning System labs. Table 25 shows also that 32.2% of the respondents indicated that more than 80% of their elementary schools that had computer labs also had integrated learning systems in there. Table 26 indicates that approximately one third of the school districts of varying sizes had integrated learning systems in 80% or more of their computer labs. A noticeable exception was school districts with 1,600 to 2,999 student where only 16.7% of the districts had integrated learning systems in 80% or more of their labs.

Table 25

Computer labs with an integrated learning system

Percentage of computer labs that have an integrated learning system	Total of the district	Percentage districts in the sample
0%	22	24.4%
1% to 20%	11	11.2%
21% to 40%	5	5.6%
41% to 60%	13	14.4%
61% - 80%	3	3.3%
More than 80%	29	32.2%
Total	83	100.0%

Table 26

Computer labs with an integrated learning system in districts of different sizes

Size of the districts	Percentage of schools that have computers labs with an integrated learning system					
	0%	1%-20%	21%-40%	41%- 60%	61%-80%	More than 80%
Less than 500 (n = 27)	34.6%			15.4%		38.5%
500 –999 (n = 18)	25.0%	12.5%	6.3%		12.5%	31.3%
1,000 – 1,599 (n = 13)	15.4%	15.4%	7.7%	23.1%		30.8%
1,600 – 2,999 (n = 11)	33.3%	8.3%	8.3%	25.0%		16.7%
3,000 – 4,999 (n = 9)		14.3%		28.6%	14.3%	42.9%
5,000 – 9,999 (n = 6)	16.7%	16.7%	33.3%			33.3%
10,000 – 24,999 (n = 1)						100.0%
25,000 – 49,000 (n=3)		100.0%				
More than 50,000 (n = 2)		50.0%				50.0%

Survey question 14: What are the district's plans regarding the current and the future of the integrated learning labs?

More than 60% of the technology coordinators who responded to this question stated that they had no plans to purchase more Integrated Learning System labs or update

the current ones. The future plan is to “phase them out”. For example, in a southern Texas ISD, which has about 41,000 students, the technology coordinator stated that 660 computers that use ILS will be replaced with labs for keyboarding, multimedia, and Internet. One respondent stated that he was “...not sure how these labs will survive as the (other) software gets more complicated. We will try to use them as long as we can still get a benefit from them.” The responses that technology coordinators provided about the current and the future status of Integrated Learning System labs can be summarized in the following:

- 1- Twenty-three technology coordinators stated that the future trend in their districts was toward moving from ILS labs toward integrating technology into the classrooms.
- 2- Nineteen respondents stated that their plan was to supplant the ILS labs with a combination of “third party software”, a district developed ILS equivalent, and teacher produced curricula that integrate Internet technology.
- 3- Eleven respondents stated that their plan was to replace ILS labs and use labs for keyboarding, multimedia, and Internet instead.
- 4- Eight respondents stated that their plan was to install Josten’s curricula.

Survey question 10: What percentage of each type of printers is available in your elementary schools?

In the survey, respondents were provided with a list of different kinds of printers that elementary schools may possibly have along with different ranges of percentages that describe the availability of each kind. Only 15.1% of the respondents indicated that none

of their elementary schools had Laser printers. The rest of the respondents, 84.9%, indicated that laser printers were available in their elementary schools; however, the percentage of laser printers varies from less than 25% in some districts to over 75% in other districts. A high percentage of respondents, 83.9%, indicated that Inkjet color printers were available in their elementary schools in percentage that varies from one district to another. Only 16.1% of the respondents indicated that Inkjet color printers were not available in any of their elementary schools. Results are displayed in table 27.

Table 27

Types of printers in elementary schools

Percentage of printers	Percentage of technology coordinators in the sample				
	Dot-matrix	Inkjet	Inkjet color	Laser	Laser color
None	23.4%	28.0%	16.1%	15.1%	45.2%
0%-25%	45.2%	33.3%	31.2%	49.5%	50.5%
26%-50%	17.2%	20.4%	19.4%	17.2%	2.2%
51%-75%	10.8%	11.8%	18.3%	6.5%	00.0
76%-100%	3.2%	6.5%	15.1%	11.8%	2.2%

The responses to this question indicate that the current trend is to acquire more laser printers in elementary schools.

Survey question 15: What kinds of computer hardware are used in your elementary school and what is the current percentage of each kind?

Respondents were provided with a list of the computer hardware that elementary schools may possibly have along with different range of percentages of the availability of each kind. Respondents were asked to mark from the list all kinds of computer hardware that their elementary schools have and the applicable range of percentage for each kind.

Table 28 shows that the most common computer hardware in schools was Dos or Windows based machines. A high percentage of the technology coordinators, 93.6%, indicated that this kind of computers was available in their elementary schools. Macintosh was the second most available with 68.1% of the technology coordinators indicating that they had these machines in their elementary schools. Interestingly, over half of the coordinators responded that they still had Apple II machines in their elementary schools a machine that went off the market several years ago. Table 29 shows that more than half of the technology coordinators, 51.1%, indicated that Windows machines were available in more than 76% of their elementary schools. Apple machines, as 43.6% of the technology coordinators indicated, were available in less than 25% of the elementary schools.

Table 28

Availability of each type of computer hardware in elementary schools

Type of the Computer hardware	Total of districts	Percentage of districts in the sample
(PC) Windows	88	93.6%
Apple II	49	52.1%
Macintosh	64	68.1%
Other kinds of hardware	21	22.3%

Table 29

Types Computer hardware in elementary schools

Percentage of elementary schools in the district	Percentage respondents in the sample			
	Dos or Windows	Apple	Macintosh	Other Kinds
None	6.4%	47.9%	31.9%	77.7%
0% - 25%	16.0%	43.6%	29.8%	19.1%
26% - 50%	11.7%	5.3%	16.0%	1.1%
51% - 75%	14.9%	2.1%	10.6%	1.1%
76% - 100%	51.1%	1.1%	12.4%	1.1%

Survey question 18: What are your future buying plans for elementary school computers?

To answer this question, respondents were provided with a list of computer hardware and they were asked to mark the ones that they are planning to buy. Table 30 shows that the future plan for the greatest percentage of school districts, 77.2%, was to buy Windows machines. Table 31 shows that future plans were to primarily buy Windows machines is the characteristic of 94 different size districts.

Table 30

Future plan for buying computer hardware

Type of Computers	Total number of districts	Percent of the districts in the sample
Buy MAC machines	15	16.3%
Buy Windows Machines	71	77.2%
Other	3	3.3%
Buy MAC and Windows	3	3.3%
Total	92	100.0%

Table 31

Future plans for buying computer hardware in districts of different sizes

Size of the district	Percentage of the districts in the sample			
	MAC	Windows	Other	Mac & Win
Less than 500 (N = 27)	15.4% n = 4	80.0% n = 22		3.8% n = 1
500 – 999 (N = 18)	11% n = 2	83.3% n = 15	5.6% n = 1	
1,000 – 1,599 (N = 13)	23.1% n = 3	69.2% n = 9	7.7% n = 1	
1,600 – 2,999 (N = 11)	18.2% n = 2	72.7% n = 9		9.1% n = 1
3,000 – 4,999 (N = 9)	12.5% n = 1	87.5% n = 8		
5,000 – 9,999 (N = 6)	16.7% n = 1	83.3% n = 5		
10,000 – 24,999 (N = 1)	100.0% n = 1			
25,000 – 49,000 (N = 3)		100.0% n = 3		
More than 50,000 (N = 2)			50.0% n = 1	50.0% n = 1

Survey question 17: What are the future plans to increase the number of computers in each elementary school?

Technology coordinators stated that adding new computers to their elementary schools is an ongoing process. Seven respondents in districts that had student populations over 3,000 students indicated that each of their districts spends about \$ 2.5

millions a year in upgrading computers in their districts. They will add more computers as quickly as finances will permit. The following can summarize the future plans of the school districts:

- 1- Over than half of the respondents, 51, stated that the trend was to change the current format in their elementary schools from Macintosh to Windows based machines.
- 2- The ideal number of computers in the classrooms that school districts seek to reach varies among different districts. About 23 of the technology coordinators stated that having five to six computers in each classroom was their goal.
- 3- About 27 of the technology coordinators stated that their plan was to purchase between 5 to 10 computers per year for each elementary school. The ultimate goal is to reach the ideal student to computer ratio which they considered to be four to five students per computer.
- 4- About two thirds of the technology coordinators, 59, stated that they will search and secure technology grants such as the TIF and technology allotment money to buy additional computers each year.
- 5- About 18 technology coordinators reported that they had a future upgrading plan that included standardization of platform plus increased network connections.
- 6- About 45 of the technology coordinators stated that the plan for increasing the number of computers went along with a plan to enlarge the physical plants such as new buildings to accommodate them.

Survey question 19: Please explain the rationale that was used to guide future purchases?

From the responses, the following rationales were the primary focus of the majority of technology coordinators.

- 1- The interest and the needs of students and the business world's need to prepare students for the business world. This point was stated by 67 of the technology coordinators.
- 2- Compatibility with software programs and ease of networking was stated by 41 of the technology coordinators.
- 3- Reliability and cost was stated by 36 of the technology coordinators.
- 4- Instructional activities that enable students to take advantages of technology learning as conveniently as possible was stated by 33 technology coordinators.
- 5- Availability of parts and services and software was stated by 28 of the technology coordinators.
- 6- Consolidate all purchases to similar brands and models. This will make their maintenance easier and require less training and knowledge. This point was stated by 27 of the technology coordinators.
- 7- Standardization, industry standards and district standardization was stated by 19 of the technology coordinators.
- 8- Existing knowledge base was stated by 13 of the technology coordinators.

Research question 2: what are the current instructional uses of computer/ technology in elementary schools?

This broad research question was broken down into a set of related but more specific questions that were asked in the survey instrument.

Survey question 20: Listed below are some of the common uses of computers in elementary classrooms. Please indicate the top five uses by placing a 1 next to the most frequent use, a 2 next to the second most frequent use, and a 3 next to the third most frequent use etc...

To identify the common instructional uses of computers in elementary schools, the survey respondents were provided with a list of different possible uses of computer in classroom and they were asked to indicate the top five uses.

As shown in Table 32, the most frequent use of computers in elementary classrooms was Drill and Practice (mean 3.04); Word Processing ranked second (mean 3.11); Telecommunication ranked third (mean 4.08); CAI ranked fourth (mean 4.38); and Research ranked fifth (mean 4.64).

Table 32

Common uses of computers in elementary classrooms

Kind of use	Mean*	Sum	Rank
Drill and Practice	3.04	286	1
Word Processing	3.11	293	2
Telecommunication	4.08	434	4
CAI	4.38	407	3
Research	4.64	437	5

*A five-point scale: (1.00) is the most common and (5.0) is the least common.

Survey question 21: What changes have occurred in teachers' teaching styles due to computer/ Internet use?

In the survey question, respondents were provided with a list of possible changes and they were asked to mark the ones that have occurred in teaching styles of elementary teachers in their districts due to computer use. Table 33 shows that most technology coordinators indicated that changes occurred in elementary school teachers' teaching styles due to the use of the computer/ Internet in their classrooms. Only 19.5% indicated that no changes occurred. Respondents indicated that the most common change among teachers was that teachers had become better able to tailor students' work to their individual needs. From the technology coordinators that responded to this question, 38.6% agreed this change had occurred. The second most common change according to 32.9% was that teachers expected more from students in terms of their pursuing and editing their work. The third most common change according to 32.1 of the respondents was teacher become more comfortable with students working independently. The fourth most common change according to 31.8 of the technology coordinators that elementary teachers become more comfortable with small group activities. The fifth most common according to 29.5% of the technology coordinators was that teachers spent less time lecturing to the entire class.

Table 33

Changes in teachers' teaching styles due to computer use

Changes have occurred	Agreement %	Number of respondents
Better able to tailor students' work to their individual needs	38.6	34
Expect more from students in terms of their pursuing and editing their work	32.9	29
More comfortable with students' working independently	32.1	28
More comfortable with small group activities	31.8	27
Spend less time lecturing to the entire class	29.5	26
Better able to present more complex material to students	25.0	22
No Changes	19.3	17
Spend less time with the whole class practicing or reviewing material	17.2	15
Spend more time with individual students	15.9	14

Survey question 23: From your observation of working with students, which of the following benefits do you feel students gain from working with computers:

To determine the benefits that students have gained from working with computers, respondents were provided a list of possible benefits and they were asked to mark all the ones that best apply to students in their districts. As shown in Table 34, the first most common benefit that students have gained from using computers is greater self-responsibility for their learning. About 68% of the respondents agreed on this. Collaboration with peers ranked second with 52.7% of the respondents agreeing on this, Interest in world events/ cultures ranked third (agreement 43.9%), work longer ranked

fourth with (agreement 36.9%), and deeper understanding ranked fifth (agreement 35.1%).

Table 34

Benefits students have gained from working with computers

Benefits students gain	Agreement %	Number of respondents
Greater self-responsibility for learning	68.1	62
Collaboration with peers	52.7	48
Interest in world events/ cultures	43.9	40
Work Longer	36.9	34
Deeper understanding	35.1	32
Expertise is more equally distributed	20.0	18
Interest in “adult” world of science/business	13.2	12
Communicate with adults	9.8	9
Other benefits	4.0	4

Survey question 22: What percentage the students at your schools use a computer at schools daily?

Respondents were asked to mark from five ranges of percentages the one that best applies to their districts. The responses indicate that not all students in elementary schools use a computer at school daily. Table 35 reveals that 78.8% of the technology coordinators indicated that less than 80% of the students in their elementary schools used computers at school daily. Table 35 shows that in 29.8% of the districts, the percentage of students who used a computer daily was between 41% and 60%. Only 7.5% of the respondents reported daily student use in the 0%-20% range. Approximately 20% of the districts reported daily student use for each of the 21% to 40%, 61% to 80%, and more than 80% ranges.

Table 36 indicates that there is a great amount of variability across districts of different sizes in the percentage of students who use a computer at school daily. The range that appears to be most frequent is 41% to 60%.

Table 35

Elementary students who use a computer at school daily

Percentage of students who use computers at schools daily	Total of districts	Percentage of district in the sample
0% to 20%	7	7.5%
21% to 40%	18	19.1%
41% to 60%	28	29.8%
61% - 80%	21	22.3%
More than 80%	20	21.3%
Total	94	100.0%

Table 36

Students who use a computer at school daily in districts of different sizes

Size of the districts	Percentage of students use who use computer at school daily				
	0% - 20%	21%-40%	41%- 60%	61%-80%	More than 80%
Less than 500 (n = 27)	7.4%	18.5%	25.9%	18.5%	29.6%
500 –999 (n = 18)	6.7%	26.7%	26.7%	20.0%	20.0%
1,000 – 1,599 (n = 13)	7.7%	23.1%	46.2%		23.1%
1,600 – 2,999 (n = 11)		9.1%	45.5%	27.3%	18.2%
3,000 – 4,999 (n = 9)	22.2%	11.1%	22.2%	44.4%	
5,000 – 9,999 (n = 6)	16.7%	33.3%	33.3%		16.7%
10,000 – 24,999 (n = 1)			100.0%		
25,000 – 49,000 (n=3)			33.3%	33.3%	33.3%
More than 50,000 (n = 2)		50.0%		50.0%	

Survey question 24: In what direction do you see the instructional uses of computers moving?

Technology coordinators stated that the direction of the instructional uses of computers was toward a full integration of computers into classroom environment. From the responses the following can be concluded:

- 1- A high number of technology coordinators, 45, stated that their goal was for all textbooks and curriculum guides to be available on computer.
- 2- About half of the technology coordinators, 49, reported that their plan was to involve teachers and students more in research process and information handling through electronic media.
- 3- Forty-one respondents reported that the future movement toward individualized instruction and self directed and self motivated independent study.
- 4- According to 39 technology coordinators, technology would provide students with a variety of information sources replacing the sole reliance on the textbook.
- 5- According to 37 of the technology coordinators, computers would provide greater curriculum choices and would be more incorporated into the core curriculum.
- 6- About 10 of the technology coordinators believed that in the connected classrooms, students would have universal access to information resources that go well beyond textbooks. “Students will be educated on global issues

through dialogues with real-life experts equipped with satellite up links across continents to explore different cultures and world events.”

- 7- About eight of the respondents stated that in the connected school, teachers would communicate with parents via e-mail or interactive audio-video, enabling frequent and timely exchange of student progress.
- 8- According to 12 technology coordinators, computer would contribute in deeper involvement and accountability of students for learning
- 9- According to 21 technology coordinators, computer would contribute to a movement toward constructivist learning environment where knowledge is not passively received, but actively constructed by learners
- 10- A number of technology coordinators varies from 11 to 21 expected that students would be more competent in technology and able to absorb technology changes, becoming innovative building life long learning skills, and professional attribute
- 11- Thirteen technology coordinators reported that the had plan to Begin filtering the use of the Internet in schools.
- 12- A high number of technology coordinators, 40, reported that all software purchased must relate to the required curriculum for any given grade level and correlate to TEKS (Texas Essential Knowledge Skills).
- 13- About 15 technology coordinators believed that Students will experience real-world applications by studying with the business community and accepting mentoring services.

Research question 3: What are the issues related to computer/ technology use in elementary classrooms?

This broad research question was broken down into a set of related but more specific questions that were asked in the survey instrument.

Survey question 25: The following reasons are often cited when teachers report difficulty integrating computers into their classrooms. If teachers in your schools have experienced difficulty, which most closely describe their reasons. Please indicate the top five difficulties by placing a 1 next to the most frequent reason, a 2 next to the second frequent reasons, and a 3 next to the third most frequent reason continuing through to 5.

As shown in table 37, the most common problem among elementary school teachers was lack of training (mean 2.66). Lack of time to develop lesson plans that use computer ranked second (mean 3.01), lack of knowledge using computer ranked third (mean 3.30), lack of hardware ranked fourth (mean 4.29), and lack of software ranked fifth (mean 4.53).

Table 37

Difficulties teacher face while integrate computers into their classrooms

Reasons of difficulty	Mean*	Sum	Rank
Lack of training	2.66	245	1
Lack of time to develop Lessons that use computer	3.01	274	2
Lack of knowledge Using computer	3.30	301	3
Lack of Hardware	4.29	391	4
Lack of software	4.53	413	5

*A five-point scale: (1) is the first most common and (5) is the fifth most common

Survey question 26: What is your future plans to solve the difficulty?

Technology coordinators stated a variety of plans that will be used to solve these difficulties. Some of these plans are:

- 1- More than 90% of the technology coordinators reported that their future plans to solve these difficulties presented in providing a continuous and a sufficient need based training. This training will focus on various educational software and operating systems. “This training can be house sessions on weekly basis in a lab environment to allow teachers to come in after hours and discuss and work through problems.”
- 2- Over 85% of the respondents stated that major acquisition of proper and sufficient hardware and software would significantly help to solve the problems.

Survey question 27: To what extent do you feel that the school administration is helpful and supportive of teacher use of computer technology?

Respondents were instructed to mark from three statements the one that best describes the administrative support in their districts. Table 38 shows that all technology coordinators indicated that school administrations were either very helpful and supportive or slightly helpful. The greatest percentage of technology coordinators, 81.9%, indicated that the administrators were very helpful and supportive of teacher use of computer technology. However, Table 39 shows a difference between administration in large districts and administration in small districts. The majority of technology coordinators in

districts with student populations more than 10,000 described their administrative support as slightly helpful and supportive.

Table 38

The extent of help and support school administration provides

The extent of support and help that administration provides	Total of districts	Percentage of districts in the sample
Very helpful and supportive	77	81.9%
Slightly helpful and supportive	17	18.1%
Not helpful and supportive	0	00.0%
Total	0	00.0%

Table 39

The extent of help and support school administration provides in districts of different sizes

Size of the District	The extent of support and help that administration provides		
	Very helpful and supportive	Slightly helpful and supportive	Not helpful and supportive
Less than 500 (n = 27)	85.2%	14.8%	
500 –999 (n = 18)	66.7%	33.3%	
1,000 – 1,599 (n = 13)	76.9%	23.1%	
1,600 – 2,999 (n = 11)	100.0%		
3,000 – 4,999 (n = 9)	100.0%		
5,000 – 9,999 (n = 6)	83.3%	16.7%	
10,000 – 24,999 (n = 1)		100.0%	
25,000 – 49,000 (n=3)		100.0%	
More than 50,000 (n = 2)	50.0%	50.0%	

Survey question 28: For how many years have teachers in your schools used telecommunication (a modem or the Internet) for professional or recreational purposes?

In the survey question, respondents were asked to mark from the following the one that best applies to elementary teachers in their districts; 0 – 2 years, 2-5 years, 5-8 years, and more than 10 years. Table 40 shows that 60.6% of technology coordinators indicated that elementary school teachers in their districts had used telecommunication (a modem or the Internet) for professional and recreational development for less than two years. Table 40 also shows that a small percentage of elementary teachers who had used telecommunication for more than eight years. Table 41 shows that elementary teachers in districts that had student populations more than 3,000 had used telecommunication for professional or recreational purposes longer than their peers in districts with student populations less than 3,000.

Table 40

Years of using telecommunication by elementary teachers for professional and or recreational purposes

Years of use	Total of the districts	Percentage respondents in the sample
0 –2 years	57	60.6%
2 – 5 years	29	30.9%
5 –8 years	5	5.3%
More than 8 years	3	3.2%
Total	94	100.0%

Table 41

Years of using telecommunication by elementary teachers for recreational and professional purposes in districts of different sizes

Size of the district	Percentage respondents in the sample			
	0-2 years	2-5 years	5-8 years	More than 8 years
Less than 500 (n = 27)	70.4%	25.9%		3.7%
500 –999 (n = 18)	66.7%	22.2%	11.1%	
1,000 – 1,599 (n = 13)	61.5%	23.1%	7.7%	7.7%
1,600 – 2,999 (n = 11)	72.7%	18.2%	9.1%	
3,000 – 4,999 (n = 9)	33.3%	66.7%		
5,000 – 9,999 (n = 6)	50.0%	33.3%	16.7%	
10,000 – 24,999 (n = 1)		100.0%		
25,000 – 49,000 (n=3)	33.3%	33.3%	33.3%	
More than 50,000 (n = 2)	50.0%	50.0%		

It appears from the responses that elementary teachers were not experienced significantly in terms of years they had used telecommunication (a modem or the Internet) for professional or recreational purposes.

Survey question 29: For how many years have teachers used telecommunication with students?

Respondents were asked to mark from the following the one that best applies to elementary teachers in their districts; 0 – 2 years, 2-5 years, 5-8 years, and more than 10 years. Table 42 reveals that 76.6% of the technology coordinators indicated that teachers in their elementary schools had used telecommunication with students for less than two years. Table 43 indicates that the total range of districts with teachers who had used

telecommunication with students for less than two years varies across districts from 33.3% to 100.0%.

Table 42

Years of using telecommunication with elementary school students

Years of use	Total of districts	Percentage of districts in the sample
0 –2 years	72	76.6%
2 – 5 years	18	19.1%
5 –8 years	2	2.1%
More than 8 years	2	2.1%
Total	94	100.0%

Table 43

Years of using telecommunication with students in districts of different sizes

Size of the district	Percentage of Technology coordinators in the sample			
	0-2 years	2-5 years	5-8 years	More than 8 years
Less than 500 (n = 27)	81.5%	18.5%		
500 –999 (n = 18)	77.8%	11.1%	11.1%	
1,000 – 1,599 (n = 13)	76.9%	15.4%		7.7%
1,600 – 2,999 (n = 11)	72.7%	27.3%		
3,000 – 4,999 (n = 9)	77.8%	22.2%		
5,000 – 9,999 (n = 6)	66.7%	33.3%		
10,000 – 24,999 (n = 1)	100.0%			
25,000 – 49,000 (n=3)	33.3%	33.3%		33.3%
More than 50,000 (n = 2)	100.0%			

From the responses to this question it seems that elementary teachers have just started recently using telecommunication with students.

Survey question 30: How often do you collaborate with other technology coordinators in the use of technology?

Respondents were directed to mark one of the following: never collaborate, occasionally collaborate, frequently collaborate, and continuously collaborate. It appears from Table 44 that about 88% of the technology coordinators indicated that they collaborate with each other in the use of technology either occasionally or frequently, 45.7% said occasionally and 42.6% said frequently. Table 45 shows that the level of collaboration among technology coordinators in large districts was higher than in small districts. In districts with student populations from 5,000 to 50,000, the total range of technology coordinators in the sample who collaborate with each other continuously varies from 16.7% to 100.0%.

Table 44

Technology coordinators collaboration

Time of collaboration	Total of Districts	Percentage of Technology coordinators in the sample
Never	1	1.1%
Occasionally	43	45.7%
Frequently	40	42.6%
Continuously	10	10.6%
Total	94	100.0%

Table 45

Technology coordinators collaboration in districts of different sizes

Size of the district	Percentage of Technology coordinators in the sample			
	Never	Occasionally	Frequently	Continuously
Less than 500 (n = 27)	3.7%	59.3%	29.6%	7.4%
500 –999 (n = 18)		27.8%	50.0%	22.2%
1,000 – 1,599 (n = 13)		61.5%	30.8%	7.7%
1,600 – 2,999 (n = 11)		54.5%	45.5%	
3,000 – 4,999 (n = 9)		22.2%	77.8%	
5,000 – 9,999 (n = 6)		33.3%	50%	16.7%
10,000 – 24,999 (n = 1)			66.7%	33.3%
25,000 – 49,000 (n=3)				100.0%
More than 50,000 (n = 2)		50.0%	50.0%	

The responses indicate that almost all technology coordinators showed that they collaborate with each other to different extents.

Survey question 31: Which of the following methods do you use to collaborate?

Technology coordinators were directed to mark from four possible methods of collaboration the one that they usually use; E-mail, conferences, personal correspondence, and newsgroups and listserves. In their responses, technology coordinators indicated that the most common methods of collaboration among each other were e-mail and conferences. Table 46 shows that from the technology coordinators who responded to this question, 74.4% indicated that they used e-mail and 70.2% used Conferences.

Table 46

Methods of collaboration among technology coordinators

Methods of Collaboration	Agreement %	Number of technology coordinators in the sample
E-mail	74.4	70
Conferences	70.2	66
Personal Correspondence	37.2	35
Newsgroups and listserves	27.6	26

Research question 4: What kinds of training and staff development activities are provided to teachers to use computer/ technology in their classrooms?

This broad research question was broken down into a set of related but more specific questions that were asked in the survey instrument.

Survey question 32: To what extent do your schools provide teachers with regular out-of-class preparation time for learning and integrating technology into the curriculum?

Respondents were instructed to mark whether this time is weekly, monthly, each term, or yearly. Table 47 shows that the highest percentage of technology coordinators, 37.4%, indicated that elementary schools in their districts provided teachers with this time each term. Other respondents, 31.9%, indicated that schools in their districts provided this time yearly. Table 48 shows that elementary schools in districts of different sizes vary in providing teachers with regular out-of-class preparation time for learning and integrating technology into the curriculum. School districts that had student populations over 25,000 provided time for their elementary teachers monthly. On the

other hand, most school districts with student populations less than 25,000 provided time either each term or yearly.

Table 47

Out-of-class preparation time for learning and integrating technology into the curriculum that teachers have been provided

Extent of preparation	Total of districts	Percentage of Technology coordinators in the sample
Weekly	15	16.5%
Monthly	13	14.3%
Each term	34	37.4%
Yearly	29	31.8%
Total	91	100.0%

Table 48

Out-of- class preparation time for learning and integrating technology into the curriculum that teachers have been provided

Size of the district	Regular out-class preparation time for learning and integrating technology into the curriculum			
	Weekly	Monthly	Each Term	Yearly
Less than 500 (n = 27)	3.8%	7.7%	53.8%	34.6%
500 –999 (n = 18)	23.5%	17.6%	23.5%	35.3%
1,000 – 1,599 (n = 13)	23.1%	7.7%	46.2%	23.1%
1,600 – 2,999 (n = 11)			45.5%	54.5%
3,000 – 4,999 (n = 9)	44.4%	11.1%	11.1%	33.3%
5,000 – 9,999 (n = 6)	20.0%	60.0%	20.0%	
10,000 – 24,999 (n = 1)			100.0%	
25,000 – 49,000 (n=3)		100.0%		
More than 50,000 (n = 2)		100.0%		

Survey question 33: What types of technology training have teachers received?

Respondents were asked to mark whether this type of technology training is computer application, basic computer literacy, computer integration, and no training. From the responses, it appears that the training that teachers received mainly dealt with computer application and basic computer literacy. Table 49 shows that most technology coordinators, 86.8%, reported that teachers in their districts received training in computer application. Computer literacy training was mentioned by 82.4%. Training in computer integration was the least mentioned by respondents with 59.3% of the technology coordinators mentioning this type of training. Table 50 shows that for all types of training, elementary teachers in districts that had large student populations received more training than did teachers in smaller districts. For example, all technology coordinators in schools that had over 3,000 students indicated that elementary teachers in their districts received computer application training.

Table 49

Types of technology training elementary teachers have received

Type of Training	Agreement %	Number of respondents
Computer application	86.8	79
Basic computer literacy	82.4	75
Computer Integration	59.3	54
No training	2.3	2

Table 50

Types of technology training elementary teachers have received in districts of different sizes

Size of the district	Type of technology training teachers receive			
	Computer application	Basic computer literacy	Computer Integration	No training
Less than 500 (n = 27)	66.7%	81.5%	51.9%	00.0%
500 –999 (n = 18)	82.4%	76.5%	47.1%	5.9%
1,000 – 1,599 (n = 13)	83.3%	75.0%	33.3%	8.3%
1,600 – 2,999 (n = 11)	90.0%	100.0%	50.0%	00.0%
3,000 – 4,999 (n = 9)	100.0%	66.7%	66.7%	00.0%
5,000 – 9,999 (n = 6)	100.0%	83.3%	100.0%	00.0%
10,000 – 24,999 (n = 1)	100.0%	100.0%	00.0%	00.0%
25,000 – 49,000 (n=3)	100.0%	100.0%	100.0%	00.0%
More than 50,000 (n = 2)	100.0%	100.0%	100.0%	00.0%

Survey question 34: About what percent of the elementary teachers in your district have had training?

Respondents were instructed to mark from the following percentages the one that the best applies to elementary teachers in their districts: 0% - 30%, 31%-60%, 61%-80%, and more than 80%. Table 51 shows that only 44.0% technology coordinators indicated that more than 80% of elementary teachers in the elementary schools in their districts have had training. Table 52 provides a breakdown of the results. In districts that had student populations less than 10,000, the total range of those districts with over 80% of elementary teachers had training varies from 33.3% to 66.7%.

Table 51

Teachers who have had training in elementary schools

Percentage of Teachers who have had training	Total of districts	Percentage of districts in the sample
0% - 30%	11	12.1%
31% - 60%	21	23.1%
61% - 80%	19	20.8%
More than 80%	40	44.0%
Total	91	100.0

Table 52

Teachers who have had training in districts of different sizes

Size of the district	Percentage of Teachers who have had training			
	0% -30%	31%-60%	61%-80%	More than 80%
Less than 500 (n = 27)		25.9%	7.4%	66.7%
500 –999 (n = 18)	29.4%	17.6%	11.8%	41.2%
1,000 – 1,599 (n = 13)	16.7%	25.0%	25.0%	33.3%
1,600 – 2,999 (n = 11)		20.0%	40.0%	40.0%
3,000 – 4,999 (n = 9)	44.4%	11.1%	11.1%	33.3%
5,000 – 9,999 (n = 6)		33.3%	16.7%	50.0%
10,000 – 24,999 (n = 1)			100.0%	
25,000 – 49,000 (n=3)		33.7	66.7%	
More than 50,000 (n = 2)		100.0%		

From the responses to this question, it can be concluded that a considerable percentage of elementary teachers have not had adequate training yet.

Survey question 35: How and to what extent have teachers been involved in making a decision regarding using computers in the classrooms or schools?

Respondents were directed to mark from the following the one that best describes this involvement: none, some, considerable, and extensively. Table 53 shows that more than half of the technology coordinators, 54.9%, indicated that teachers in the elementary schools in their districts had been involved considerably in making a decision regarding using computers in classrooms. In addition, 31.9% of the technology coordinators indicated that elementary teachers in their districts involved in making decision regarding computer use to some extent

Table 54 shows that elementary teachers in the majority of the districts of different sizes had been involved in making decisions regarding using computers in the classrooms, however, this involvement is still to a considerable extent. Only one technology coordinator from districts that had student populations of 1,000 –1,599 indicated that none of the elementary teachers in his district had been involved in making decision regarding using computers in classrooms.

Table 53

The extent of teachers involvement in making decision regarding using computers

The extent of involvement	Total of districts	Percentage of the districts in the sample
None	1	1.1%
Some	29	31.9%
Considerable	50	54.9%
Extensively	11	12.1%
Total	91	100.0%

Table 54

The extent of teachers involvement in making decision regarding using computers in districts of different sizes.

Size of the district	The extent of teachers' involvement in making decision regarding using computers in the classrooms			
	None	Some	Considerable	Extensively
Less than 500(n = 27)		37.0%	51.9%	11.1%
500 –999 (n = 18)		29.4%	47.1%	23.5%
1,000 – 1,599 (n = 13)	8.3%	25.0%	58.3%	8.3%
1,600 – 2,999 (n = 11)		30.0%	70.0%	
3,000 – 4,999 (n = 9)		44.4%	55.6%	
5,000 – 9,999 (n = 6)		16.7%	50.0%	33.3%
10,000 – 24,999 (n = 1)		100.0%		
25,000 – 49,000 (n=3)			66.6%	33.3%
More than 50,000 (n = 2)			100.0%	

Survey question 36: How have teachers been provided training in your schools?

Respondents were provided with a list of possible methods of training and they were directed to rank these methods from one to five. Rank 1 represents the first most common and 5 represents the fifth most common. Technology coordinators ranked school or district workshops as the most common method of providing teachers with training (mean 1.26), Self taught ranked second (mean 3.14), conferences ranked third (mean 3.92), seminars ranked fourth (mean 3.92), and college courses ranked fifth (4.84). Responses are displayed in table 55.

Table 55

Methods of providing training to teachers

Methods of providing training to teachers	Mean*	Sum	Rank
School or district workshop	1.26	115	1
Self-taught	3.14	286	2
Conferences	3.92	357	3
Seminars	3.92	357	3
College courses	4.84	441	5

*A five-point scale: rank 1 is the greatest and rank 5 is the least

From the responses to this question, it is clear that the current trend is to provide teachers with training through school or districts workshops.

Survey question 37: What types of technology-related professional development do you provide to your teachers?

A list of possible types was provided and respondents were asked to mark the ones that teachers in their districts have been provided. Table 57 show that the most common type of technology-related professional development that teachers have been provided was basic introduction to hardware/ word processor application. From the technology coordinators who responded to the survey, the highest percentage, 84.6%, indicated that teachers in their districts had been provided with this type of training. The second type was in schools one-on-one professional mentoring on a consistent or just-in time basis 62.6% of the respondents agreeing on this. Collaborative team-teaching opportunities with technology proficient instructors ranked third (agreement 45.0%), on-site visits to technology-using classrooms ranked fourth (agreement 38.4%), multi-day courses run by public or private technology training organization ranked fifth (agreement 24.1%), and on-line distance learning professional development courses ranked the least (agreement 12.0%).

Table 56

Types of technology-related professional development that been provided to elementary teachers

Type of training	Agreement %	Sum
Basic introduction to hardware/ Word Processor application	84.6%	77
In school one-on-one professional mentoring on a consistent or just-in time basis	62.6%	57
Collaborative team-teaching opportunities with technology proficient instructors	45.0%	41
On-site visits to technology-using classrooms	38.4%	35
Multi-day courses run by public or private technology training organization	24.1%	22
On-line distance learning professional development courses	12.0%	11

Survey question 38: How many technology-related professional development hours have the majority of teachers completed?

Respondents were directed to mark from the following the one that best applies to elementary school teachers in their districts: 0 – 30 hours, 31 – 50 hours, 51-70 hours, and over 70 hours. From Table 57 one can see that the vast majority of technology coordinators, 81.3%, indicated that the majority of elementary teachers in their districts had completed less than 30 hours of technology-related professional development. In addition, 15.4% of the technology coordinators indicated that the majority of elementary teachers in their districts completed from 31 to 50 hours of technology related professional development. Table 58 shows that elementary teachers in school districts of small student populations had completed more hours of training than their peers in districts with larger student populations. In districts that had student populations less

than 10,000, the total range of those districts with elementary teachers who had completed from 31 to 50 hours of technology related professional development varies from 8.3% to 40.0%.

Table 57

Technology-related professional development hours the majority of teachers have completed

Hours	Total of districts	Percentage of the districts in the sample
0-30	74	81.3%
31 – 50	14	15.4%
51 – 70	1	1.1%
Over 70 hours	2	2.2%
Total	91	100.0%

Table 58

Technology-related professional development hours the majority of teachers have completed in districts of different sizes

Size of the district	Percentage of technology coordinators in the sample			
	0 – 30	31 – 50	51 – 70	Over 70 hours
Less than 500 (n = 27)	77.8%	18.5%	3.7%	
500 –999 (n = 18)	88.2%	11.8%		
1,000 – 1,599 (n = 13)	91.7%	8.3%		
1,600 – 2,999 (n = 11)	60.0%	40.0%		
3,000 – 4,999 (n = 9)	88.9%	11.1%		
5,000 – 9,999 (n = 6)	66.7%	16.7%		16.7%
10,000 – 24,999 (n = 1)	100.0%			
25,000 – 49,000 (n=3)	66.7%			33.3%
More than 50,000 (n = 2)	100.0%			

Survey question 39: What is your future plan regarding providing training to teachers to keep them up to date to changes in computer hardware and applications?

A high percentage of technology coordinators, 37%, stated that many future plans had already been made to provide training to teachers. These plans focus on providing regular conferences and periodic workshops, providing at least one teacher technology per three elementary schools to be in each campus at least once a week. This will help providing training by this person on daily basis or when needed.

Twenty-three technology coordinators stated that their districts were building a series of courses that would be offered in a variety of formats and times per year. Other technology coordinators, 13, indicated that their districts offered weekly classes to their teachers in a variety of subjects. Some other technology coordinators, nine, indicated districts offer five days mandated staff development per year, volunteer after school, and Saturday workshops.

Research question 5: How and to what extent is the Internet being utilized in the elementary schools?

In the survey, respondents were asked the following question: are your elementary schools connected to the Internet? If the answer was yes, respondents were asked to answer the rest of the questions in the survey. If the answer was no, respondents skipped this section of these questions. Table 59 shows that 81 of the respondents answered yes this number equals 86.2% of the respondents.

The research question was broken down into a set of related but more specific questions that were asked in the survey instrument.

Table 59

Elementary schools connected to the Internet

Size of the district	Total of the districts	Percentage of respondents in the sample
Less than 500 (n = 27)	24	88.9%
500 to 999 (n = 18)	15	83.3%
1,000 to 1,599 (n = 13)	9	69.2%
1,600 to 2,999 (n = 11)	10	90.9%
3,000 to 4,999 (n = 9)	8	88.9%
5,000 to 9,999 (n = 6)	5	83.3%
10,000 to 24,999 (n = 1)	1	100.0%
25,000 to 49,999 (n = 3)	3	100.0%
Over than 50,000 (n = 2)	2	100.0%
Unknown Size	4	80.0%
The total of districts responded to the question (n = 95)	81	86.2%

Survey question 40: Approximately what percentage of classrooms are connected to the Internet?

Respondents were asked to mark from a list of possible answers the one that applies to their elementary schools. The list included the following choices: no Internet connection, Internet available in the library or computer lab, less than 50% of classrooms are connected to the Internet, and more than 50% of classrooms are connected to the Internet. Table 59 shows that 86.2% of the respondents indicated that elementary schools in their districts were connected to the Internet. However, again from the same table one can see that large schools were more likely to have Internet capabilities than their smaller counterparts.

Table 60 shows that 63.4% of technology coordinators indicated that more than 50% of classrooms are connected to the Internet. Table 61 shows that all elementary classrooms that were not connected to the Internet were schools in districts that had less than 10,000 students.

Table 60

Classrooms that are connected to the Internet

Percentage of classrooms connected	Number of districts	Percentage of districts in the sample
No Internet Access	16	17.2%
Internet access available in the library or computer lab	10	10.8%
Less than 50% of classrooms are connected to the Internet	8	8.6%%
More than 50% of classrooms are connected to the Internet	59	63.4%
Total	94	100.0%

Table 61

Classrooms that are connected to the Internet in districts of different sizes

Size of the district	Percentage of districts in the sub-set of the sample			
	No Internet access	Access a through the library or Labs	Less than 50% are connected	More than 50% are connected
Less than 500 (n = 27)	14.8%	3.7%	3.7%	77.8%
500 –999 (n = 18)	11.8%		11.8%	76.5%
1,000 – 1,599 (n = 13)	30.8%		23.1%	46.2%
1,600 – 2,999 (n = 11)	18.2%	36.4%		45.5%
3,000 – 4,999 (n = 9)	22.2%	11.1%	11.1%	55.6%
5,000 – 9,999 (n = 6)	33.3%			66.6%
10,000 – 24,999 (n = 1)				100.0%
25,000 – 49,000 (n=3)		33.3%		66.6%
More than 50,000 (n =2)		50.0%	50.0%	

Survey question 41: What uses do teachers make of the Internet?

In the survey question, respondents were asked to mark from a list of possible uses of the Internet the ones that are used by elementary school teachers in their districts. The list included the following: students use, get information for personal use, develop net skills/ awareness, professional sharing, planning and preparation, and creating curriculum. Table 62 shows that the greatest percentage of the technology coordinators, 84.4%, agreed that student use of the Internet in the classroom was one of the main uses that teachers made of the Internet. Another percentage of the technology coordinators, 77.9%, agreed that teachers in the elementary schools in their district used the Internet to get information for personal use.

Table 62

Uses that elementary teachers make to the Internet

Type of Internet use make by teachers	Agreement %	Number of respondents
Student use	84.4%	65
Get information for personal use	77.9%	60
Develop net skills/ Awareness	63.6%	49
Professional sharing, planning, and preparation	63.6%	49
Creating curriculum	61.0%	47

Survey question 42: How often do teachers use the Internet for preparation for their classes?

In the survey question, respondents were asked to mark whether elementary teachers in their districts never used the Internet, rarely use it, some days, or most days. From the responses to this question, it appears that teachers used the Internet for preparation for their classes only some days. Table 63 reveals that 60.5% of the technology coordinators in the sample indicated that elementary teachers in their districts used the Internet “some days” for preparation for their classes.

Table 63

Using the Internet by teachers for preparation for classes

Time of use	Total of districts	Percentage districts in the sub-set of the sample
Never	0	0%
Rare	15	19.7%
Some days	46	60.5%
Most days	15	19.7%
Total	76	100.0%

Survey question 43: What Types of Internet learning activities teachers use with students in elementary schools?

Respondents were provided with a list of possible activities and they were asked to mark all the activities that elementary teachers in their districts use. Table 64 shows that the most common Internet learning activity that elementary teachers use with students was research. A great percentage of the technology coordinators, 88.2%, agreed that teachers in their districts use these activities. Using e-mail was the second most common activity with 63.2% of the technology coordinators agreeing on this. Only 6.6% of the technology coordinators indicated that elementary teachers make no use of the Internet learning activities.

Table 64

Types of Internet learning activities teachers use with students

Types of Activities	Agreement %	Number of respondents
Research	88.2	67
e-mail	63.2	48
Live events	27.6	21
www publishing	30.3	23
Collaborative writing	25.3	19
Collaborative science	23.7	18
Contest e.g. web design	18.4	14
Live chats	13.2	10
Community interviews/ reports	11.8	9
None	6.6	5
Others	7.9	6

Survey question 44: How often do teachers require students to use the Internet for assignments?

Respondents were instructed to mark whether this use was not required, required once a week, two times a week, three times a week, more than three times a week. Table 65 shows that the highest percentage of technology coordinators, 67.1%, reported that the elementary teachers in their districts did not require students to use the Internet to do assignments. About one-fourth of the respondents indicated that students were required to use the Internet for doing assignments once a week.

Table 65

Using the Internet for doing assignments by students

Time required	Number of districts in the sample	Percentage the districts in the sub-set of the sample
Not required	51	67.1%
Once a week	20	26.5%
Two times a week	4	6.4%
Three times a week	0	00.0%
More than three times	0	00.0%
Total	75	100.0%

Survey question 45: How do teachers direct student Internet use?

Technology coordinators in the sample were directed to mark whether this use was within the classroom, through the library, students do this on their own, or other.

Table 66 shows that 84.9% of the technology coordinators agreed that elementary

teachers in their districts directed student Internet use within the classrooms. In addition, 26.5% of the respondents reported that elementary teachers in their districts directed student Internet use through the library.

Table 66

Method of directing students Internet using

Ways of directing students Internet Use	Agreement %	Number of respondents
Within the classroom	84.9%	65
Through the Library	37.6%	29
Students do this on their own	9.09%	7
Other	12.9%	10

Survey question 46: What approximately is the proportion of students that teachers have involved with Internet activities?

Table 67 shows that 32.9% of the technology coordinators who responded to this question indicated that less than 20% of elementary students in their districts had involved in Internet activities. In addition, 17.1% of the respondents indicated that more than 80% of their elementary students involved in these activities.

Table 67

The proportion of students that teachers have involved with in Internet activities

Percentage of students	Total of the districts	Percentage districts in the sub-set of the sample
0% - 20%	25	32.9%
21% - 40%	11	14.5%
41% - 60%	15	19.7%
61% - 80%	12	15.8%
More than 80%	13	17.1%
Total	76	100.0%

Survey question 47: Regarding Internet use, please check whether each of the following is a major problem, occasional problem, or no problem:

To identify the problems that elementary teachers face while using the Internet, respondents were provided with a list of possible problems and were asked to determine whether each of the problems in the list could be described as a no problem, an occasional problem, or a major problem. Table 68 shows that 42.3% of the technology coordinators indicated that time of use was a major problem of Internet use in their elementary schools. Not enough connections was identified as a major problem by 26.0% of the respondents. Other major problems reported were: district financial lacking identified by 19.2% of the respondents, information overload 14.1%, and inconvenient access 11.5%.

Some of the problems that identified as occasional problems were: hard to find information (70.5%), information over load (60.3), slow (50.0%), and hard to use with low achieving students.

Table 68

Problems that teachers face while using the Internet

Problem	Percentage of technology coordinators in the sub-set of the sample		
	No Problem	Occasional	Major Problem
Slow	42.3%	50.0%	7.7%
Unreliable	52.6%	44.9%	2.6%
Too complicated to access	80.8%	17.9%	1.3%
Low quality materials	69.7%	27.9%	1.3%
Tech support lacking	50.6%	39.0%	10.4%
Hard to find information	26.9%	70.5%	2.6%
Information overload	25.6%	60.3%	14.1%
E-mail Overload	67.5%	29.9%	2.6%
Hard to use with low achieving students	46.7%	49.3%	4.0%
Time for use	12.8%	44.9%	42.3%
Inconvenient access	57.7%	30.8%	11.5%
Not enough connections	54.5%	19.5%	26.0
Administrators support/ Initiative lacking	74.4%	21.8%	3.8%
District Financial lacking	42.3%	38.5%	19.2%
Privacy	65.4%	34.6%	00.0%

Survey question 48: What Percent of elementary students have an e-mail address provided by the schools?

Technology coordinators were instructed to mark from the following the one that best applies to the elementary schools in their districts: None, 0%-25%, 26%-50%, 51%-75%, 76%-100%. Table 69 shows that 88.5% of the technology coordinators indicated that less than 25% of students in the elementary schools in their districts had e-mail addresses provided by the schools. Table 70 shows that school districts of different sizes have the same policy regarding providing students with e-mail addresses. However, two technology coordinators provided noticeably different responses, one of them from districts that had less than 500 students and the other from districts that had 1,600 and 2,999 students, indicated that over 76% of students in their districts had e-mail addresses.

Table 69

Elementary students who have an e-mail address provided by schools

Percentage of students	Total of districts	Percentage of districts in the sub-set of the sample
None	5	6.4%
0% - 25%	69	88.5%
26% - 50%	2	2.6%
51% - 75%	0	00.0%
76% - 100%	2	2.6%
Total	74	100.0%

Table 70

Students who have an e-mail address provided by schools in districts of different sizes

Size of the district	Percentage of technology coordinators in the sub-set of the sample				
	None	0% - 25%	26%-50%	51%-75%	76%-100%
Less than 500 (n = 24)	8.3%	79.2%	8.3%		4.2%
500 –999 (n = 15)		100.0%			
1,000 – 1,599 (n = 9)		100.0%			
1,600 – 2,999 (n = 10)		87.5%			12.5%
3,000 – 4,999 (n = 8)	25.0%	75.0%			
5,000 – 9,999 (n = 5)		100.0%			
10,000 – 24,999 (n = 1)		100.0%			
25,000 – 49,999 (n=3)		100.0%			
More than 50,000 (n = 2)		100.0%			

From the responses to this question, it is clear that very few students are provided with e-mail addresses.

Survey questions 49:What percent of teachers have a LAN e-mail address provided by the school from the school that are connected to the Internet?

Technology coordinators were asked to mark from the following the one that best applies to the elementary schools in their districts: None, 0%-25%, 26%-50%, 51%-75%, 76%-100%. Table 71 shows that 69.6% of the technology coordinators indicated that over 76% of the elementary teachers in their districts had a LAN e-mail addresses provided by the schools. From Table 72, it appears that school districts that had student population less than 10,000 provided more of their elementary teachers with LAN email addresses more than did larger districts. The total range of districts with over 76% of the

elementary teachers had LAN e-mail addresses varies across districts from 55.6% to 83.3%.

Table 71

Teachers who have a LAN e-mail address

Percentage of teachers	Total of districts	Percentage the districts in the sub-set of the sample
None	1	1.3%
0% - 25%	18	22.8%
26% - 50%	3	3.8%
51% - 75%	2	2.5%
76% - 100%	55	69.6%
Total	79	100.0%

Table 72

Teachers who have LAN e-mail address in districts of different sizes

Size of the district	Percentage of technology coordinators in the sub-set of the sample				
	None	0% - 25%	26%-50%	51%-75%	76%-100%
Less than 500 (n = 24)		16.7%			83.3%
500 –999 (n = 15)		13.3%		6.7%	80.0%
1,000 – 1,599 (n = 9)		12.5%	12.5%		75.0%
1,600 – 2,999 (n = 10)		33.3%		11.1%	55.6%
3,000 – 4,999 (n = 8)	12.5%		12.5%		75.0%
5,000 – 9,999 (n = 5)			20.0%		80.0%
10,000 – 24,999 (n = 1)		100.0%			
25,000 – 49,000 (n=3)		33.3%			66.7%
More than 50,000 (n = 2)		100.0%			

Responses to this question reveal that most districts had provided teachers with LAN e-mail addresses.

Survey question 50: What Kind of Web page do the elementary schools have?

To describe the kinds of Web page the elementary schools have, technology coordinators were asked to mark whether schools have an individual school site, school district site, independent by teachers, or no web page. Table 73 indicates that 21.8% of elementary schools did not have web pages and 30.8% had individual school sites.

Table 74 shows that all elementary schools that did not have web pages were located in districts that had student populations less than 3,000. In addition, that technology coordinators in districts that had student populations over 5,000 reported that all elementary schools in their districts, 100%, had their individual school web pages.

Table 73

Kind of Web page the schools have

Percentage of students	Total of the districts	Percentage the districts in the sub-set of the sample
Individual school site	24	30.8%
School district site	36	46.2%
Independent by teachers	1	1.3%
No web page	17	21.8%
Total	78	100.0%

Table 74

Kind of Web page the schools have in districts of different sizes

Size of the district	Percentage of districts in the sub-set of the sample			
	Individual school site	School district site	Independent by teachers	No web page
Less than 500 (n = 24)	8.3%	62.5%		29.2%
500 –999 (n = 15)	13.3%	53.3%		33.3%
1,000 – 1,599 (n = 9)	62.5%	12.5%		25.0%
1,600 – 2,999 (n = 10)	11.1%	44.4%	11.1%	33.3%
3,000 – 4,999 (n = 8)	28.6%	71.4%		
5,000 – 9,999 (n = 5)	100.0%			
10,000 – 24,999 (n = 1)	100.0%			
25,000 – 49,000 (n=3)	100.0%			
More than 50,000 (n = 2)	100.0%			

Responses to this question reveal that most elementary schools relied on their districts web pages and they did not have their own individual web pages.

Survey question 51: What is your future plan regarding schools connection to the Internet?

Elementary school connection to the Internet is an ongoing process. All technology coordinators stated that they are already connected to the Internet or they plan to obtain this connection in the near future. It is expected that by the year 2001 all classrooms will be connected. The Internet will be accessible to all classrooms. Some districts have plans to expand from T1 to DS 3.

All the buildings will have a proper physical layout support in the areas of data connections, electrical outlets, video connection, and air conditioning.

Other future plans that some school districts have are:

- 1- Nineteen technology coordinators mentioned that they had plan to provide a dial-in access to the Internet provided free charge to staff members in their districts.
- 2- Nineteen technology coordinators mentioned that they had a plan to provide a dial-in access to the Internet provided free of charge to the public library.
- 3- Seventeen technology districts reported that their districts planning to acquire district web servers in place providing district information and student work.
- 4- About 55 technology coordinators reported that they had a plan to have written policies on acceptable use of the Internet, World Wide Web content, network management, and equipment donations.
- 5- Three technology coordinators reported that they had plans to acquire T-STAR satellite receiver used for district training and information.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this chapter is to provide a summary of the study and the findings, conclusions, and recommendations for future research.

Summary of the study

The problem addressed in this study was to describe the current and future trend of computer use in elementary school settings. The research questions were as follows:

- 1- What are the current physical configurations of computers in elementary schools?
- 2- What are the current instructional uses of computer/technology in elementary schools?
- 3- What are the issues related to computer/ technology use in elementary schools?
- 4- What kinds of training and staff development activities do teacher receives to use computer/technology in their classrooms.
- 5- How and to what extent is the Internet being utilized in the elementary schools?
- 6- What are the future trends of using computer technology in elementary schools?

In order to answer these questions, a total of two hundred technology Coordinators from two hundred public school districts in Texas were randomly selected as the sample. The technology coordinators were sent a survey that was designed for this purpose. After four weeks, if no response was received, a follow-up letter was sent to them as a reminder. After the second request, if there was no response obtained, telephone calls and e-mail were made and another copy of the survey was either mailed or e-mailed.

These procedures resulted in 95 surveys being returned. The data collected pertained to information on physical configuration of computers in elementary schools, instructional use of computers, implementation issues, training and professional development, and Internet use.

Findings

To assist coordination of the results of the survey, the survey questions were divided into five broad major categories concerning the current and future trends of computer use in elementary school settings. These categories are: the physical configurations, instructional use of computers, implementation issues, professional development, and Internet use. The findings were as follows:

Physical Configurations

- 1- Approximately 60% of the technology coordinators that participated in the study reported that 80% or more of the elementary school teachers in their districts had computers on their desks devoted for their use.

- 2- Approximately 58% of the technology coordinators that participated in the study reported that 80% or more of the elementary school teachers in their districts had computers in their classrooms for use by students. However, small districts had a higher percentage of elementary teachers who had computers in their classrooms than the percentage of elementary teachers in large districts.
- 3- Approximately 59% of the technology coordinators that participated in the study reported that the average number of computers in each elementary classroom in their districts was two to five computers.
- 4- The current ratio of student to computer in elementary schools varies among schools. The majority of technology coordinators, 68%, indicated that elementary schools in their districts had a student to computer ratio between 25:1 and 5:1.
- 5- The highest percentage of technology coordinators that participated in the study, 31.5% indicated that their elementary schools had a ratio of student to computer with multimedia capabilities between 25:1 and 10:1.
- 6- The highest percentage of technology coordinators that participated in the study, 43.0%, indicated that less than 25% of their elementary teachers had teacher workstations in their offices or workrooms. The second highest percent, 41.9% indicated that over 75% of their elementary teachers had teacher workstations in their offices or workrooms.
- 7- Workstations that have a projection panel in the classrooms were not common in elementary schools in the districts that participated in the study. Only 6.4% of the technology coordinators that participated in the study indicated that more than

25% of their elementary schools had workstations that had a projection panel in the classrooms.

- 8- The majority of technology coordinators that participated in the study, 40.4% indicated that over 76% of their elementary schools had computers with CD-ROM drives. However, this configuration is more common in small districts than in large districts.
- 9- Approximately 52% of the technology coordinators that participated in the study reported that 80% or more of the elementary schools in their districts were connected to the central office through a network.
- 10- Approximately 79% of the technology coordinators that participated in the study reported that 80% or more of the elementary schools in their districts had computer labs.
- 11- Over half of the districts that participated in the study indicated that less than 60% of their computer labs had integrated learning systems.
- 12- More than 60% of the respondents indicated that the future plans for integrated learning system labs in their districts was to replace them with keyboarding, multimedia, and Internet.
- 13- Elementary schools in districts that participated in the study had all kinds of printers, dot matrix, Inkjet, Inkjet color, and Laser color. A high percentage of technology coordinators that participated in the study, 84.9%, indicated that laser printers are available in their elementary schools.
- 14- A high percentage of technology coordinators, 93.6%, indicated that PC or Windows computer hardware was currently available in their elementary schools.

In addition, 68.1% of the respondents indicated that Macintosh was currently available in their elementary schools. Also, 52.1% of the respondents indicated that they still have Apple II computers in their elementary schools.

15- A high percentage of the technology coordinators that participated in the study, 77.2%, indicated that the future plans in the majority of the school districts regarding computer hardware in their elementary schools was to buy Windows machines.

16- About half of the school districts that participated in the study indicated that they were already had plans to increase the number of computers in their elementary schools as quickly as their finances will permit.

17- Respondents reported different rationales that had been used to guide their future purchases of computers. Some of these rationales were: compatibility, availability, standardization, instructional activities, reliability and cost, existing knowledge, students' needs and interests, and preparing students for the next millennium.

Instructional uses

1- According to technology coordinators that participated in the study the top five common uses of computer in their elementary classrooms were; Drill and practice, word processing, telecommunication, CAI, and Research.

2- According to technology coordinators that participated in the study, the most common changes that have occurred in elementary teachers' teaching styles due to computer use were: Teachers have become better able to tailor students' work to

their individual needs, expect more from students in terms of their pursuing and editing their work, more comfortable with students' working independently, more comfortable with small group activities, spend less time lecturing to the entire class, and better able to present more complex material to students.

- 3- According to technology coordinators that participated in the study, the most common benefits that elementary students have gained from working with computers are; greater self-responsibility for learning, Collaboration with peers, Interest in world events/ cultures, work longer, and deeper understanding.
- 4- In districts that participated in the study, not all elementary students used computers at school daily. The percentage of elementary school students who use computers at school daily varies among different districts. In General, the percentage of elementary students who use computers daily in small districts is greater than the percentage of students in large districts.
- 5- Instructional uses of computers is moving toward a full integration of computers in all aspects of the teaching and learning process and using computer as a replacement for the traditional role of textbook in the classroom environment.

Current issues related to computer use in elementary classrooms

- 1- According to the technology coordinators that participated in the study, the main difficulties that elementary teachers face while integrating computers into their classrooms were: lack of training, lack of time to develop lessons that use computers, lack of knowledge of using computers, lack of hardware, and lack of software.

- 2- More than 90% of technology coordinators indicated that they had plans to solve the previous difficulties. They stated that their plan was to provide a continuous and a sufficient training for elementary teachers beside major acquisition of proper and sufficient hardware.
- 3- A high percentage of participants, 81.9%, indicated that school administrators in their districts were very helpful and supportive of elementary teachers who integrated computers into their curriculum.
- 4- The experience of the majority of the elementary teachers in districts that participated in the study in using telecommunication (a modem or the Internet) for professional or recreational purposes was less than five years.
- 5- The experience that elementary teachers in districts that participated in the study had in using telecommunication with students is less than two years for the majority of the elementary school teachers.
- 6- Technology coordinators in districts that participated in the study indicated that they collaborated with each other to different extents.
- 7- The major methods of collaboration among technology coordinators in districts that participated in the study were: e-mail, conferences, personal correspondence, and newsgroups.

Training and staff development

- 1- The majority of school districts, 69.2%, that participated in the study provided their elementary teachers with regular out-of- class preparation time for learning and integrating technology into the curriculum each term or yearly.

- 2- The vast majority of districts that participated in the study, 86.8%, indicated that elementary teachers had received training. The most common types of training they had received were: computer applications, basic computer literacy, and computer integration. This training, however, is still not adequate and does not meet the needs of all teachers.
- 3- In districts that participated in the study, teacher involvement in making decisions regarding computer use in elementary classrooms is still not extensive.
- 4- According to the technology coordinators that participated in the study, the most common methods of providing elementary teachers with training in their districts were: school or district workshops, self-taught, conferences, and seminars.
- 5- Technology coordinators who participated in the study indicated that the most common types of technology-related professional development that had been provided to elementary teachers were : basic introduction to hardware/ word processor application, in school one-on-one professional mentoring on a consistent or just-in time basis, collaborative team-teaching opportunities with technology proficient instructors, and on-site visits to technology using classrooms
- 6- The majority of the participants, 81.3%, indicated that the majority of elementary teachers in their districts had completed less than 30 hours of technology related professional development.
- 7- Most school districts in the study, 82%, indicated that they had future plans regarding providing training to teachers to keep them up to date to changes in computer hardware and software. These plans include providing regular

conferences, periodic workshops, weekly classes, and providing a technology trainer in each elementary school to provide training on daily basis or when it is needed.

Utilization of the Internet in elementary schools

- 1- A high percentage of districts that participated in the study, 86.2%, indicated that their elementary schools were connected to the Internet and the schools that were not connected are already had plans to get connected.
- 2- The majority of the districts that participated in the study, 63.4%, indicated that more than 50% of their elementary classrooms were connected to the Internet.
- 3- According to the technology coordinators in districts that participated in the study, the most common types of Internet uses that their elementary teachers made were: student use; get information for personal use; develop net skills/ awareness; professional sharing, planing and preparation, and creating curriculum.
- 4- The majority of participants, 60.5%, indicated that elementary teachers in their districts used the Internet for preparation for classes some days, but not all the time.
- 5- Respondents indicated that the most common types of Internet learning activities that teachers use with students in their elementary schools were: research, e-mail, World Wide Web publishing, collaborative writing, and collaborative science.
- 6- Most of the participants, 67.1%, indicated that elementary teachers in their districts did not require their students to use the Internet for doing assignments.

- 7- The majority of participants, 84.9%, indicated that elementary school students in their districts use the Internet only under the direct of their teachers. This use takes place mostly within classrooms.
- 8- According to technology coordinators that participated in the study, the following are major problems regarding the use of the Internet in elementary schools: lack of time for use, not enough connections, districts financial lacking, and information over load.
- 9- The following problems regarding the use of the Internet in elementary schools were identified by participants as occasional problems: hard to find information, slow, and unreliable.
- 10- Most of the technology coordinators that participated in the study, 88.5%, indicated that less than 25% of their elementary school students had e-mail addresses provided by the schools.
- 11- Most of the technology coordinators that participated in the study, 69.6%, indicated that more than 76% of their elementary school teachers had LAN e-mail addresses provided by schools.
- 12- A high percentage of the technology coordinators, 46.2%, indicated that the web pages that their elementary schools had were school districts web pages.

Conclusions

The following conclusions are based on the findings of the study:

- 1- All public school districts in Texas have acquired computer hardware in their elementary schools. In addition to computers, some other advanced computer

technology components are starting to be found in elementary schools, such as teacher workstations, CD-ROM, interactive video, computer multi media, LCD panels, and laser printers. This increasing acquisition of computer technology, from technology coordinators' point of view, still does not meet their goal of providing more students access to computers. The future trend is toward a continuous increase in acquiring high computer technology and providing each elementary classroom with at least 5 to 6 computers so as to reach the ratio of 1:5 computers to students.

- 2- There are a variety of computer platforms present in elementary schools, including Windows ® based machines, Macintosh, and Apple II computers. Approximately 94% of the technology coordinators reported that they had Windows based machines in their elementary schools, 68.1% reported they had Macintosh, and 52.1% reported that they still have Apple II computers. The future purchases of approximately 77% of the districts that participated in the study will be concentrated around Windows ® based machines.
- 3- Apparently, the future plan for more than 60% of the school districts that participated in the study regarding Integrated Learning System labs is to phase them out of their elementary schools and replace them with other computer technologies, such as keyboarding, multimedia, and the Internet.
- 4- The most common instructional uses of computer in elementary schools are: drill and practice, word processing, telecommunication, Computer Assisted Instruction (CAI), and research. These uses have affected teachers teaching styles in different ways. Teachers have become better able to tailor students'

work to their individual needs. They expect more from students in terms of pursuing and editing their own work. They are more comfortable with students working independently, and they spend less time lecturing to the whole class.

- 5- Some barriers still emerge and still hinder the effective use of computers in schools. Lack of funding is a problem that prevents many school districts from acquiring computer hardware and software. Most of the school districts have plans to acquire more computers, but these plans are dependent on sufficient funds.
- 6- Currently, around 87% of elementary schools in districts that participated in the study are connected to the Internet and the plan is that by the year 2001 all elementary classrooms will be connected. While access to the Internet in elementary schools is still growing rapidly, it is still problematic. The Internet is still not highly incorporated into classroom activities and students are not given very many opportunities to access the Internet. Furthermore, teachers have not been provided with enough training or time to integrate the Internet into the curriculum.
- 7- Lack of training was reported as a major problem of computer use in elementary schools. Teachers have not been provided with sufficient training in computer use and have had to obtain training on their own. A high percentage of the respondents, 81.3%, indicated that the majority of their elementary teachers had completed less than 30 hours of technology related professional development. The types of training that have been provided are

basic introduction to hardware/ word processor application, in school one-on-one professional mentoring on a consistent or just-in time basis, collaborative team-teaching opportunities with technology proficient instructors, and on-site visits to technology using classrooms.

Recommendations for further studies

1. It is recommended that an investigation be conducted to determine the instructional roles that teachers have adopted due to computer use.
2. It is recommended that an investigation be conducted to determine teachers' attitudes toward the integration of computers, Internet capabilities as an instructional tool, and their professional development preferences.
3. It is recommended that a study be conducted to provide a deep description of a fully computer integrated classroom environment.
4. It is recommended that the same study be done using elementary teachers as respondents instead of technology coordinators.
5. It is recommended that this study be replicated after five years to determine if changes have occurred.
6. It is recommended that the same study be done in countries other than the United States.

APPINDEX A
COVER LETTER



University of North Texas

*Department of Teacher Education
and Administration*

December 1, 1998

Weldon English
Technology Director, Arlington ISD
1203 WEST PIONEER PARKWAY
ARLINGTON, TX 76013-6246

Dear Mr. English,

Our Teacher Education Department at UNT is very interested in learning where technology is headed in the schools. As the chief technology coordinator for your district, you are in a unique position to provide a broad and informed perspective on current and future technology uses in your schools. As one among 200 technology coordinators throughout the state of Texas, we are soliciting your responses to a survey of current and future uses of computers in elementary school settings.

We hope that your time will permit you to assist Hamed Al-Awidi in collecting these data both for his dissertation and for our planning needs. Hamed is one of our international doctoral students sent by his country, Jordan, to study elementary education in the United States. His desire is that he will be able to take back to his country the very best insights he can gather as to current and future trends in computer use in elementary school settings. We have determined that a survey of technology coordinators in Texas Public Schools is a valid source of this information.

We will be greatly in your debt if you will find time in your busy schedule to complete the attached questionnaire. Your input will be valuable in charting future technology related activities. We also plan to interview a small number of coordinators by telephone. On the questionnaire is a place for you to indicate your willingness to participate in about a 10-minute follow-up interview. Again we hope that you can be of assistance. Once the results are in we intend to post them on our web site which will make them readily available for interested parties. Thanking you in advance for your cooperation, we remain,

Respectfully,

Cliff Hardy, Ed.D
Robert K. Bane, Ed.D
Co-Chairman

Hamed Al-Awidi
Doctoral Candidate
Curriculum & Instruction

APPENDIX B
SURVEY QUESTIONNAIRE

Name:

School district:

E-Mail:

Physical Configuration:

- 1- Approximately what percent of the elementary teachers in your district have a computer on their desks devoted for teacher use?
 - 0%-20%
 - 21%-40%
 - 41%-60%
 - 61%-80%
 - More than 80%

- 2- Approximately what percent of elementary teachers in your district have one or more computers in their classrooms for use by students?
 - 0%-20%
 - 21%-40%
 - 41%-60%
 - 61%-80%
 - More than 80%

- 3- How many computers on average do you have in each elementary classroom for student use?
 - 0
 - 1
 - 2-5
 - 5-10
 - over 10

- 4- What is your current student-to-computer ratio?
 - no computer in school
 - greater than 25:1
 - between 25:1 and 10:1
 - between 9:1 and 5:1
 - lower than 5:1

- 5- What is your current ratio of student-to-computers with multimedia capabilities? (Interactive Video, CD-I, DVI, Hypermedia, hypertext, etc...)
 - No multimedia computers in schools
 - Greater than 25:1
 - Between 25:1 and 10:1
 - Between 10:1 and 5:1
 - Lower than 5:1

- 6- What percentage, if any, of your teachers have teacher work stations in their offices or workrooms?
- 0-25%
 - 26-50%
 - 51-75%
 - 76-100%
- 7- What percentage of your work stations have a large screen display in the classrooms?
- None of them has
 - 1% to 25%
 - 26% to 50%
 - 51% to 75%
 - 76% to 100%
 - Not Applicable
- 8- What percentage of your work station have a projection panel in the classrooms?
- None of them has
 - 1% to 25%
 - 26% to 50%
 - 51% to 75%
 - 76% to 100%
 - Not Applicable
- 9- What percentage of your computers have CD-ROM drives?
- 0-25%
 - 26%-50%
 - 51%-75%
 - 76%-100
- 10- What percentage of each type of printer is available in your schools?
- | | | | | |
|--------------|--------------------------------|---------------------------------|---------------------------------|----------------------------------|
| Dot-matrix | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
| Inkjet | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
| Inkjet color | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
| Laser | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
| Laser color | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
- 11- What percentage of your elementary schools have computer labs?
- 0%
 - 1%-20%
 - 21%-40%
 - 41%-60%
 - 61%-80%
 - More than 80%

12- If the answer for question number 11 is Greater than 0%, for what grade levels are these labs used?

- K-2
- 3-4
- 5-6

13- What percentage of these computer labs have an integrated learning system?

- 0%
- 1% - 20%
- 21%-40%
- 41%-60%
- 61%-80%
- More than 80%

14- What are the district's plans regarding the current and the future of the integrated learning labs?

15- What kinds of computer hardware are used in your classrooms? And what is the current percentage of each kind?

- | | | | | |
|--|--------------------------------|---------------------------------|---------------------------------|----------------------------------|
| <input type="checkbox"/> Apple II series | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
| <input type="checkbox"/> (PC) DOS or Windows | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
| <input type="checkbox"/> Macintosh | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |
| <input type="checkbox"/> Other... | <input type="checkbox"/> 0-25% | <input type="checkbox"/> 26-50% | <input type="checkbox"/> 51-75% | <input type="checkbox"/> 76-100% |

16- What percentage of the elementary classrooms are connected to the central office through a network? ____

- 0%
- 1% - 20%
- 21%-40%
- 41%-60%
- 61%-80%
- More than 80%

17- What are your future plans to increase the number of computers in each elementary school?

18- What are the future buying plans for elementary school computers?

- Buy MAC machines
- Buy Windows Machines
- Other, describe_____

19- Please explain the rationale used to guide your future purchases?

Instructional Uses:

20- Listed below are some of the common uses of computers in elementary classrooms.

Please indicate the top five uses by placing a 1 next to the most frequent use, a 2 next to the second most frequent use, and a 3 next to the third most frequent use etc...

- CAI
- Word processing
- Drill and practice
- Graphics
- Database
- Problem solving
- Simulation
- Spreadsheet
- Presentations (HyperStudio, PowerPoint, etc...)
- Group demonstration
- Research
- Reward (Games)
- Programming
- Telecommunication (E-mail, Internet)
- Other ...

21- What changes have occurred in teachers' teaching styles due to computer /Internet use?

- No changes
- Expect more from students in terms of their pursuing and editing their work
- Spend more time with individual students
- More comfortable with students' working independently
- Better able to present more complex material to their students
- Better able to tailor students' work to their individual needs
- Spend less time lecturing to the entire class
- More comfortable with small group activities
- Spend less time with the whole class practicing or reviewing material

22- What percent of the students at your schools use a computer at schools daily?

- 0%-20%
- 21%-40%
- 41%-60%
- 61%-80%
- more than 80%

23- From your observation of working with students, which of the following benefits do you feel students gain from working with computers:

- Work longer
- deeper understanding,
- interest in world events/ cultures,
- interest in “adult” world of science/business
- greater self-responsibility for learning
- communicate with adults
- expertise is more equally distributed
- collaboration with peers
- other

24- In what direction do you see the instructional uses of computer moving?

Implementation Issues:

25- The following reasons are often cited when teachers report difficulty integrating computers into their classrooms. If teachers in your schools have experienced difficulty, which most closely describe their reasons. Please indicate the top five difficulties by placing a 1 next to the most frequent reason, a 2 next to the second frequent reasons, and a 3 next to the third most frequent reason continuing through to 5.

- Lack of training
- Lack of hardware
- Lack of software
- Lack of technical support
- Lack of administrators support
- Lack of time to develop lessons that use computers
- Not enough help for supervising student computer use
- Lack of knowledge of using computer

26- What is your future plan to solve these difficulties?

27- To what extent you feel that the school administration is helpful and supportive of teacher use of computer technology?

- Very Helpful and supportive
- Slightly helpful and supportive
- Not helpful and supportive

28- For how many years have teachers in your schools used telecommunications (a modem or the Internet) for professional or recreational purposes?

- 0-2 years
- 2-5 years
- 5-8 years
- more than 8 years

29- For how many years have teachers in your schools used telecommunications with students?

- 0-2 years
- 2-5 years
- 5-8 years
- More than 8 years

30- How often do you collaborate with other technology coordinators in the use of technology?

- never
- Occasionally
- frequently
- continuously, almost on a daily basis

31- If so, which of the following methods do you use to collaborate?

- E-mail
- Personal correspondence
- Conferences
- Newsgroups, listservers

Training and Professional Development:

32- To what extent do your schools provide teachers with regular out-of-class preparation time for learning and integrating technology into the curriculum?

- Weekly
- Monthly
- Each term
- Yearly

- 33- What type of technology training have teachers received?
- No training
 - Basic Computer Literacy (on/off operations, how to run programs)
 - Computer applications (word processing, spreadsheet, presentation)
 - Computer integration into the curriculum
- 34- About what percent of the elementary teachers in your district have had training?
- 0%-30%
 - 31%-60%
 - 61%-80%
 - More than 80%
- 35- To what extent have teachers been involved in making decisions regarding using computers in the classrooms or schools?
- none
 - some
 - considerable
 - extensively
- 36- How have teachers been provided training in your schools? (Rank order all that apply, 1 as the greatest amount and 5 as the least).
- school or district workshops
 - Seminars
 - Conferences
 - College courses
 - Self-taught
 - Others...
- 37- What type of technology- related professional development do you provide to your teachers? (check all applicable)
- basic introduction to hardware/ word processor applications
 - multi-day courses run by public or private technology training organizations
 - on-site visits to technology- using classrooms
 - on-line distance learning professional development courses
 - in-school one-on-one professional mentoring on a consistent or just-in-time basis
 - collaborative team-teaching opportunities with technology proficient instructors
- 38- How many technology-related professional development hours have the majority of teachers completed?
- 0 – 30 hours
 - 31- 50 hours
 - 51- 70 hours
 - over 70 hours

39- What is your future plan regarding providing training to teachers to keep them up to date to the changes in computer hardware and applications?

Internet:

Are your elementary schools connected to the internet?..... if yes please answer the following questions.

40- Approximately what percent of your classrooms are connected to the Internet?

- no Internet access in the school
- Internet access available in the library or computer lab
- less than 50% of classrooms are connected to the Internet
- more than 50% of classrooms are connected to the Internet

41- What uses do your teachers make of the Internet?

- Develop Net skills/awareness
- get information for personal use
- professional sharing, planning, and preparation
- creating curriculum
- Student use

42- How often do teachers use the Internet for preparation for their classes?

- never
- rare
- some days
- most days
- not applicable

43- Please check the types of internet learning activities teachers use with students in your schools:

- none
- e-mail
- telementoring writing
- collaborative writing
- collaborative science
- live events
- live chats
- www publishing
- community interviews/ reports
- contest e.g. web design
- Research
- others...

44- How often do teachers require students to use the Internet for assignments?

- Not required
- Once a week
- two times a week
- three times a week
- more than three times

45- How do teachers direct student Internet use?

- Within the classroom
- Through the library
- students do this on their own
- Other _____

46- What approximately is the proportion of students that teachers have involved in these kinds of Internet learning activities?

- 0%-20%
- 21%-40%
- 41%-60%
- 61%-80%
- more than 80%

47- Regarding Internet use, Please check whether each of the following is a major problem, occasional problem, or no problem.

	No Problem	Occasional	Major problem
Slow	_____	_____	_____
Unreliable	_____	_____	_____
Too complicated to access	_____	_____	_____
Low quality materials	_____	_____	_____
Tech support lacking,	_____	_____	_____
Hard to find information,	_____	_____	_____
Information overload	_____	_____	_____
E-mail overload	_____	_____	_____
Hard to use with low achieving students	_____	_____	_____
Time for use	_____	_____	_____
Inconvenient access	_____	_____	_____
Not enough connections	_____	_____	_____
Administrators support/ Initiative lacking	_____	_____	_____
District financial lacking	_____	_____	_____
Privacy	_____	_____	_____

48- What percent of your students have an e-mail address provided by the school?

- 0%-25%
- 26% - 50%
- 51% - 75%
- 76%-100%

49- What percent of your teachers have a LAN e-mail address provided by the school?

- 0%-25%
- 26% - 50%
- 51% - 75%
- 75%-100%

50- What kind of web page do the schools have?

- Individual school site
- School district site
- Independent by teachers
- No web page

51- What is your future plan regarding school connection to the Internet?

Please indicate your preference

_____ Yes, I will be available for a short telephone interview if needed

My telephone number is _____

_____ No, I will not be available.

APPINDEX C
FOLLOW UP LETTER



University of North Texas

*Department of Teacher Education
and Administration*

Barnes, Randy
Technology Director
PERRYTON ISD
P O BOX 1048
PERRYTON, TX 79070-1048

Several weeks ago, we sent you a survey to learn about your perspective on the current and future trends of computer uses in elementary schools. We are still desirous of obtaining your responses which will significantly contribute toward the success of our research.

We will appreciate it if you complete the survey and return it as soon as your time permits. If you need another copy of the survey, we will be more than happy to send it to you.

Any comments that you may have are welcomed. You can call us at (940)565-6728 or e-mail at hma0004@unt.edu.

We will be most pleased to send you a summary of the survey, if you desire. Your cooperation is greatly appreciated.

Sincerely yours

Cliff Hardy, Ed.D
Robert K. Bane, Ed.D
Co-Chairman

Hamed Al-Awidi
Doctoral Candidate
Curriculum& Instruction

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