4-1-2000

A Perspective of Technology Supervisors In Support of Schools

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A Perspective of Technology Supervisors In Support of Schools

A Thesis presented to the

College of Education

and the

Faculty of the Graduate College

University of Nebraska

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

University of Nebraska at Omaha

By

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April 2000

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Thesis Acceptance

Acceptance for the faculty of the Graduate College, University of Nebraska, in partial fulfillment of the requirements for the degree Masters of Sciences, University of Nebraska at Omaha.

Committee

Chairperson

Date 5/2/2000

Abstract

The basic concern of this study was to begin looking at how to best implement the Internet into the classroom from the perspective of technology supervisors. Questioning the ifs and the why's of the Internet are not the primary focus of this study. Many studies are investigating the effectiveness of the Internet in education. The focus here is on the hows. Such as how does a school or district implement an effective Internet strategy? Or what resources might be needed for an adequate implementation strategy. Even more basic to this thesis are questions about who is shouldering the burden for implementing this strategy and how are they empowered, if at all, to do their job. Effective implementation of the Internet and the effective use of Internet technologies in education require a sound understanding of how children learn, something we know quite a bit about, and how technologies can be molded and crafted to this end, something we know little about. Hence, the hows are the hard part. Most importantly this study was designed to look at this problem from a different perspective: that of the technology leader or coordinator, who is responsible for such efforts within a school district.

A questionnaire was distributed over the Internet to approximately 100 well-known technology leaders/coordinators throughout the state of Nebraska. The questionnaire focused on four areas: Demographics, The Impact of the Internet, The Characteristics of Teachers Who Use the Web and The Division of Labor. After several weeks of collection the data was analyzed.

The results of the study showed that while many technology coordinators believe that the Internet is a powerful tool for learning, the actual application both, in the classroom and administratively, leaves much to be desired. Many times teachers lack training in even basic computer skills, forcing technology leaders/coordinators to spend most of their time serving as an on-site help desk. Often, technology leaders/coordinators are in general over tasked and find themselves having little influence within schools or districts.

The recommendations provided were to: 1) Increase technology training for teachers, 2) Pay technology leaders/coordinators on an administrative scale, 3) Provide merit pay for teachers who learn technology skills and 4) Further study lesson development with regard to technology incorporation.

Acknowledgements

The completion of this thesis came about through the assistance of many people.

Dr. Neal Grandgenett, committee chairperson, gave me so much help and guidance that I will always be grateful for his help. I also want to thank the other members of the committee who sacrificed their time on my behalf, Dr. Elliot Ostler and Dr. Jim Akers.

I also want to thank my family for putting up with all of the tasks I had to do to make this thing happen.

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Chapter 1

Introduction

We have been overrun. Computers and computer technology have overrun our society. Businesses and governments would never operate without them, and our schools are quickly following suit. Why? Technology has always been seen as a means to increase productivity. The word technology comes from Greek *tekhne*, which means "craft" or "art," and *logia,* which means the "study of." Essentially this means the study of crafting resources (Kurzweil, 1999). Generally, technology's purpose is to enhance productivity. Business exploits technology for productivity's sake regularly. Our country's leadership sees education benefiting the same way businesses have benefited by claiming it is essential for schools to get "on-line" now. Getting "on-line" is an expensive proposition, however, and many fear that Moore's law will cause our school children to fall too far behind where society is going. Moore's law simply states that every two years computer processing power doubles, thereby causing an evolutionary change in the technology (Kurzweil, 1999). To see the significance, think about how much has changed in computers and their application over the past five to ten years. Imagine trying to get a job in today's workforce armed only with the skills required to operate a 386 or an Apple II? Worse yet, competing with others in our society being unable to perform even the simplest of Internet functions?

Questioning the ifs and the whys of the Internet are not the primary focus of this study. Many studies are investigating the effectiveness of the Internet in education. The focus here is on the hows; such as how does a school or district implement an effective

Internet strategy? Or what resources are needed for an adequate implementation strategy? Even more basic are questions about who is shouldering the burden for implementing this strategy and how are they empowered, if at all, to do their job? Effective implementation of the Internet and Internet technologies in education requires a sound understanding of how children learn, something we know quite a bit about, and how technologies can be molded and crafted to this end, something we know little about. Hence, the hows are the hard part.

Confusing the issue of how is the issue of access. The push for universal access has caused the Internet access within public schools to rise from 35% in 1994 to 78% in 1997 (NCES, 1998). Schools spent two billion dollars on access in the first 75 days of what some have termed the "Gore tax"(Timulty and Dickerson, 1998).

The "Gore Tax"

The real name for the E-rate is the Universal Service program. The program was authorized under the Telecommunications Act of 1996. The program provides "discounts on telecommunications and Internet technologies to elementary and secondary schools and public libraries across the country" (Education and Library Networks Coalition, 1999). Almost every elementary and secondary school in the nation is eligible to file for E-rate discounts. The discounts themselves range from 20% to 90%. The actual discount is computed using the levels of eligibility under the school lunch program. For libraries the level of eligibility is based upon the level of eligibility of the school district where it is located (Education and Library Networks Coalition, 1999). Over 30,000 schools applied for E-rate discounts in its first year, and these requests equaled well over 2 billion

dollars. The FCC only funded 1.2 billion dollars. Last year, the FCC received over 32,000 requests.

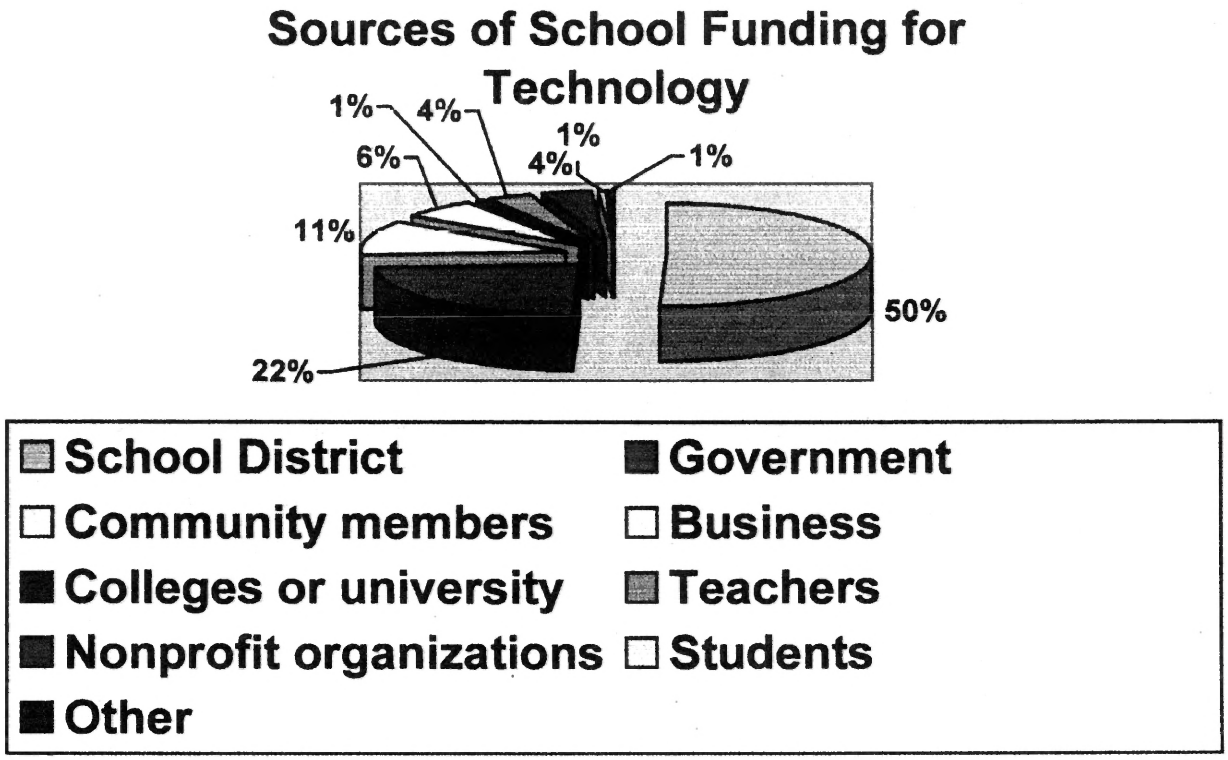
Despite being a high-ticket item, the E-rate is effective. In a 1999 report done by EdLiNC (Education and Libraries Networks Coalition), several key findings were made:

1. The public strongly supports the introduction of information technology into our nation's schools and libraries. As information technology becomes more and more important in our global economy, Americans have come to overwhelmingly support the need for computers in our nation's classrooms. A non-partisan poll commissioned by EdLiNC found that 87% of respondents support the mission of the E-rate program.
2. Schools and libraries are eager to adopt technology, but prior to the E-rate many lacked the funding to do so. Schools and libraries filed more than 32,000 applications for E-rate support in the second year of the program, increased by more than 2,000 over year one. These year-two applications are requesting over 2.4 billion in discounts to help pay for Internet connections, telecommunications services and internal connections in public libraries and elementary and secondary schools.
3. Education technology benefits kids and lifelong learners. The introduction of information technologies in our schools and libraries has dramatically helped learners of all ages – from children to senior citizens – looking for information on the latest developments around the world.
4. The E-rate program's full effectiveness has been hampered by a shortage of funding. Schools' and libraries' need for discounts dramatically outstripped the amount of funding provided. In order to make the E-rate work effectively for all schools and libraries, full funding for the program should be restored.

Other Players

Government isn't the only supporter of technology use in schools. Substantial contributions flow from all aspects of our society. Figure 1 shows where and from what sources schools receive their funding for education and operations.

Figure 1 -- Sources of School Funding for Technology



Shows the various funding sources for school's telecommunication initiatives and their relative importance with respect to size of funding (NCES, 1998)

Background of the Problem

Nebraska is right in the middle of the push for more technology in the schools. For example, in 1996 the Nebraska State Board of Education established the following objectives for the development of technology in Nebraska schools. Here is only a brief illustration:

- Assure that all students have access to quality learning experiences using modern technologies in their learning environments.

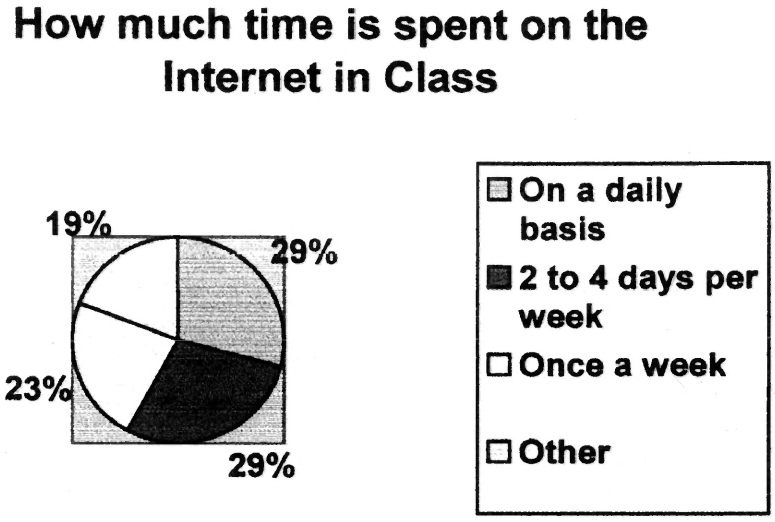
- Provide staff members with easy access to technology, ongoing staff development and training opportunities in the effective use of technology in learning.

Although this represents a past state initiative, many Nebraska initiatives are still applicable today and include:

- Plan and Coordinate Technology Infrastructures
- Interactive Distance Learning Networks
- Internet Connections
- Local School Planning Models
- Technology Literacy Challenge Grant Programs
- Staff Development Plans
- Minimum Technology Competencies for Educators
- Minimum Technology Competencies for K-12 Students
- Class Technology Resources

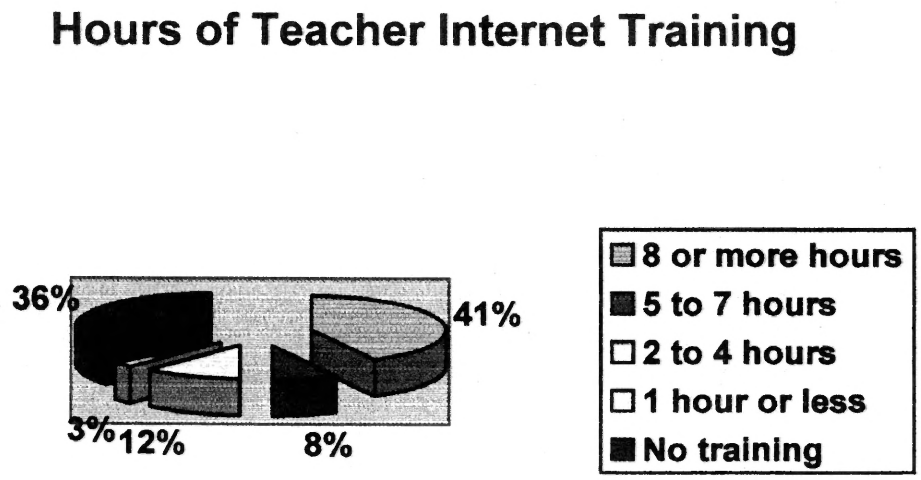
All of this emphasis drives the focus towards increasing the Internet usage in the classroom and more importantly, the growth of its use during instruction time. The number of teachers at the national level who used the Internet for teaching purposes reached 65.2% in 1997, and teachers who are connected at home reached 55.8%(Quality Education Data, 1999). Although these percentages are significant, the following figure shows the breakdown of Internet usage for actual instruction time:

Figure 2 -- How much time is spent on the Internet in Class



This figure shows the frequency that the Internet is used for instruction in class. Teachers are using the Internet more and more, but is training keeping up? When asked, only 49.8% of teachers felt they were "moderately prepared" to use the Internet in teaching (Quality Education Data, 1999). Meanwhile 34.9% felt "well prepared" and 15.3% felt they are "not well prepared." In addition, 44.1% of teachers claim they are self-taught, 20.3% receive actual in-service training, and 15.7% had in-service district training. Teachers also claim that 34.1% of their training comes from other sources such as universities, other staff members, workshops, etc.(Quality Education Data, 1999). Quality is important but so is quantity. Here is a figure illustrating the natural breakdown of the amount of Internet training teachers have typically received.

Figure 3 -- Hours of Internet Training for Teachers.



This figure shows the number of hours of actual training teachers have received with regard to the use of the Internet (Quality Education Data, 1999)

Significance of the Problem

Despite Nebraska's efforts to not only provide access but also promote quality, the job of integrating the Internet into education may be quite difficult and, unfortunately, on a national scale the statistics above indicate that some work still needs to be done on a wider scale. Consider that 65.2% of teachers at the national level used the Internet for instructional purposes and 29% percent of them used it on a daily basis, yet 36% have received no training whatsoever (Quality Education Data, 1999). It was easy to see that only 34.9% of the teachers who use the Internet felt "well prepared" (Quality Education

Data, 1999); particularly when considering the fact that 44.1% of teachers are self-taught (Quality Education Data, 1999). Although learning by one's self can indeed be an enjoyable, fulfilling experience; yet a lack of school or district methodology for teacher training shows a serious shortfall in Internet implementation in the classroom.

Furthermore, since 78% of all classrooms are now "on-line" (NCES, 1998) more vigilance and control is required. Schools just don't let anyone teach reading or math, nor do they allow free reign over all the school's teaching resources. Then why should Internet use not be monitored and checked for quality and effectiveness? The most powerful tools are those that can be molded and shaped dynamically to fit a need. However, skill and experience is often required to mold and shape a tool correctly. Otherwise, the tools loose effectiveness and become at best a poor learning aid and at worst a distraction.

Vice President Gore often suggests that the Internet is one of the main tools for preparing our children for the next century (Gore, 1998). In a century where we will fully convert to an information/knowledge-based society, these societal changes are causing us to rethink our views on education. As Osberg (1993) puts it:

> As we move towards being an information/knowledge-based society, access to and ability to work with diverse sources and types of information will be very important. At minimum, it is my belief that the only way to accommodate the needs of the individual within such a society is through the use of technology, specifically the use of computers (p.2).

The statement above might be restated as "the **effective** use of computers." So not only is technology driving the changes in our society but it is also the accepted way for helping prepare our children for such changes.

The person who shoulders most, if not all, of this burden at the school level is the school's Technology Coordinator. The Technology Coordinator is the front line in a school's technology implementation. In general, he serves many vital functions. First, he acts as the school's "help desk," where teachers look to them to answer questions and resolve technology related problems. Second, he performs software and hardware upgrades and fixes to the school's computer systems. Last, he is often seen as the school's technology and Internet experts. Because of these responsibilities, they perform many ad hoc tasks on a daily basis.

Generally, Technology Coordinators are typically former teachers who have or were volunteered for their position. Also, they tend to be paid on a teacher's scale, which gives them limited influence. In addition, because of their position they have a high degree of responsibility, often mixed with a low degree of authority.

Reason for the Study

The big questions facing education, and the use of technology today, appear to be essentially are we getting the "biggest bang for our buck"? The perceptions of Technology Coordinators related to such questions will be key to addressing such questions.

Research Questions

The following are some common questions that are of particular interest in understanding the complexity of the issues and the importance of examining the perceptions of Technology Coordinators on the teacher's use of the Internet based technologies in the classroom; they will serve as the research questions for this study:

1. As perceived by Technology Coordinators, why are teachers using the Internet? Are they just using it as a crutch or a tool? Are they using it just because they are supposed to? Is the teacher merely using the Internet just because it is there? Do teachers try to mold the technology or do they let it mold them?

   These questions are linked to the motives for using the Internet. When tools are used just for the sake of using them or to fulfill a principal's goal or a district goal, they often don't have a lasting effect. Teachers typically know best how to motivate and teach their pupils. However, if teachers don't use this knowledge to shape and focus the technology available, then its effectiveness is questionable.

2. As perceived by Technology Coordinators, are there teacher characteristics or teaching philosophies which tend to utilize computers more effectively? Are particular subjects more supportable with technology? What types of teachers use technology?

   These questions, and the related perceptions of the technology leaders, are linked to finding the teaching methods which direct the power of the Internet more effectively in the classroom. If there are certain methods which provide for better instruction through the use of the Internet, how easy is it to incorporate them?

3. How has the increase in using the Internet for teaching purposes affected the technology leaders within the districts? Are the technology coordinators overworked? What tasks are they performing? Are these tasks the best use of their time? Could properly trained teachers better perform these tasks?

For such questions, it is of interest how Technology Coordinators perceive how proper teacher training might help improve the quality of Internet use in the classroom. Perhaps better-trained teachers would help schools or even district resources focus on improving Internet. In other words, perhaps focus technology resources on improving instruction rather than a maintenance of technology.

4. As perceived by the technology coordinator, are teachers using the resources available to them effectively? Do they know what resources are available? Do they only draw on them in an emergency? How well do they frame their classroom requirements? Do they see a technology leader merely providing a list of useful Internet pages? Are Internet resources really being integrated into the classroom?

Theses questions of interest examine how Technology Leaders perceive how well teachers use the resources around them. The concerned, knowledgeable teacher would know and effectively use the resources available. On the other side, technology leaders have to get the word out in the schools and to teachers as to what resources are available and how to access them. Also, effective implementation of technology often requires a focused, goal-driven effort. Districts, schools and teachers must no doubt work together to provide a foundation where technology can thrive collaboratively, versus a lone teacher making an impact using the Internet but never sharing.

Statement of the Problem

The educational leadership of Nebraska, and of the Nation itself, would appear to want to leverage the power of the Internet for the effective education of today's children.

Unfortunately, teachers have often been left without clear guidance in ways to implement the Internet in their classrooms. Given the complexity of some of the technologies involved, this could lead to an ineffective use. It is important to understand these issues more fully, and the first line support mechanism, the school technology coordinators or specialists, might well have valuable perspectives on these issues. Considering all the resources used to bring children the Internet, according to Nebraska's educational technology leaders (many of whom are teachers or former teachers), are children getting the most benefit this technology and the available resources can provide? If not, what do they think can be done?

Survey Topics:

Listed below are the specific topics the thesis related survey of technology leaders covered related to the research questions above:

1. How has the Internet impacted the role of a technology leader?
    a) How much of your time is consumed with tasks related to the Internet?
    b) What are these tasks?
    c) If you didn't have responsibilities for the Internet, how much of your workload would be decreased?
2. What are the characteristics of teachers who use the Internet consistently?
    a) What subjects do they teach?
    b) What schools?
    c) What tasks, if any, do they ask you to perform?
3. How many teachers use your resources on a consistent basis?

4. What are the main reasons why teachers use the Internet?
5. What are some of the most innovative educational uses for the Internet?
6. What do you consider to be the teacher's job in building Internet based lessons?
7. What do you consider your job should be in assisting a teacher in building Internet based lessons?
8. How many hours per day do you spend on doing what is normally considered the teacher's job in building Internet based lessons?
9. In approximate terms, how many hours of work you have backlogged?
10. On average, how much overtime do you work?
11. What would help you the most in doing your job?
12. What do you think teachers need to know in building Internet based lessons?
13. What training do you think teachers need?

Scope of the Study

This survey was sent to approximately100 of Nebraska's well-known technology leaders via a web-based survey. The respondents were given two weeks to complete it. Within that period, 47 responses were received.

Definition of Terms

World Wide Web or Web or the Internet -- an inter-linked public domain capable of transporting information worldwide.

On-line – an active connection to the Internet.

Technology Coordinators – employees who work more than 50% of their day on directly supporting Internet and technology issues for schools.

Leveraging – "getting the biggest bang for your buck," the most efficient use of technology resources to teach in the most effective manner.

Assumptions

In this study it was assumed that the technology coordinators were experienced teachers and knowledgeable in the proper application of technology in the classroom.

Chapter 2

Introduction

The purpose of this chapter is to provide a framework from which to evaluate the effectiveness of the implementation of the Internet in Nebraska classrooms, and the importance of examining the related perceptions of school technology coordinators. To give direction to this inquiry the following general areas were investigated: history, importance, implementation, successful examples, and the school technology leadership. Throughout this chapter the terms "computers" and "Internet" are used somewhat interchangeably. Since, after all, the Internet is a collection of interconnected computers. However, all the examples provided involve the Internet or Internet specific technologies.

History

The Internet was born over 20 years ago by the Department of Defense. Its original purpose was to provide survivable communications after a limited nuclear attack. In the late 1980's the National Science Foundation extended the network to include scientific institutions and institutions of higher learning. Since then the Internet has grown commercially. The number of Internet hosts from 9 June 1998 to 9 June 1999 jumped from 34.653 million to 57.642 million alone (http://www.argreenhouse.com/netsizer/daily/table.html). At the time of this thesis, there were 5,730,700 thousand .edu (education) domains (http://www.argreenhouse.com/netsizer/daily/table.html).

A National Priority

President Clinton has made inclusion of the Internet into today's classrooms a national priority.

> In our schools, every classroom in America must be connected to the information superhighway with computers and good software and well trained teachers...I ask congress to support this education technology initiative so that we can make sure this national partnership succeeds. (State of the Union, January 23, 1996)

This emphasis has translated into an initiative from the federal government called "America's Technical Literacy Challenge." This challenge is based upon four "pillars":

1. Provide all teachers with the training and support that they need to help students learn through computers and the information superhighway.
2. Develop effective and engaging software and on-line learning resources as an integral part of the school curriculum.
3. Provide access to modern computers for all teachers and students.
4. Connect every school and classroom in America to the information superhighway. (Nebraska K-12 Internet Evaluation Progress Report p2)

These initiatives have sparked a substantial 5.2 billion dollars in education technology expenditures, which outpaces the 4.3 billion spent last year (Ravitch, 1998). The President's advisory council on the National Information Infrastructure has fueled much of this emerging effort. This effort (1996) named the "KickStart initiative," included extensive data analysis, review of research, discussion, and site visits to schools. They concluded that there were nine distinct benefits of educational technology:

1. It brings the world to the classroom.
2. It enables students to learn by doing.
3. It encourages students and parents with limited English to learn English.
4. It makes parents partners in their children's education.
5. It makes it possible for educators to teach at more than one location.
6. It enables educators to accommodate varied learning styles.
7. It encourages students to become life long learners.
8. It enables administrators and educators to reduce record keeping time.
9. It makes students proficient in basic society related technology skills.

Regarding this last point, computer literacy will become increasingly significant. In 1983, the number of jobs requiring computer skills was 25 percent. In 1993 the number rose to 47 percent. Estimates indicate that by the year 2000, 60 percent of the nation's jobs will require computer literacy (Oppenheimer, 1997). On top of all that, jobs which require computer literate employees pay 10 to 15 percent more than those that don't (Oppenheimer, 1997).

Computers Good or Bad?

Despite this national effort to bring computers into the schools many still side with Henry David Thoreau who states:

> Our inventions are wont to be pretty things. They are but improved means to an unimproved end. We are in great haste to construct a magnetic telegraph from Maine to Texas; but Maine and Texas, it maybe, have nothing important to communicate." (Stoll, 1995)

To this end many are critical of computer use in the classroom citing that a computer can never replace a teacher as some have proposed (Perelman, 1992, p.20-21). This may be true. Computers are a tool and not the means to an end. In the military, tools that improve the capability of a unit or squadron are called force multipliers. They exponentially augment effectiveness. When used correctly computers can be a force multiplier in education. Here are some studies which emphasize the point:

- Intelligent tutors (simulations, animations, sound and video delivered over a network or on a stand-alone machine) can achieve a two sigma effect which is the same effect achieved by on-on-one human tutoring over classroom lectures. (Woolf, 1996)

- Students who used a microcomputer-based laboratory were able to make better inferences and master more details than those who didn't. The 1990 study found the following advantages of computers (Friedler, Y., Nachmias, R., and Linn, M.,1990):

    1. Represent multiple information in multiple modes or forms to facilitate learning.
    2. Helps the student to make connections between the phenomena the students investigate.
    3. Aids in verbal representation of the results.
    4. Aids in graphical representation of the results.
    5. It allows students to achieve more accurate outcomes because the computer gives them multiple ways for representing the data.

6. They reduce the workload for students. They can concentrate on the problem rather than how to present it.
7. Eases the load on their short-term memory through actually collecting the data, allowing the students to focus on the information gained from the observations done in this study.

- After ten years of a series of studies, the Department of Education determined that students in classes that use computers outperform their peers on standardized tests of basic skills by an average of 30% (Kulik, Kulik, and Bangert-Downs, 1991).

- A study conducted by Fletcher, Hawley, and Piele in 1990 found that Computer Assisted Instruction caused a 40% increase in achievement over traditional methods and cost roughly $13 less than traditional methods. This is especially interesting when considering the fact that technology costs have dropped significantly over the past nine years. (Fletcher, Hawley, and Piele, 1990)

- A Congressional mandated review of 47 studies of multimedia instruction found a 30% timesaving, an improvement of .5 standard deviations and a 30-40% cost savings. (Fletcher, 1990)

- Another study found that computer assisted instruction may be as much as three times more cost effective than tutoring. (Niemic, Sikorski and Walberg, 1989)

The Phases of Educational Technology Implementation

Essentially there have been four generations of educational technology thought (Winn, 1993). The first generation focused solely upon the content of educational technology and was built around several assumptions. The first assumption was that students will learn what you want them to learn if enough is known about the subject matter, how the subject matter will be taught, and the learning environment. The second assumption was that everything that can be taught should be broken down into smaller concepts taught individually, and that the aggregate of which will communicate the desired concept. The last assumption is that the systematic application of these design techniques will work effectively without the intervention of designers or teachers. This generation of thought was based upon the tenants of behavioral theory grounded in traditional educational theory and instructional design (Winn, 1993).

The second generation of educational technology thought focused upon the actual presentation of concepts. This came about from the realization that how students process information has a greater impact on what they learn than any of the other concepts of the previous theory. How did this come about? Psychologists through research realized that no two students are alike in their psychological make up and the differences were significant enough that different teaching strategies were needed (Winn, 1993).

The third generation found that interactivity was the key to learning. The nature of the interaction between the student and instruction is more powerful in learning than content or presentation (Winn, 1993). The actual learning comes from the interaction

between the student and the program. This generation pushed to bring about the interactive educational programming that is so prevalent in today's educational software.

The fourth is constructivism. The basic assumption is that students construct knowledge themselves; the knowledge doesn't come from the courseware (Winn, 1993). This is a radical change from how education has been thought of in the past. Essentially, constructivism revolves around trying to explain how learners make meaning (Osberg, 1992). Constructivists have theorized about how learners make meaning and they have found that there are three components or processes that the human mind goes through. Dr. William Winn (1993) theorized the following: First, we all build models in our minds about our environment, how things interact in that environment and how things behave in that environment. We do this because humans are informationally closed systems where we respond only to the changes in our environment. Learning doesn't necessarily add to knowledge but serves to make changes to the mental models we have made of our world. Second, each person is unique; hence there is no standard way to perceive the world. The meaning of a concept or idea can vary from student to student. Last, since we all perceive things differently, the only way to communicate meaning comes from our social context. In order to communicate, society has agreed on a system of symbols to help communicate our models to one another. Even this is not fool-proof. Meanings of symbols might change completely or only vary to some degree and become barriers to understanding (pp.7-8). Essentially, the focus here is on facilitating the learning process rather than teaching concepts; student focused versus teacher focused education.

This would be a good time to reinforce the importance of the perceptions and leadership of the school technology leader in leveraging technology. Several studies show the importance of the technology leader. In 1998, Cerny investigated the factors that affect student Internet use in schools. Bivariate correlations found that teacher use of the Internet was the greatest factor. However, on-site support plays a major role (Cerny, 1998). Common sense dictates that teachers will feel more comfortable relying on technology in the classroom with better technology support on hand.

Based upon this background of research and thought, educators and their tools must emphasize high order thinking skills in order to help the student derive meaning. Some of the things that education and educational technology must do are: 1) Students find and define relationships within and outside of the concepts and ideas they must learn. 2) Students must understand why these relationships exist. 3) Students must achieve transfer of the knowledge they have already learned (Osberg, 1993). What is transfer? Osberg (1993) answered this question:

> Transfer is the ability to map appropriate processes and analogies from one set of circumstances to another, developing a deeper understanding regarding the circumstances at hand. These are essentially a combination of pattern recognition and action-sequence skills, utilizing generalization, discrimination, proceduralization, and composition of sequences (Gagne, 1985, p. 8).

In a nutshell, in the information age students are the ones who make the meaning (McKenzie, 1998). In today's society students must learn how to manage, analyze, critique, cross-reference and transform it into useable knowledge (Harris, 1996). In order to perform these functions students must develop the following cognitive habits:

1. Framing essential and subsidiary questions
2. Exploiting serendipitous discoveries
3. Asking for assistance
4. Sorting and analyzing data
5. Screening and compacting garbage
6. Maintaining the "big picture"
7. Building and testing models and hypotheses
8. Creating new answers to old questions
9. Seeing what's missing
10. Recognizing anomaly

The reader should agree that these habits are necessary in any worthwhile human endeavor. We can see how they would be useful and important for any child to learn. The Internet appears to be uniquely qualified to help us develop them.

Helping Students Make Meaning

As stated before, in the information age students are the ones who make the meaning (McKenzie, 1998). Which begs the question, how do we use the Internet to help students make meaning? Renowned computer expert and author, Cliff Stoll, can help us understand. In his book, Silicon Snake Oil, he gives us some ideas by way of criticism of some of today's applications of educational technology (1995). First, he points out that many programs suffer from what he

terms the "tyranny of the right answer." This means that each question and learning goal must be resolved into one or a series of right answers. For example, it's like a true or false exam or a multiple-choice exam. Everything boils down to a black or white type answer. Students are never required to justify their response, impetus for critical thought. Concepts or ideas become over-simplified ignoring gray areas or fine points. Last, he relates that computers tend to accent the product over the process. Because computers act as a "black box," an object whose internal processes and logic are unknown, sight is lost of how the answer is reached. In education, how the answer is derived tends to be more important than the answer itself. For example, a student can memorize the fact that 2+2=4 without learning addition; which is fine as long as everything fits into the 2+2=4 paradigm. However, in real life a child will need to know how to add 4+4 or 10+10, etc. In this case, addition, the process is far more important than the product, 2+2=4. Therefore, effective Internet application designed for education must focus on the process student's use rather than only getting the right answer.

On a positive note, Stoll provides some common sense recommendations on what children need to learn. First, children need to be taught to think critically. These higher order thinking skills would give them the skills necessary to make intelligent rational decisions. They would help students recognize truth from error and function effectively for society's betterment. These critical thinking skills are the cognitive habits cited earlier. Here is another example of their use in the context of the web. A student doing research on emission standards over the web must be able to filter out erroneous results, determine which sources hold

more weight (i.e. a formal, unbiased study vs. a diatribe on someone's home page) and synthesize their results. This is not much different than what has been done in the past except that the student never has to leave the classroom, and they have more information than what is found in a normal public library. Granted there is a lot of junk on the web, but shouldn't we teach our students how to recognize and eliminate it? Last, Stoll argues that children must be taught to overcome passive learning. Passive learning is where the student acts as a sponge just sitting in class soaking up information only to regurgitate it for the next exam. Active learning also incorporates the cognitive habits mentioned before. We can determine active learning when (McKenzie, 1998):

- Children are engaged in authentic and multidisciplinary tasks
- Students participate in interactive learning
- Students work collaboratively
- Students learn through exploration
- Students are responsible for their learning
- Students are strategic

For example, a passive learning Internet-centered lesson often acts like flash cards, effective for simple tasks like addition or multiplication. Here the computer is the focal point of the learning, every thing relies on it, there's no interdisciplinary study, no real interaction and no collaboration. On the other hand, active learning application involves the student's use of the Internet to gather data, draw conclusions, and justify their results. Here the Internet is a tool used for learning, the focus being on the objective not the computer.

The "Nuts and Bolts"

The ideas outlined above are some lofty, worthy goals for schools to achieve, and difficult goals for school technology leaders to try to support at the school level. These goals need to be met by doing more than just putting computers in the schools and hooking up classrooms to the Internet. Healy, in her book Failure to Connect (1998), poses some serious questions that must be asked in order to maximize computer use in the schools:

1. How can computer technology help achieve our educational goals? Are these goals compatible with the interests, abilities, and needs of today's students? [We must do more than put computers in and turn them on; we must incorporate computers into the curriculum.]
2. How and why will this experience improve the quality of learning sufficiently to justify the cost and time involved? [We must have defined learning objects that computers will fulfill.]
3. What will it have to replace (family activities, silent reading, social playtime, art, music, gym, recess, foreign language) and is the trade-off acceptable? [Actually computers, intelligently learned can help with many of these areas. What this author is trying to get at is that there are only so many hours in a day and schools must achieve a balance.]
4. Who make software decisions and on what criteria? [Are schools thinking about choosing software that achieves an aim, or do they just buy the hottest thing out there?]
5. Are we willing to loosen traditional top-down structures of education and produce students who will think—and question? [Computers have been shown to shift the balance of power in a classroom, causing in many instances, teachers to fill more of a facilitator role. (Grazing the Net [pro internet])
6. What content can be taught, and how do we measure the outcomes? Are computers the best—not just the trendiest—way to do this particular job? [Maybe a better way to phrase this question is, how are computers going to aide the teacher in teaching the desired content?]

Once schools have devised an effective rationale for incorporation of the Internet into the classroom, integration of the Internet into the school curriculum

often becomes an obstacle. Foa, Schwab and Johnson, experts who have visited and worked with many schools that have received grants from the U.S. West Foundation, provide some simple advice (Healy, 1998)):

1. *Support the innovators* willing to devote energy and commit to change. They may be teachers, principals, or superintendents who under stand the potential of technology and cannot only develop effective uses but also gain resources by grant-writing and other means.

2. *Plan for teacher education first.* Good training is expensive and on-going. Teachers must have access to the equipment and time to practice while they are learning about it.

3. *Technical support needs to be on-site, individualized and teacher-oriented.* Having to phone for help and wait endlessly for needed repairs makes technology more of a nuisance than a benefit in a busy classroom.

4. *Move forward with those who are ready.* Some teachers will resist change. Allow others to become models of what can be accomplished.

5. *Expect changes in the school power structure.* Administrators and teachers may feel threatened. "Techies" may try to gain control and prescribe placement or use of computers. Sufficient training of all personnel should minimize conflicts.

6. *Successful integration of classroom technology implies changes of huge magnitude in educational philosophy, classroom management, and curricular goals.* "The common belief," state the authors, "is that if one simply teaches teachers how to use computers and telecommunications and provides the necessary equipment, classroom teaching and learning will improve automatically. Nothing could be farther from the truth. For the technology to be used optimally, teachers must be comfortable with a constructivist or project-based, problem-solving approach to learning; they must be willing to tolerate students' progressing independently and at widely varying paces; they must trust students to sometimes know more than they do and to take on the role of expert teacher... and they must be flexible enough to change directions when technical glitches occur." These demands often

represent a departure from professional experience and may even be at odds with core beliefs.

7. *Build learning from what is known for teachers as well as students.* Introducing teachers to new technologies is most effectively done by reducing the implicit threat of change. For example, emphasize that multimedia is not an end in itself but rather one more means to accomplish familiar educational goals.

8. *Consider the social and emotional aspects of learning to use technologies.* Teachers need hands-on, personal encounters to understand how these programs can be of use to them, not abstruse explanations of the inner workings of the computers.

9. *Remember that change takes time.* "We are asking already over-worked individuals to undergo profound belief and habit transformation."

10. *Allow students to take responsibility for teaching others.* A cadre of classroom volunteer "experts" can help other students and troubleshoot simple problems.

11. *Use technology to link schools, parents and the wider community.* Parent technology-training sessions, interaction with senior citizen programs, and technology open houses bring the community into the school. Corporations may donate used equipment superior to what the school can afford. Students can make multimedia presentations at school board meetings, community events, and even in the legislature.

After establishing some reasoned-based heuristics for the implementation of the Internet in today's schools, some actual examples will be discussed.

The Technology Coordinator / Technology Leader

The person at the focal point of a school's or a district's technology implementation is indeed the school technology coordinator or leader. The role of

the computer coordinator, much like the field of Instructional Technology itself, is new to the world of education. A landmark work in the field that comes from Seels and Richey (1994), published by the Association for Educational Communications and Technology (AECT), defines Instructional Technology as:

> the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning.

Instructional technology is much broader in its scope now than when it was just in schools. Now IT graduates have many choices in the field of instructional technology to include health, government, home, business and industry. Given the competition for these resources, schools must make appropriate decisions at all levels to recruit and keep the best professionals. Cohen (1988) recalled that many previous technologies such as paperback books and educational television failed because they were not accompanied by systemic organizational change. These changes could also mean the difference between successful implementation or a huge waste of resources.

Pawloski (1999) suggests that the school librarian position has been well established and has emerged as the sole or central technological support person in a school (labeled "media technologists"); the position of district or building computer coordinator has only recently come about. The role and responsibilities of computer coordinators evolve as quickly as the technologies they facilitate, exacerbated by dissimilar or nonexistent job descriptions. Unfortunately, many technology coordinators are self-taught technologists who often have little or no management training.

In the *Roadmaps to Success: The Practicing Administrator's Leadership Series*, McKenzie (1992) presents the key educational technology leader as the administrator. In his chapter, the Technology Leader, he never discusses the computer coordinator but relates that schools rely on the heroic efforts of one individual. The author also advocates a more systematic approach, but he never provides any solutions. The author also includes a discussion on the necessary leadership activities required to increase technology use in a school system including: questioning old paradigms and approaches, providing time and incentive for staff development and access to traditional on-line literature, and the ongoing formative evaluation that helps weed out efforts that don't work and divert resources.

In a study done by Smith (1996), a correlation between administrator's technology competencies and technology-richness in a school is indicated. The mere existence of a technology coordinator, regardless of level of responsibility, was not a determining factor for technology-richness.

Currently, IT jobs are divided into two types of jobs: practitioners and researchers (Pawloski, 1999). Researchers tend to focus on evaluation. Practitioners tend to focus on day-to-day classroom activities. Their tasks focus on database security, hoaxes, viruses and blocking inappropriate sites. Vojtek (1997) found that coordinators do not hold administrative positions, limiting their authority and influence on district policy, evaluation and procedures, and don't know how to enact change.

Another study (Cerny, 1998) studied the factors which affect student use of the Internet in K-12 schools. A bivariate correlation found that student use was the most closely correlated with teacher use of the Internet. A second factor was the availability of on-site technical assistance. Additionally, data collected from 180 schools in Nebraska showed that teacher use of the Internet was the only significant predictor of student Internet use. Logic would also dictate that teachers are more comfortable using computer systems when on-site assistance is readily available.

However, it is also important to study the perceptions of the school technology leader/coordinator because they are the ones who are closest to the actual implementation. They are uniquely qualified to understand and grasp what actually is happening because they work closely with education and they keep their fingers on the pulse of technology. Teachers themselves would be more likely to see things only from education's perspective because, as stated above, most really don't have strong technology backgrounds. Technology can only be understood and implemented by those who have at least a basic knowledge of computers and what they can do.

We have already discussed above a few technologies that have failed due to a lack of a systematic organizational change. Technology leaders/coordinators represent this change in the organization, but they can tell us if the change has really taken place or if the change is merely cosmetic.

Some Successful Examples

At this point, a quick review of some successful programs that use the Internet will provide a bit of context for what school technology leaders are up against in supporting the Internet and the general use of computer technology at the classroom level. All of these programs appear to share the same characteristic—the Internet is only a tool in a wider conceptualized educational effort. They've found that the best way to learn through the use of the Internet is to incorporate it into the experience, instruction and other activities (Linn, 1996). These programs appear to have achieved an Internet based curriculum that emphasizes "making the thinking students need for knowledge integration visible and at the same time encouraging learners to take responsibility for their own learning." (Linn, 1996).

Many of the examples provided come from the math and science disciplines, as one illustrative environment. To be sure, other disciplines have the same potential.

The Cardiac Tutor

The Cardiac Tutor is a "knowledge-based" simulation designed to teach about cardiac resuscitation. It used an expert system engine, a form of artificial intelligence which incorporates extensive expert inputs. The Tutor offered:

- Automated tutorial help
- Customizes problems to suit the student's level of achievement

- Assists the learning process dynamically
- Provides positive feedback
- Categorizes and comments on poor performance

The program spawned active student discussions, problem review and textbook research.

In general, researchers have found that correct simulations using "knowledge-based" systems versus traditional scenario based systems overcome the "tyranny of the right answer." They can tell a student that an action is out of order or it is too late based upon an expert's action which is contextual. Also,

> "these systems can reason about tutorial goals and situations toward which the simulation should be directed. Dynamic assessments, on-line calculations and reasoning about user actions provide real-time comparisons between the student's and expert actions. Because the system's recommendations reflect the current context, they are often relevant and robust." (Woolf, 1996).

Overall they concluded:

> Simulations, animations, sound and video are also used to keep students learning and active. However, flashy graphics and simulations alone are not enough. For students to learn, the experience has to be authentic and relevant to their lives." (Woolf, 1996).

Knowledge Integration Environment

The Knowledge Integration Environment (KIE) is a project designed to take advantage of digital libraries "when on line information and resources are carefully wedded to learning activities" (Bell and Hoadley, 1996). This project was started through the realization that the content on the Internet varies with regard to quality and

credibility; we can't just use it as an "electronic textbook." We must teach students how to discriminate between "competing information resources." The project was built upon the Scaffolded Knowledge Integration framework (Bell and Hoadley, 1996); its principles are as follows:

1. Cognitive goals for instruction where less is more—connecting ideas with a student's own experiences.
2. Student autonomy
3. Scientific thinking made visible through computer representations—visualization
4. Social support during instruction

To the student, the KIE tool is an aggregate of two smaller tools: this Networked Evidence Database or NED and the SpeakEasy. The NED is a "pedagogically-cataloged index into science information on the web." Students use this tool for information gathering. In essence it is a database of web links that focus on a particular project. In building the NED the following was learned:

1. Advance Organization – it was discovered that students perform better when provided with short briefs that introduce the content and help direct students in their critical thinking on the subject.
2. Guidance—it's best when students can request guidance or a tutor who helps them apply the evidence to the task at hand.
3. Wise use of media – accentuate the right ideas through multimedia and downplay it in some instances.

4. Role of Authority – it's best when the student is encouraged to consider the source of the information critically.

The second sub tool is the SpeakEasy. Simply put, it is a chat room. Here students discuss results, argue points and are monitored by the instructor who can also participate anonymously or overtly. This tool helps students to actively transfer knowledge and articulate salient points.

The Maverick Space Shuttle (A local Nebraska example)

This is a space shuttle simulation using the Internet and Internet technologies, which also seeks to involve school technology leaders in the training process. Students, teachers, and school technology specialists, run both the shuttle and mission control, perform specific shuttle type functions, and return the spacecraft safely back to earth. Students must make decisions, work as a team, gather data, analyze the data and communicate effectively. Before the mission, students undergo several training sessions and are selected for specific roles. Once the students are trained and enter the shuttle or mission control, they follow a script and are monitored regularly. To give a good feel as to the missions and tasks performed, thus showing the skills that are learned during this activity, the author includes a description of the individual roles involved:

> Maverick Shuttle Simulation Lab Roles:
> Flight Director/Shuttle Commander - The Flight Director is in charge of communicating to all Mission Control personnel and the Shuttle (mostly via the Shuttle Commander. The Shuttle Commander is in charge of all members of the Shuttle crew. They each have scripts, for most of their mission, but they also must make decisions based on weather and

monitored resources onboard the shuttle. During orbit, the Shuttle Commander will be constantly observing several gauges on an instrumentation panel, which will be simulated using Java script. (Pre-requisite skills: good vocal skills, familiarity with scripts, terms, and control panel layout. The Commander needs to understand the cabin environmental system)

Pilot/Navigation - The pilot and the Navigation Specialist at Mission Control will both monitor the position of the Shuttle throughout the mission using simulation software designed by an employee of the Johnson Space Center. Pilot and Navigation will take turns observing, one another, while each operates sophisticated software. The Pilot will utilize MacMECO to guide the Shuttle through the launch to MECO (Main Engine Cut-Off). Once orbit has been achieved, the Navigation Specialist at Mission Control operates MacSPOC, which can be used to actually monitor authentic shuttle missions and orbiting satellites (Pre-requisite skills: Familiarity with screen layout and operation of MacSPOC and MacMECO).

Payload - The payload specialist onboard the Shuttle, with the guidance of his counterpart at Mission Control will be in charge of deploying a LDEF (Long Duration Exposure Facility Satellite), docking with a TDRS (Tracking and Data Relay Satellite), and replacing and repair a solar panel. All of these maneuvers are simulated with movie clips, some feature 3-D controllable images (virtual reality).
(Pre-requisite skills: Netscape navigation, reading and following directions)

Meteorology - The meteorology specialists will observe satellite images of various weather conditions and will provide to Commander and Flight Director critical information prior to launch and landing. They will also monitor images of the sun to record potentially dangerous levels of ultra-violet rays caused by sunspot activity.
(Pre-requisites: Utilize NIH Image processing software, ability to read map data; copying, saving, and retrieving images.)

Mars Observation - The Mars Observation role solves a problem by pulling images of Mars to the Shuttle from a Mars orbiting surveyor craft (whose storage capacity is dangerously close to full), and then downloads these images to Mission Control. The two specialists then observe and analyze Martian terrain with NIH imaging software in order to determine possible sites for future landing and colonization.
(Pre-requisites: Utilize NIH Image processing software, ability to analyze landforms using topographical maps, copying, saving, and retrieving images.)

Earth Observation - The role of Earth Observation is for the Shuttle Specialist to acquire orbital images of strategic landmarks on earth. Key to this role is observation of the position of the Shuttle as it orbits the earth. The images gathered by the Shuttle are then compared with historical images at Mission Control of the same landmarks from years earlier. NIH imaging software is used to detect and analyze differences that needs to be recorded. (Pre-requisites: Utilize NIH Image Processing Software, ability to copy and retrieve images)

Nebraska Historical - Nebraska Historical will focus on satellite images taken of Nebraska specifically. Specialist will observe increasingly higher resolution images as they observe and identify local landmarks. It is then possible to "zero in" on virtual reality movies of such sites as the Lied Jungle in Henry Doorly Zoo, Omaha's Central (Pre-requisites: Use of X-axis and Y-axis coordinates to locate historical sites in Nebraska)

Medical - The medical specialist on board will be responsible for using authentic NASA wristwatch heart monitors to record Shuttle crewmembers heart rate before and after exercise. They will also use state-of-the-art ear temperature probes. This medical data will be entered through an interactive web form into a database at Mission Control. (Pre-requisites: Ability to record health information from heart-rate watches and ear temperature probes, and enter this information into a data base form on the Web)

Public Affairs Officers/PAO's - The Public Affairs Officers take pictures of the Maverick participants, making careful notation of who is in which picture. PAO's also write down mission specialist's responses to interview questions, which they the PAO's must come up with. (Pre-requisites: Ability to point and click the digital camera, think up good interview questions, and write good notes).

Since 1 June 1997, the shuttle has served 1000 students, 200 practicing teachers and received the praise of the Head Administrator of NASA, a Nebraska Senator, the New York Times and the U.S. Department of Education. Many students and teachers alike have praised the program.

Others

Described below are three more brief examples from other disciplines which illustrate that math and science aren't the only benefactors in such effective technology programs.

- An 11th and 12th grade teacher instructs his pupils about political parties by dividing them into a political party and develop a party platform. Students research their party's platform via looking them up on the web. The party chair leads a mini convention in building the party platform planks and identifies the party philosophy – liberal, moderate or conservative. When students write their party platform they must consider issues such as budget, taxes, environment and education. Students must write their party platform in a 3 to 5 page position statement and each group must present their position (National Education Association, 1998).

- A 5th grade class follows the iditarod dog sled race while reading the novel Black Star, Bright Dawn (novel about the race). Each student chooses a musher to follow and tracks their progress and standings. Some students Email their mushers (National Education Association, 1998).

- Another program links students from different countries. Each student "compares prices, packaging and content of various products." Through these exercises students integrate Math, Social Studies, Language and Geography (Parker, 1994).

Conclusion

Over the past few years of tremendous Internet growth, schools have learned many things. As Jamie Mckenzie states:

> When the Internet first came to schools in the mid-1990's, there was much talk of "surfing the Net", but most teachers quickly learned that surfing was little better than strolling through the mall. Schools with significant access to the Internet have moved to more challenging and rigorous experiences requiring research and reasoning (McKenzie, 1998).

Simply put, we must "teach carpentry not hammer" (Oppenheimer, 1997), because the Internet is a tool and a tool is only as good as its user. Therefore,

> We must also give students the tools to overcome the weaknesses of the new information sources. The extensive information resources to be found in cyberspace are both a blessing and a curse. Unless students possess a tool box of thinking and problem solving skills to help manage inadequacies of the information landfills, yard sales, gift shops, and repositories so prevalent on the "free Internet", they may emerge from their shopping expeditions and research efforts bloated with techno garbage, information junk food, or information fat (McKenzie, 1998).

We shouldn't make our teaching methods fit the demands of the computer (Roszak, 1986) and we shouldn't just let students surf. Technology must be shaped to meet our needs so its great potential can be realized. As Healy states:

> Computers [Internet included] offer extraordinary potential as brain accessories, coaches for certain types of skills, and motivators. Their greatest asset may ultimately lie in their limitations—which will force the human brain to stand back and reflect on the issues beyond the data—if it has developed that ability. (Healy, 1990, p. 329)

It is important to recall, as stated before, that most technologies have failed in education because they were not supported through a systematic organizational change. Technology leaders/coordinators often represent and lead

this organizational change. However, is this change merely cosmetic in nature or has the organization truly changed its roots? The perceptions of these professionals will help us to discover and understand this phenomenon. Also, the technology leader/coordinator is uniquely positioned, through their proximity to both education and technology, to evaluate the effectiveness of such technology use in the classroom. Their perceptions are a likely key to understanding this issue.

These perceptions must be discovered and examined. The tool we used to discover and examine the perceptions of a technology leader/coordinator in this investigation was through a survey. The study methodology is described in Chapter 3.

Chapter 3

Methodology

Introduction

This chapter includes an explanation of the subjects of the study, a description of the instrumentation, and an explanation of how the collected data was analyzed and summarized. This study was designed to examine the perceptions of school technology leaders related to the use and effectiveness of the Internet in Nebraska classrooms.

Subjects

The subjects in this study were limited to educational technology leaders throughout the state of Nebraska. The subjects were either technology coordinators for schools, Education Service Units (ESU) or the Metropolitan Omaha Educational Consortium (MOEC).

Procedures

The subjects, who were school technology leaders, were asked to complete the "Evaluation of Nebraska School's Classroom Uses of the Internet Survey" on the web at the provided URL. The surveys were designed as CGI (Common Gateway Interface) forms in Claris Home Page 3.0. CGI allows dynamic text input from a web page to be received and processed on a properly configured web server. A database to collect the subject's responses was set up using FileMaker

Pro 4.0. After the subjects finished the survey their answers were recorded via a submit button.

Instrumentation

The survey described in this section can be found in Appendix B. The survey consisted of 24 questions. The majority of the questions were purely multiple choice (16 to be exact). Six of the questions were mixed in nature; in other words the respondents could write in a free form answer if they felt that the responses provided did not fit their needs.

Section 1 -- Demographics

These questions were designed to gather information about the school technology coordinator respondent. The first question was designed to determine the scope of visibility and authority the respondent has at the school level. The second question determined their pay scale, also an indicator of level of responsibility and background. The third question determined if the respondent had experience in education. The fourth question determined if they had ever taught in a school. After the respondent answered these questions, a good understanding was gained with respect to their experience and training. Thus greater experience in the field was equated with more credibility.

Section 2 – The Impact of the Internet

These questions were designed to gather information on how much the Internet has changed the nature of the technology coordinator's work. The first question was designed to determine if they think the Internet was over utilized or underutilized. The next question was designed to determine if they felt the

direction of implementation is correct where they work. Following that question, the next question examined what Internet tasks they performed regularly. This determined how effectively the net was being employed. The assumption being that Internet savvy teachers will spend more time with higher-level tasks (i.e. finding the right sites to match learning objective and creating thought provoking lessons) or lower level tasks (i.e. logging on, connectivity, monitoring web sites, making sure kids aren't accessing restricted web sites, training etc.). The fourth question was designed to determine how much of their time was consumed with tasks related to the Internet. The last question of this section was designed to determine how much those tasks take up in their total workload.

Section 3 – The Characteristics of Teachers Who Use the Web

The third section looked at the characteristics of teachers who use the web well. The first question finds out what subject they teach. The next question looked at the number of teachers they interact with regularly (it gives an idea of the number of folks they've served). The following question looked at how often teachers request services from them. Then the survey examined the most common task they perform for teachers and after that the least common task. In both of these questions the answers are broken up into higher-level tasks and lower level tasks (see section 2). Next, the survey looked at the reasons why teachers request their assistance. This judgement by the respondent was based upon their experience. Thus, this was the technology coordinator's chance to tell what they think teachers need the most. The last question looked at what they think is the best application of Internet technology and its location on the web.

Section 4 – The Division of Labor

This section looked at what the technology coordinator respondent thought should be the teacher's responsibility and their perceptions with regard to using the Internet in the classroom. The first question asked the respondent what the teacher's role should be in this process. The next question determined what the respondent thinks their most important role should be in assisting teachers. The following question asked the respondent the number of hours they spend per day on what they think teachers should be doing for themselves. The next question examines the number of outstanding tasks the respondent has backlogged. The following question looked at the number of overtime hours the respondent works per week (this question and the previous one are a good measure of how overworked the respondent is). The next question looked at what would help the respondent do their job. This is a measure to see what would help them the most and what they think is most needed. The following question asked the respondent where they think teachers need the most help. This is to see, according to the respondent, what teachers needed the most related to the implementation of Internet technologies. The last question looked at what the respondent thinks teachers need the most in building and using Internet based lessons. This is designed to look at what is needed, according to the respondent, in the long run.

Data Analysis

The survey results for each question were entered into SPSS 8.0. SPSS computed the total frequencies and percentages for each question. The results were then evaluated and interpreted in Chapter 4, which follows.

Chapter 4

Results

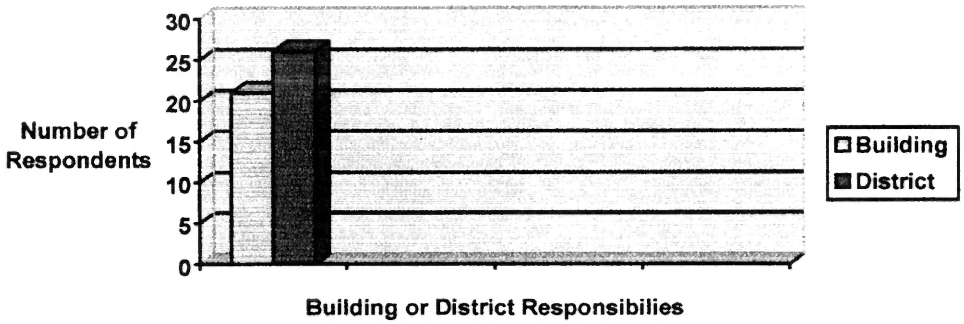
Introduction

This chapter examines the summary results related to the data collected from the web posted surveys, and responded to by the sample of school technology coordinators. The resulting data summary is presented in four sections: Demographics, the Impact of the Internet, the Characteristics of Teachers Who Use the Web, and the Division of Labor. To facilitate understanding by the reader, the key results are also presented in 11 individual figures.

Demographics

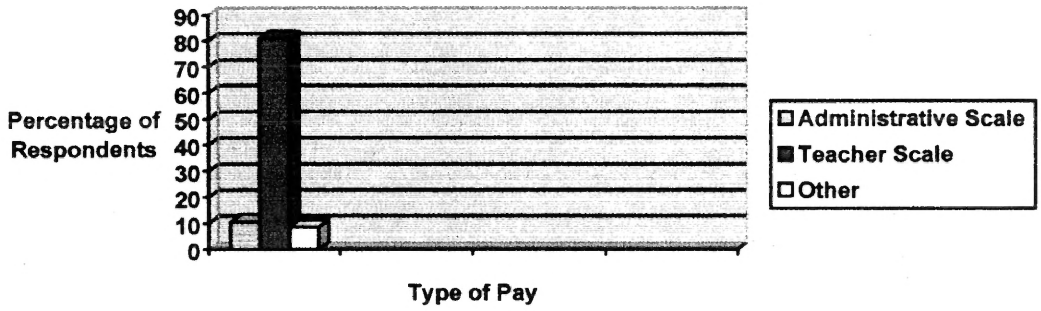
This section covers questions 1-4, which describe some of the characteristics of teachers who use the web. The survey was sent to an estimated 100 well-known educational technology leaders throughout the state. They were asked to forward the survey to their peers. A total of 47 educational technology coordinators or leaders responded to the survey. Of the respondents 21 had duties within a school or building and 26 had duties district wide.

Figure 4 -- Are your duties building or district wide?



Of those that responded 80.9% of them are paid on a teacher scale, 10.6% were paid on an administrative scale and 8.5% were paid on another scale.

Figure 5 -- The Pay Scale



In addition, 42 of the 47 respondents have had previous education experience and 41% of those were teachers.

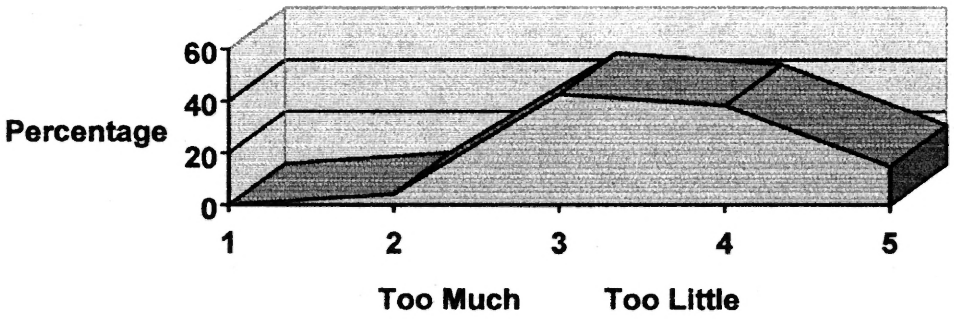
The Impact of the Internet

This section covers questions 5-9, which describe some of the characteristics of the teachers who use the web. It was designed to get the perceptions of school technology coordinators on the following research questions:

Why are teachers using the Internet? Are they just using it as a crutch or a tool? Are they using it just because they are supposed to? Is the teacher merely using the Internet just because it is there? Do teachers try to mold the technology or do they let it mold them?
Are the technology leaders overworked?
Are Internet resources really being integrated into the classroom?

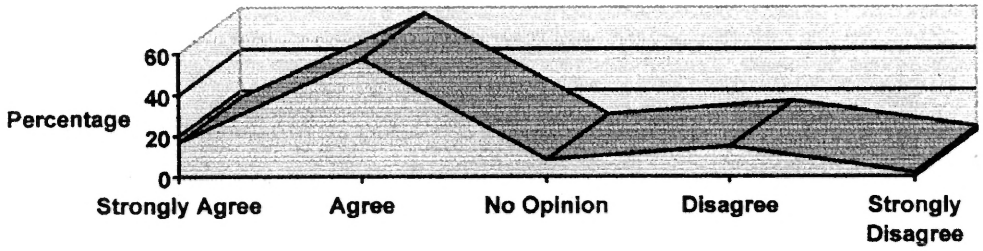
When asked if the Internet is used too much or too little in the classroom, none of the respondents thought it was used too much. Only 2 (or 4.3%) leaned towards thinking it was used too much. Many (42.6%) stayed right in the middle, thinking Internet use is currently appropriate. However, after combining those who lean towards the idea that it is used too little yields a total of 53.2% of the respondents.

Figure 6 -- Do you think the Internet is used (Too much 1 2 3 4 5 Too little) in today's classroom?



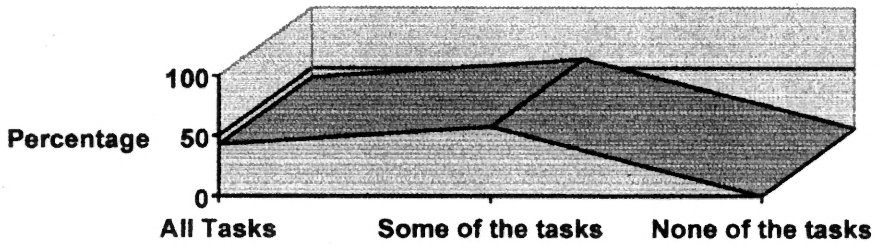
Concerning the strategy and direction schools are taking, 57.4% of the respondents agree but are not strongly persuaded. On the other hand those who disagree make up 17% of the responses.

Figure 7 -- Are you happy with the strategy and direction your school/district is going in implementing technology in the classroom?



When asked what Internet related tasks they performed and given a list, 57.4% of the respondents performed at least some, but not all, of the tasks listed. Conversely, 42.5% performed all of the tasks listed (i.e. fixing connectivity problems, providing a list of Internet sites for certain subject areas, helping teachers log on, monitoring web sites accessed, making sure no one accesses

Figure 8 -- What are the Internet related tasks that you perform?

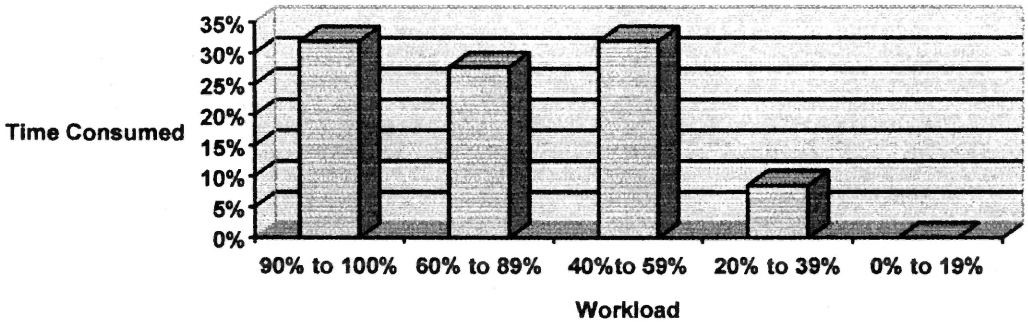


restricted web sites, upgrading machines used to access the Internet (software or

hardware), providing Internet training to teachers, helping teachers craft thought provoking and engaging lessons using the Internet and others). A complete discussion on the frequency of such tasks follows in the next section.

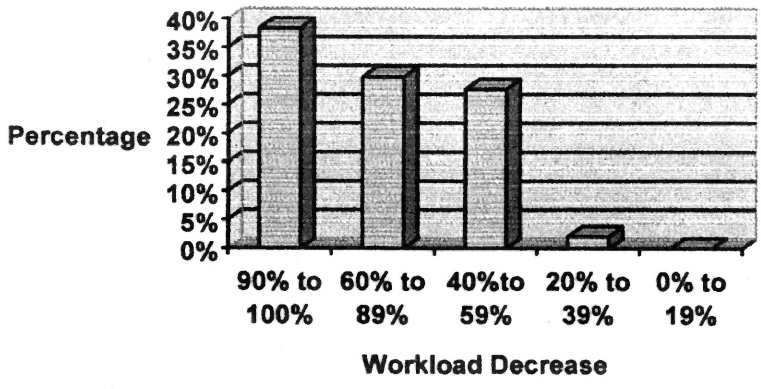
When asked about the amount of time consumed with the Internet, 59.6% of the respondents said they spent more than 60% of their day on Internet related tasks and 40.4% spent between 20 to 40% of their day with those tasks.

Figure 9 -- How much of your time is consumed with tasks related to the Internet?



If the Internet were to be taken away, 95.8% of the respondents stated that 40 to 100% of their workload would be decreased. In other words, the Internet and the tasks associated with it often comprise the majority of work for educational technology leaders.

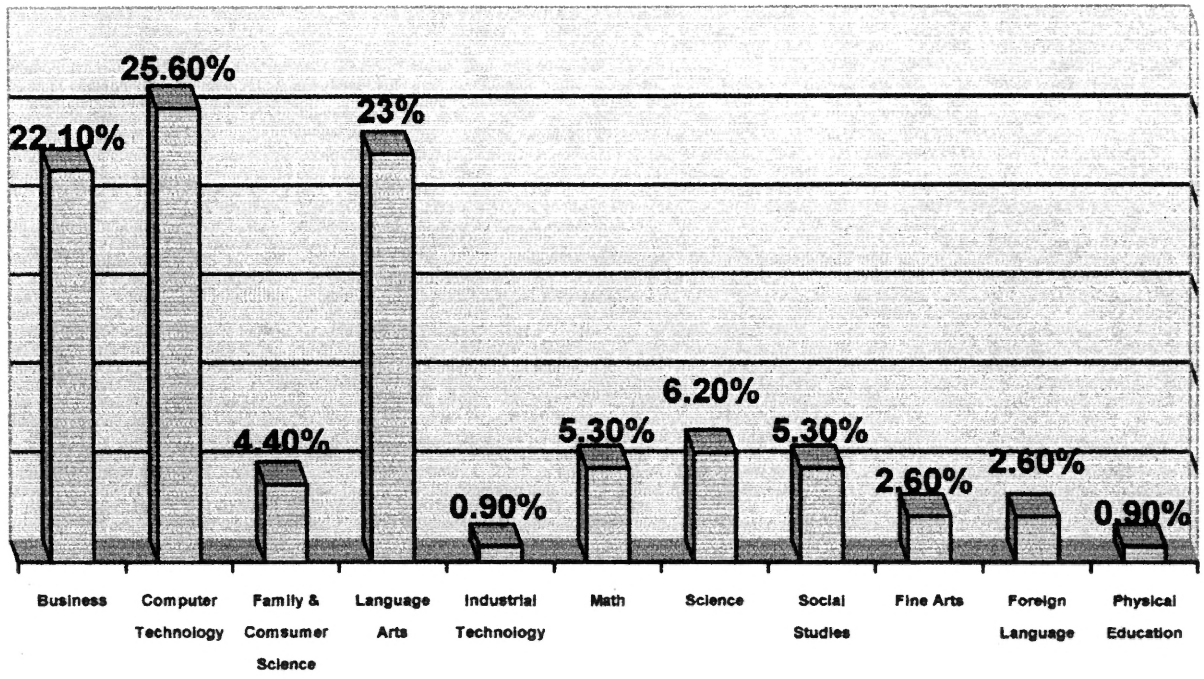
Figure 10-- If you didn't have the Internet how much of your workload would be decreased?



The Characteristics of Teachers Who Use the Web

This section of the survey covered questions 10-16, which examined the school technology coordinator's perceptions on some of the characteristics of

Figure 11-- Regarding the teachers who request your services the most, what subjects do they teach?

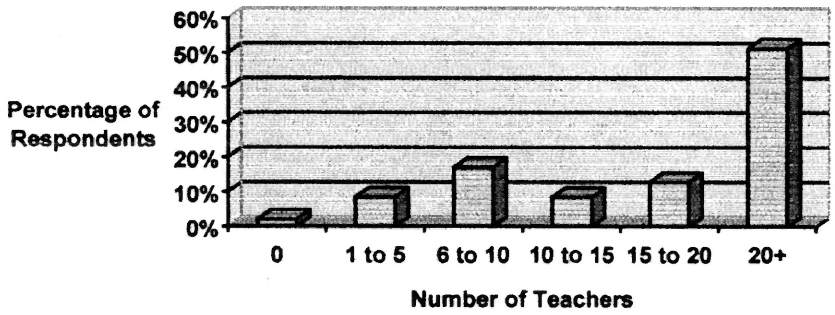


teachers who use the web. It is designed to investigate the following research topics:

> Are there teacher characteristics or teaching philosophies which utilize computers more effectively? Are particular subjects more susceptible to technology? What types of teachers use technology? These questions are designed to find the teaching methods which focus the power of the Internet more effectively in the classroom. If there are certain methods which provide for better instruction through the use of the Internet, how easy is it to incorporate them?

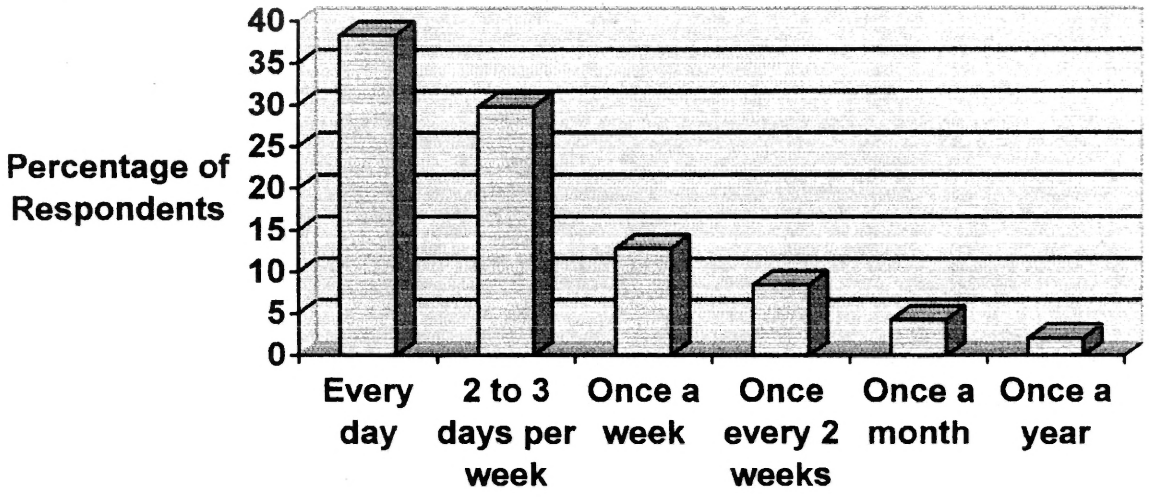
When asked what were the subjects of the teachers who requested services, a total of 11 subjects were listed. The top three were business at 22.1%, computer technology at 25.6%, and language arts at 23%, respectively. These three were significantly higher than the next closest one, which was science at 6.2%. When asked the number of teachers who typically request the services from the education technology leaders, 51.1% responded that over 20 teachers request their services regularly. The rest of the data is spread fairly evenly between the other categories.

Figure 12 -- How many Teachers request your services?



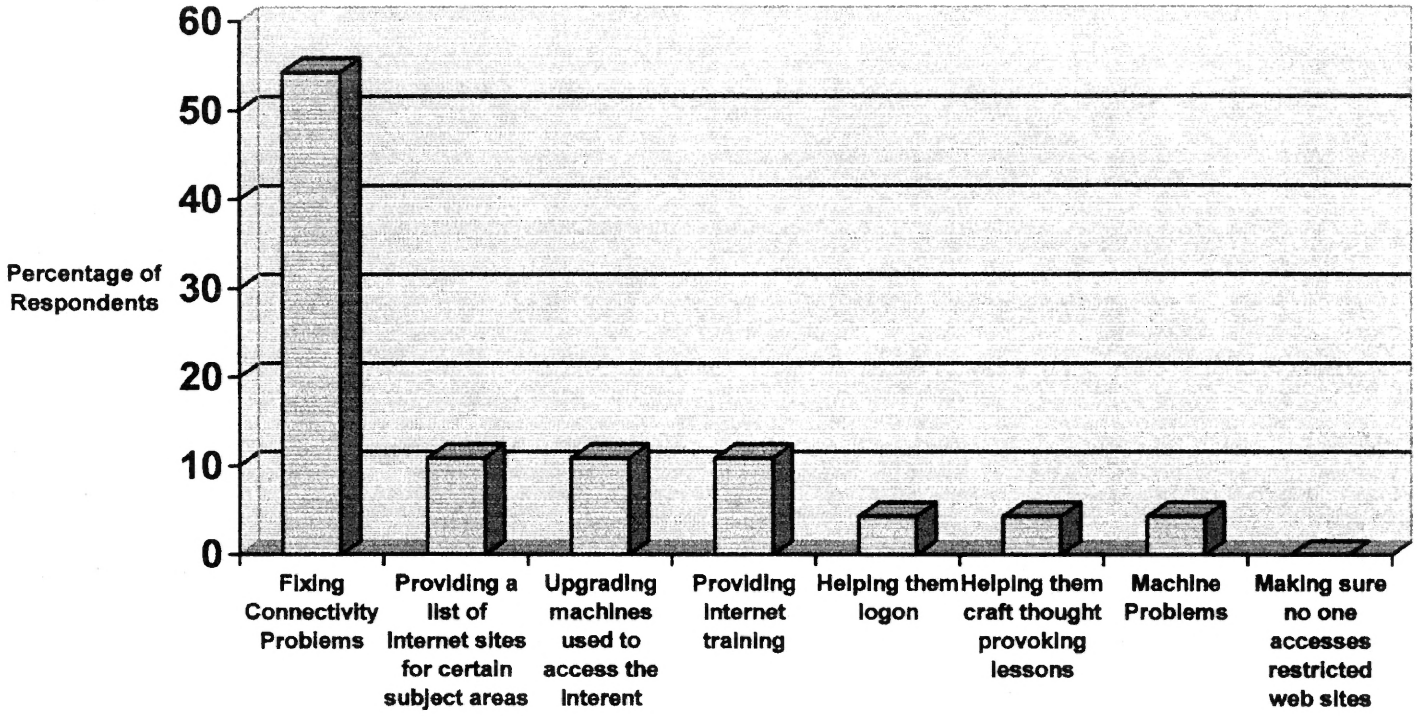
Concerning the frequency of requests for help, 68.1% of the respondents said that they receive requests either everyday or two to three days per week. The next highest result was once per week at 12.8%.

Figure 13 -- How often do teachers request your services?



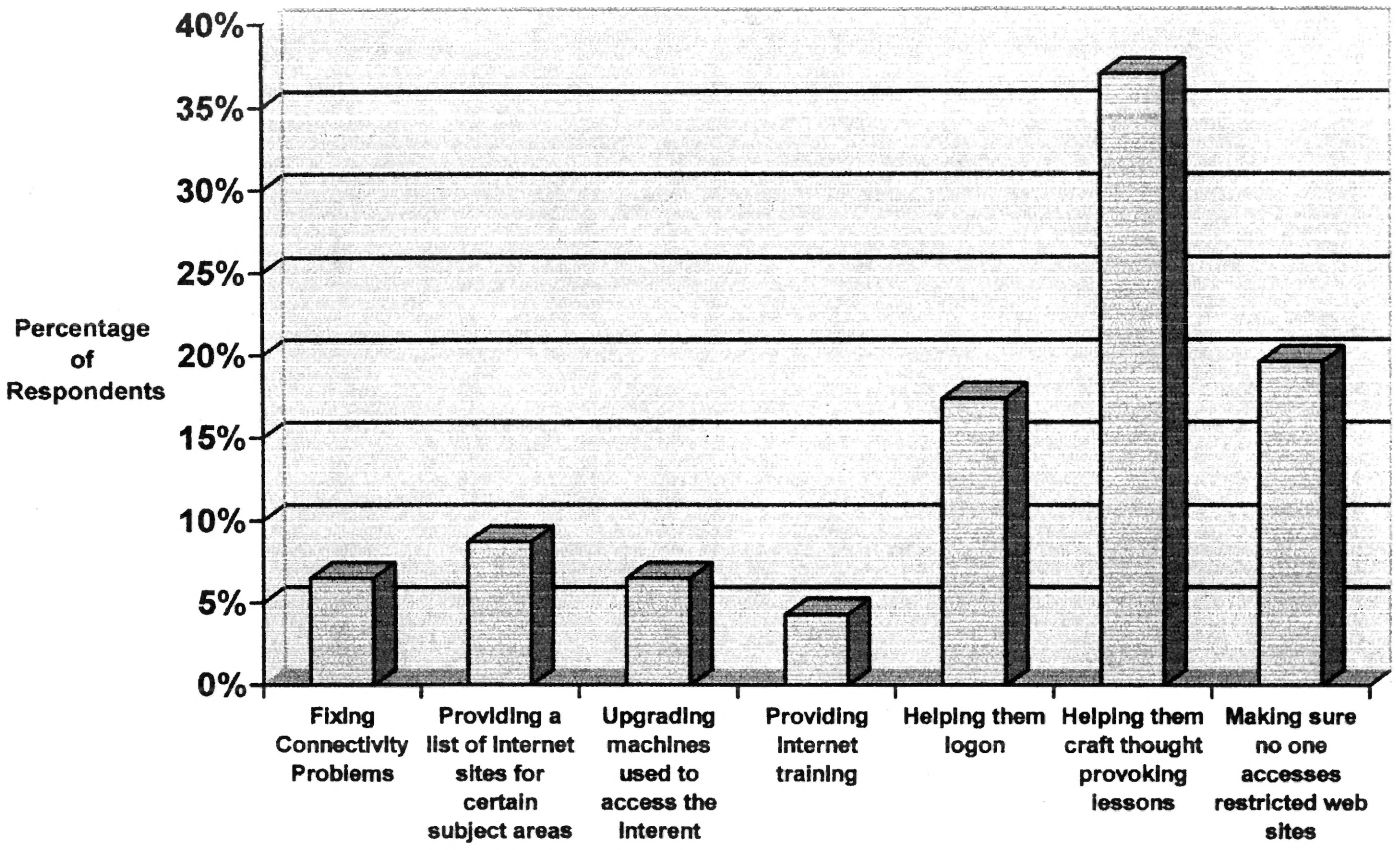
Next, the school technology coordinator respondent was asked what the most common Internet related task that they performed for these teachers. A total of 53.1% of those polled responded that their most common task is fixing connectivity problems. The next most common responses were: 1) providing a list of Internet sites for certain subject areas, 2) upgrading machines used to access the Internet, and 3) providing Internet training, all at 10.6%.

Figure 14 -- What is the most common task that they [teachers] ask you to perform?



When respondents were asked what the least common task they performed was, 36.1% replied that developing thought provoking lessons was the least common. The next least common task was making sure no student accessed restricted web sites, which was chosen at 19.1%.

Figure 15 -- What is the least common task teachers ask you to perform?



When asked what was the most common reason why teachers requested assistance, the technology coordinators responded that technical ignorance, at 70.2%, was the most common. Some of the other responses ranged from "its my job" to wanting advice. Many respondents also provided some innovative uses for the web.

The Division of Labor

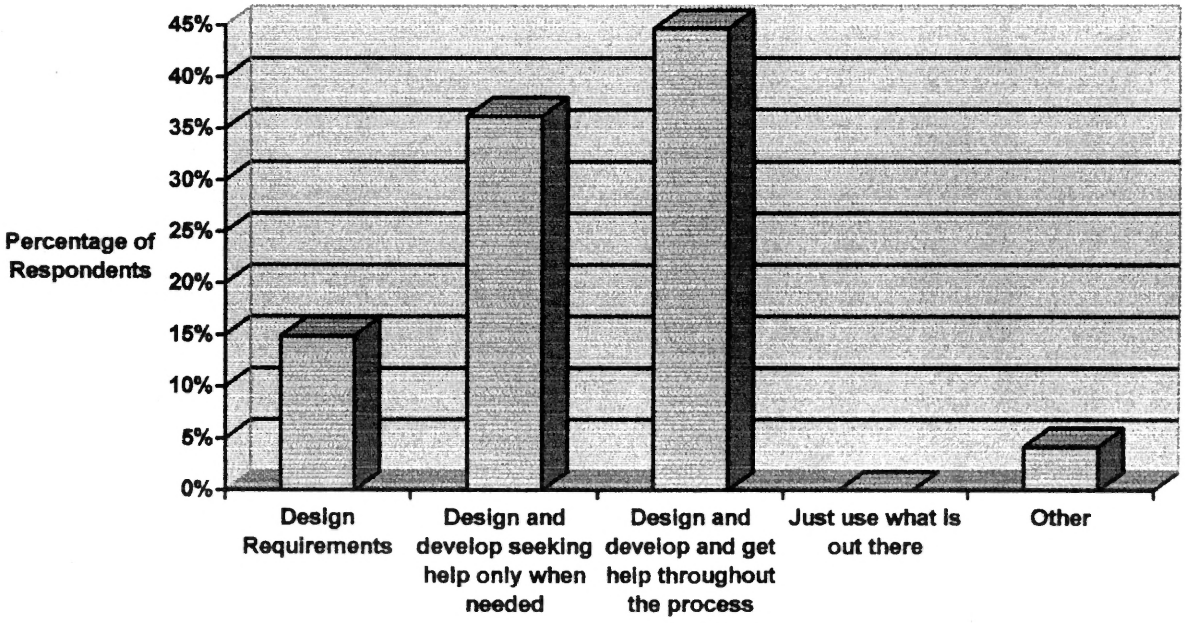
This section of the survey covered questions 17-24. These questions describe some of the characteristics of teachers who use the web. It is designed to

examine the perceptions of school technology coordinators on the following research based topics:

> Why are teachers using the Internet? Are they just using it as a crutch or a tool? Are they using it just because they are supposed to? Is the teacher merely using the Internet just because it is there? Do teachers try to mold the technology or do they let it mold them?
> Are the technology leaders overworked?
> Are Internet resources really being integrated into the classroom?

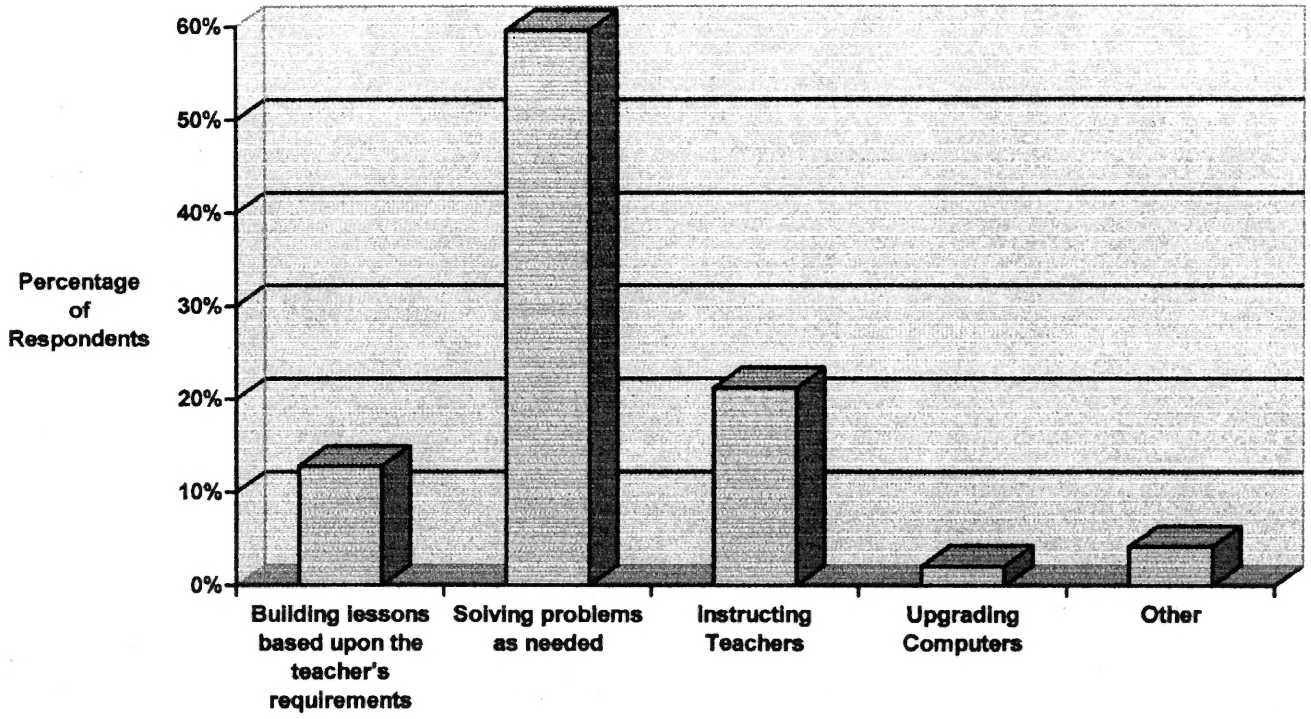
When asked what the education technology coordinator or leader thought the teacher's role should be in building lessons using the Internet: 44.6% thought that a teacher's task should be design and development, with help ongoing in the process; 36.1% thought design and development seeking help only when needed; and finally, 14.8% thought that teachers should design requirements.

Figure 16 -- What do you consider the teacher's role in building based upon or using the Internet?



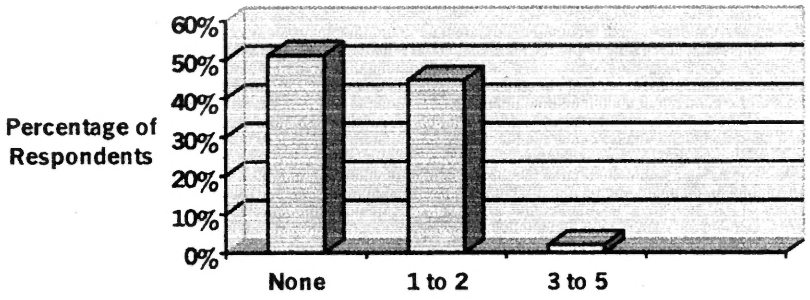
When asked what their job should be, 59.6% of education technology leaders responded that it primarily involve solving problems as needed, 21.2% responded that it should be instructing teachers, and 12.7% responded that it should be building lessons based upon the teacher's requirements.

Figure 17 -- What do you think your most job should be in assisting teachers?



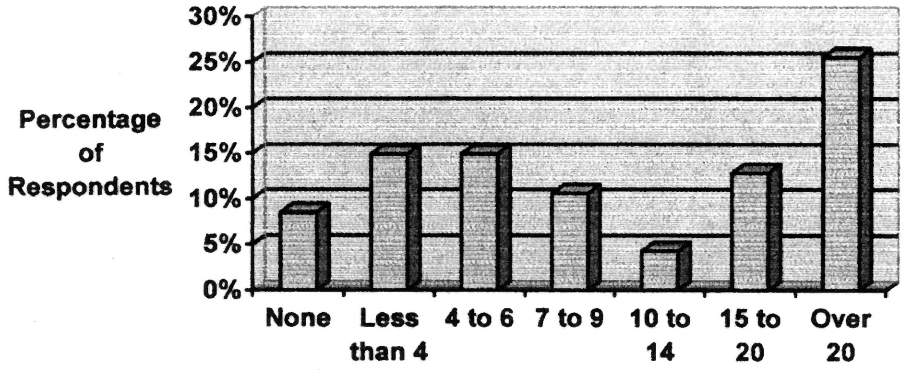
Respondents were then asked how many hours is it per day that they spend on doing what they consider the teacher's job. Fifty-one percent of the respondents stated that they spend none of their time doing what they considered the teacher's job and 44.7% responded that they spent at least 1 to 2 hours per day doing what they considered the teacher" job.

Figure 18 -- How many hours per day do you spend on doing what you consider to be the teacher's job in building Internet based lessons?



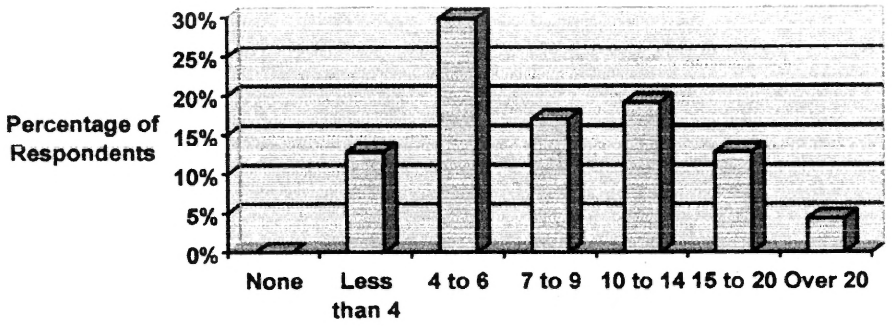
When asked how many hours of work they have backlogged, 38.3% of the respondents replied that they have over 15 hours of work backlogged. Likewise, 38.3% have less than 6 hours of backlogged work.

Figure 19 -- In approximate terms, how many hours of work do you have backlogged?



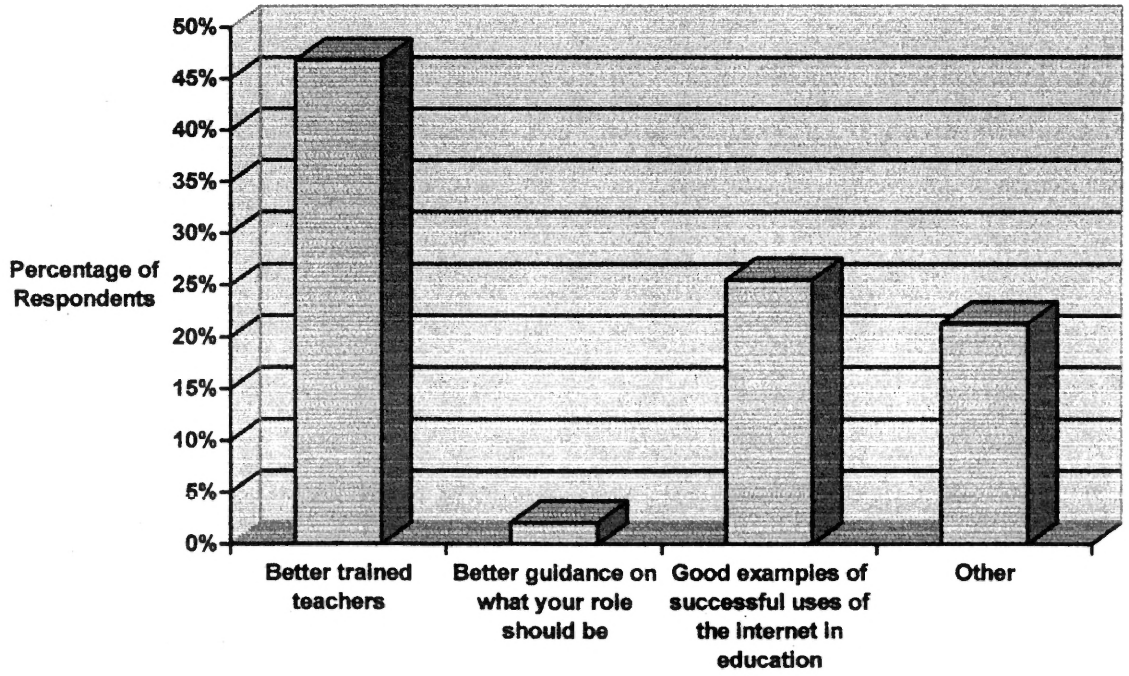
When asked the number of overtime hours worked per week, 42.6% responded they work 6 hours or less overtime per week. However, 53.2% work more than 7 hours of overtime per week and 4.3% work more than 20 hours of overtime per week.

Figure 20 -- On average, how much overtime do you work per week?



The next question posed asked the technology coordinators about what would help them the most in doing their job. Forty-seven percent responded that they wanted better-trained teachers, with 25.5% responding that they wanted good examples of successful uses of the Internet in education.

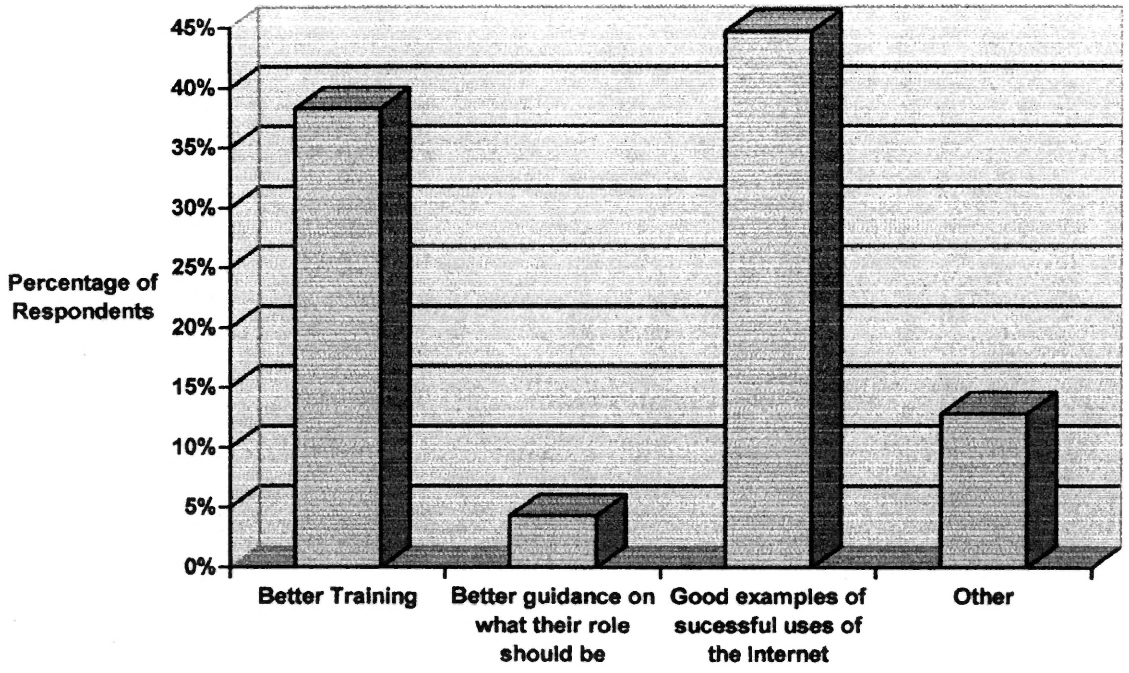
Figure 21 -- What would help you the most in doing your job?



There were a few free form answers that ranged from "a smaller job description" to more staff.

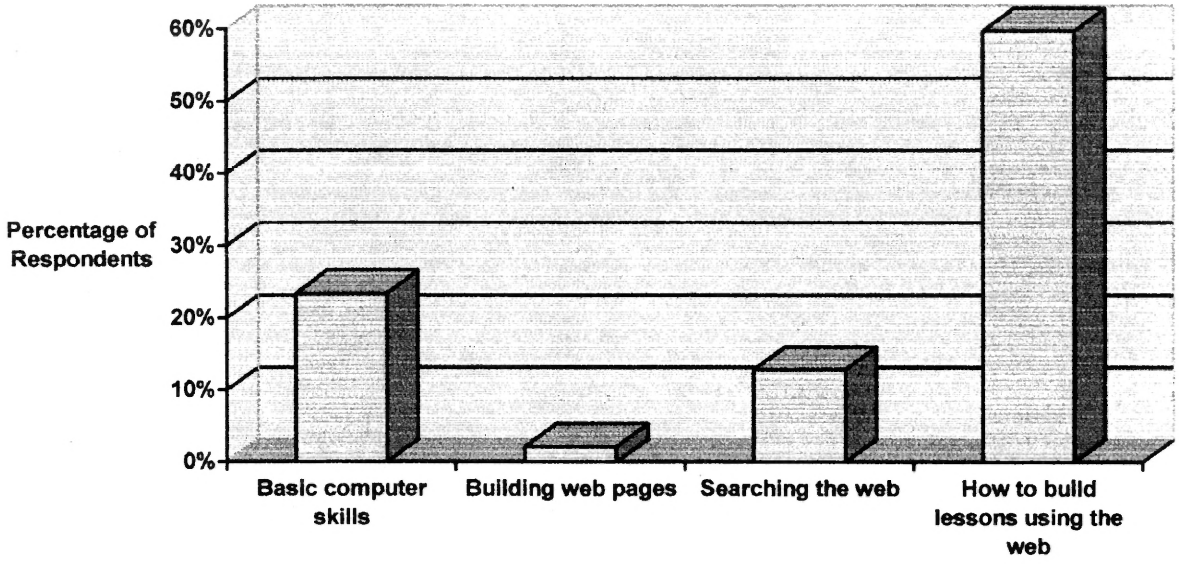
Next respondents were asked what would help teachers the most. Thirty-eight percent of the respondents answered "better training" but 44.7% of the respondents considered that "providing good examples of successful uses of the Internet in education" was most important.

Figure 22 -- What would help teachers the most in developing Internet based lessons?



When asked what they thought teachers needed the most in building and using Internet based lessons, 59.6% of the school technology coordinators responded that training on how to build lessons was the most important and 23.4% responded that training in basic computer skills were more needed.

Figure 23 -- In your opinion, what training do teachers need the most in building and using Internet based lessons?



Interpretation of the Data

The purpose of this chapter was to report the data found. The next chapter, Chapter 5, will provide an interpretation of that data.

Chapter 5

Data Interpretation

Summary

As mentioned in Chapter 1, questioning the ifs and the whys of the Internet were not the primary focus of this study. Many studies are investigating the effectiveness of the Internet in education. The focus here is on the hows. Such as how does a school or district implement an effective Internet strategy and leverage this great technology? Or what resources are needed for an adequate implementation strategy? Even more basic are questions about who is shouldering the burden for implementing this strategy and how are they empowered, if at all, to do their job. Effective implementation of the Internet and Internet technologies in education requires a sound understanding of how children learn, something we know quite a bit about, and how technologies can be molded, crafted to this end, something we know little about. Hence, the hows are the hard part.

The Study

This study sought to begin to answer the big questions facing education and the uses of technology today: Are we getting the "biggest bang for our buck"? The perceptions of educational technology coordinators related to such questions are indeed key. The following were the questions that are of particular interest for this study in understanding the complexity of the issues, and the importance of examining the perceptions of the

Educational Technology Coordinator on the teacher's use of the Internet based technologies in the classroom:

Why are teachers using the Internet? Are they just using it as a crutch or a tool? Are they using it just because they are supposed to? Is the teacher merely using the Internet just because it is there? Do teachers try to mold the technology or do they let it mold them?

Are there teacher characteristics or teaching philosophies which utilize computers more effectively? Are particular subjects more susceptible to technology? What types of teachers use technology?

How has the increase in using the Internet for teaching purposes affected the technology leaders within the districts? Are the technology leaders overworked? What tasks are they performing? Are these tasks the best use of their time? Could properly trained teachers better perform these tasks?

Are teachers using the resources available to them effectively? Do they know what resources are available? Do they only draw on them in an emergency? How well do they frame their classroom requirements? Do they see a technology leader merely providing a list of useful Internet pages? Are Internet resources really being integrated into the classroom?

The Procedures

The subjects, who were well known school technology leaders, were asked to complete the "Evaluation of Nebraska School's Classroom Uses of the Internet Survey" on the web at the provided URL. The surveys were designed as CGI (Common Gateway Interface) forms in Claris Home Page 3.0. CGI allows dynamic text input from a web

page to be received and processed on a properly configured web server. A database to collect the subject's responses was set up using FileMaker Pro 4.0. After the subjects finished the survey their answers were recorded via the submit button.

Conclusions

Results were examined in Chapter 4, and now an interpretation of that data is contained here.

The demographics section of the survey yielded two valuable insights in understanding education technology leaders/coordinators:

- An overwhelming number of the education technology leaders or coordinators sampled, even those with district responsibilities, are paid the same as teachers.
- A good number of education technology leaders/coordinators (41%) come from the ranks of teachers.

Based upon the results outlined in Chapter 4, the data will now be applied to the research questions asked in Chapter 1.

Why are teachers using the Internet?

This question can only be answered successfully by referencing the following sub-questions:

- Are teachers just using the Internet as a crutch or a tool?

  To fully answer this question a review of the data gathered on questions 5,6 and 23 on the survey is necessary. These questions show that only a small number of education technology coordinators lean towards the idea that they think it is being used too much (4.3%). A

significant percentage of education technology coordinators (53.2%) think it is being used too little. Interesting considering that they tend to be overworked. Obviously, coordinators are dedicated to the uses of technology in the classroom. Another factor to consider is that most education technology/coordinators approve (57.4%) of the school or district's strategy of increasing access and use in the classroom. Finally, when asked what would help teachers the most in developing Internet based lessons the top two answers were better training (38.3%) and good examples of successful uses of the Internet (44.7%).

All three of these factors suggest that teachers within the sampled school and district, in general, are trying to make an honest attempt at incorporating Internet technologies in the classroom. They see it as a tool. Otherwise, the respondents would have thought that the Internet was being used too much (indicating that too much class time is taken up with Internet related tasks), the school or district's direction would be wrong (indicating that not as much access is required or there is too much access) and an overwhelming number of them would have stated that the number one initiative to help teachers the most in developing internet-based lessons would be better guidance on what the teacher's role should be (perhaps this indicates that teachers don't know how the Internet should be used or placed in a lesson, pointing to the idea that it is seen as a crutch or a way to take up required class time).

- Are teachers using the Internet just because they are supposed to?

As shown above, most education technology coordinators responded that the Internet should be used more in classes. This result hints at the fact that perhaps some teachers may only be using it to "fill a square" or in a token way just because it is there. Otherwise, the responses would have tended to fall along in the middle of the distribution rather than on the right-hand side. This tends to indicate more of a reactive mode rather than a proactive one which is understandable considering the small amount of training that teachers receive.

- Do teachers try to mold the technology or do they let it mold them?

Once again the answer to this question will result from the synthesis of three different questions on the survey, questions 7, 23 and 24. In question 7 the respondents were given a series of standard tasks and the data show that 57.4% of the respondents perform at least some of the tasks listed. This shows that the education technology leader/coordinator performs a variety of Internet-related tasks (i.e. providing a list of Internet sites for certain subject areas, logon problems, monitoring web sites accessed in the classroom) which make up the majority of their workday (as shown by the analysis of questions 8 and 9 from the survey). Many of these tasks could be performed very easily by well-trained teachers. This indicates that teachers have failed to master the application of the technology let alone understand what it can and can't do. An analysis of question 23 shows that better training is needed for teachers. From question 24 the respondents reply that training in basic computer skills and

direction on how to build lessons using the web are sorely needed. Again, this indicates that without an understanding of the basics, technology cannot be molded to meet the needs of the classroom rather the technology molds the classroom; which puts the technology in the driver's seat, not the student or the teacher.

Are there teacher characteristics or teaching philosophies which utilize computers more effectively?

This question can be answered successfully by examining the following sub-questions:

- Are particular subjects more susceptible to technology?

  In analyzing question 10, a total of 11 subjects were listed. However, three were clearly head and shoulders above the rest in frequency of response: business, computer technology and language arts. These three choices make sense. Business class uses the Internet because today's businesses rely upon it. Computer technology, the name alone justifies its prominence. Language arts use this technology for research and writing, etc. However, wouldn't these skills also be of use in other subject areas as well?

- What types of teachers use technology?

  Analysis of question 16 found that most "innovative" uses fell into two areas: research and constructivist lessons (i.e. students are asked to produce a report on the Iditarod dog race – they download pictures, create a presentation and track results). Therefore, the teachers who tend to use

the web the most follow a teaching methodology which focuses on one or both of the areas.

How has the increase in using the Internet for teaching purposes affected the technology leaders within the districts?

This question can be answered successfully by examining the following sub-questions:

- Are the technology leaders overworked?

  The data received from questions 7,8,11,12 and 20 accurately paint a picture of overworked technology leader/coordinator. For many, their jobs were created due to the web (i.e. a significant number of their tasks are web-based and without the web most of their tasks might disappear). On top of that, most receive multiple requests from 20 or more teachers each week. Lastly, approximately 53% have more than 7 hours of backlogged work per week. These are signs of over-tasked, possibly close to being burned out personnel.

- What tasks are education technology leaders/coordinators performing?

  A synthesis of the data presented in questions 7,13,14 and 15 yields the answer to this question. In short, most of the time education technology leaders/coordinators are asked to do mundane tasks as result of teachers' technological ignorance. The last thing an education technology leader/coordinator would be found doing is helping a teacher craft thought provoking lessons (even though many are qualified to help).

- Are these tasks the best use of education technology leaders/coordinators time?

  Using the data from the above question, no may be the appropriate response. Most of the respondents were adamant in deploring the complete lack of training that teachers have received.

- Could properly trained teachers better perform these tasks?

  This question can be best answered through examining the data from responses to questions 22, 23, and 24. Teachers need more and better training in areas such as basic skills and building lessons. These would not only help education technology leaders/coordinators perform more valuable functions for those they service (i.e. helping them craft lessons, doing more that just solving routine problems etc.). Also, training would help teachers instill an understanding for the importance of the web in a student's future endeavors through the teacher's good example.

Are teachers using the resources available to them effectively?

This question can be answered successfully by examining the following sub-questions:

- So do teachers know what resources are available?

  Based upon the results from questions 13,14, 17, and 18 we see that teachers generally may only see technology coordinators as a local "help" desk. They may not see technology coordinators as a resource to help leverage the power of the Internet in the classroom. This situation is probably exacerbated by the lack of coordinated training for teachers.

- Do teachers only draw on education technology leaders/coordinators in an emergency?

  Teachers tend to use a just in time approach to technology use since they tend to task technology leaders/coordinators on a daily basis (see question 12) for tasks that are more in response to problems encountered by the teacher (see questions 13, 14).

- How well do teachers frame their classroom requirements?

  Since we've already characterized the nature and frequency of tasks a teacher requests of the technology leader/coordinator, these results tend to indicate that if teachers do frame such requirements they certainly don't share them with the technology leader/coordinator.

- Do teachers see a technology leader merely providing a list of useful Internet pages?

  Technology leaders/coordinators would like most to see teachers better trained in how to build lessons using the web (questions 22,23 and 24). This result suggests that many teachers may be using the web only in a rudimentary fashion, which is significant, when one considers that the effectiveness of the tool is limited by the depth of knowledge of the user of the tool. Hence, while teachers may not only see their technology leaders/coordinators as those who can provide a list of web sites but they also see them as a "help" desk for computer problems.

- Are Internet resources really being integrated into the classroom?

Based upon the fact that most technology leaders/coordinators agreed with the implementation strategy their districts are using (question 6) and that it isn't being used enough (question 5) it may be suggested that the Internet is indeed beginning to be integrated into the classroom but hasn't finished that involved process.

Recommendations

Based upon the results and conclusions in this project, there are several key recommendations that can be made.

A recommendation can be made to school districts statewide to provide classes on educational technology for teachers. Technology leaders/coordinators might facilitate this training at the local level.

A recommendation can also be made to increase the pay and standing of technology leaders/coordinators by paying them on an administrative scale. This would help provide incentive for other Information Technology professionals to enter the ranks of technology leaders/coordinators. Also, teachers might begin to see the technology leader/coordinator as not only a help desk but also as a true partner in education.

A recommendation can be made to school boards statewide to provide merit pay for teachers who show expertise in the use of education technology in the classroom. This would perhaps help motivate teachers to want to learn about technology and incorporate it in the classroom.

A recommendation for further study in this area is to investigate lesson development with regard to technology incorporation. Are there specific instructional

design concerns? What are teacher's attitudes? Are there specific metrics that can be used to determine the level of effectiveness for technology incorporation in lessons?

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Appendix A

IRB Approval Forms

Douglas K Ealy
12402 Walker Dr
Omaha NE, 68123

May 12, 1999

Dr. Ernest Prentice
Instructional Review Board
Eppley Science Hall 3018
University of Nebraska Medical Center
Omaha, NE 68198-6810

Dear Dr. Prentice:

At the University of Nebraska at Omaha I am currently studying to obtain a Master's Degree in Teacher Education with an emphasis in technology. As part of my requirements, I am planning to conduct a research study involving internet use in Nebraska's classrooms.

Please refer to the enclosed IRB Request for Exemption form to gain more insight on the proposed study. I believe the study qualifies as exempt within the IRB guidelines. Enclosed you will also find a copy of the survey I am using to collect my data.

If you have any questions, please do not hesitate to contact me at my work 232-7075 or my home 291-2360. Dr. Neal Grandgenett, an associate professor at the University of Nebraska at Omaha, is my advisor and is working closely with me on this project. If needed, you may also contact Dr. Grandgenett at 554-2690.

Thank you for considering my request, I am looking forward to hearing from you.

Sincerely,

Douglas K. Ealy

University of Nebraska
Institutional Review Board
For the Protection of
Human Subjects

University of Nebraska Medical Center
Eppley Science Hall 3018
600 South 42nd Street
Omaha, NE 68198-6810
(402) 559-6463
Fax (402) 559-7845

EXEMPTION FORM

SECTION I: APPLICATION DATA

TITLE OF RESEARCH PROPOSAL: A Perspective of Technology Supervisors in Support of Schools

STARTING DATE: 3 June 1999

PRINCIPAL INVESTIGATOR: Douglas K. Ealy

SECONDARY INVESTIGATOR(S):

DEPARTMENT/COLLEGE: Teacher Education/College of Education

ADDRESS: 12402 Walker Dr Omaha NE **ZIP CODE:** 68123

TELEPHONE: Home 291-2360 Work 232-7075

SECTION 2: CERTIFICATION

CERTIFICATION OF PRINCIPAL INVESTIGATOR: Signature certifies that the research project as described will be conducted in full compliance with University of Nebraska Regulations governing human subject research as stated in the IRB Guidelines for the Protection of Human Subjects. It is understood that the IRB will be notified of any proposed changes which may affect the exempt status of the research.

Signature of Principal Investigator — 12 May 1999 (Date)

Graduate Student
Position

ADVISOR APPROVAL: Student investigators are required to obtain approval from their advisor. Signature of approval certifies the research proposal has been approved and recommended for submission to the IRB.

Signature of Advisor — 15 May 1999 (Date)

Dr. Neal Grandgenett
Printed Name of Advisor

The IRB requires submission of an original and one (1) copy of the Exemption Form.

Institutional Review Board
EXEMPTION FORM

I. Purpose of the Study

The purpose of this study is to determine how effectively the Internet is being used in the classroom from the perspective of education technology leaders and to determine the needs for improving the current implementation of the Internet in the classroom.

II. Characteristics of the Subject Population

(a) Age Range: All of the subjects are teachers legally considered adults.

(b) Sex: Both male and female education technology leaders will be used.

(c) Number: Approximately 150 technology specialists will participate in this study.

(d) Selection Criteria: Technology leaders from ESUs, MOEC and Technology Coordinators will be used.

III. Method of Subject Selection

The subjects will receive an electronic mailing soliciting their participation in this study. The notice will have a link to the Office of Internet Studies web site that has the survey in electronic form.

IV. Study Site

Those asked to participate can respond from their own work area via the Internet.

V. Description of Procedures

The subject will go to the web site and fill out the survey which has only 24 questions. All the results are recorded on the Office of Internet Studies web server accessible only by myself and the system administrator.

VI. Confidentiality

Individual's names and school will not be used to report the results. All responses will be kept strictly confidential. All results will be reported in aggregate format.

VII. Informed Consent

This study meets informed consent, since survey respondents are informed that the survey is part of a study in the survey information, and the completion and return of the survey imply their consent.

VIII. Justification of Exemption

1. Research is conducted in an established or commonly accepted educational setting with research on the effectiveness or the comparison among instructional techniques and cirricula.

(a) Research is conducted in an established or commonly accepted educational setting, in this case at the computer station of convenience to the respondent, since the survey is a web-based survey form accessible from anywhere on the Internet.

(b) The research involves normal educational practices and can be directly linked to the implementation of the Internet in instruction and curricula.

(c) The study procedures do not represent a significant deviation in time or effort and the requirements from those educational practices already exist at the study site, the survey will involve only 24 questions requiring approximately 35 minutes of the subject's time.

(d) The study procedures involve no increase in the level of risk of discomfort, are actually normal, routine educational practices.

(e) The study procedures do not involve sensitive subjects.

(f) Those who choose not to participate merely need not fill out the survey.

(g) Since the survey will be conducted at the convenience of the subject and the investigator is not required to physically visit the school or classroom, no written approval from schools or other education institutions is required.

2. Research involves the use of a survey and identification is voluntary otherwise, the subjects cannot be identified.

University of Nebraska

Institutional Review Board (IRB)
Office of Regulatory Affairs (ORA)
University of Nebraska Medical Center
Eppley Science Hall 3018
986810 Nebraska Medical Center
Omaha, NE 68198-6810
(402) 559-6463
Fax (402) 559-7845
E- mail: irbora@unmc.edu
http://info.unmc.edu/irb/irbhome.htm

June 25, 1999

Douglas Ealy
12402 Walker Drive
Omaha, NE 68123

IRB#: 259-99-EX

TITLE OF PROTOCOL: A Perspective of Technology Supervisors in Support of Schools

Dear Mr. Ealy:

The IRB has reviewed your Exemption Form for the above-titled research project. According to the information provided, this project is exempt under 45 CFR 46:101b, category 1. You are therefore authorized to begin the research.

It is understood this project will be conducted in full accordance with all applicable sections of the IRB Guidelines. It is also understood that the IRB will be immediately notified of any proposed changes that may affect the exempt status of your research project.

Please be advised that the IRB has a maximum protocol approval period of five years from the original date of approval and release. If this study continues beyond the five year approval period, the project must be resubmitted in order to maintain an active approval status.

Sincerely,

Ernest D. Prentice, Ph.D.
Co-Chair, IRB

lw

Appendix B

Internet Survey

Evaluation of Nebraska School's Classroom Uses of the Internet Survey

June 1999

PURPOSE: The Internet has an exciting potential for use in the K-12 classroom, and may be one of the most innovative technology tools of the information age. Yet very little is known about how to most effectively help teachers to learn to access the full potential of this powerful tool. The purpose of this survey is to gather some information from technology leaders as to the impact, the uses and the level of effort required to implement the Internet into the classroom. This information may be very important to the future of the Internet in Nebraska schools.

ANONYMOUS AND VOLUNTARY PARTICIPATION: All data collected by this survey will be kept in the strictest confidence. No individual data will be reported in any report, and only group information will be analyzed and described. Individuals have the full right to participate or not participate in the survey as desired, without any repercussions of any kind for this decision. This survey is coordinated by Dr. Neal Grandgenett, University of Nebraska at Omaha.

Name (optional)
Location (optional)
Position

Please fill in the appropriate circle for only ONE best response to each item, unless otherwise indicated

Are your duties building or district wide?
Building District

Are you paid on an:
Administrative Scale
Teacher Scale
Other

Was your previous experience education related?
Yes No

If yes, were you a teacher?
Yes No

The Impact of the Internet

Do you think the Internet is used _____ in today's classroom?
Too much 1 2 3 4 5 Too little

Are you happy with the strategy and direction your school/district is going in implementing technology in the classroom?
Strongly agree
Agree
No opinion
Disagree
Strongly disagree

What are the Internet related tasks that you perform?
Fixing Connectivity problems
Providing a list of Internet sites for certain subject areas
Helping teachers logon

Monitoring web sites accessed
Making sure no one accesses restricted web sites
Upgrading machines used to access the Internet (software or hardware)
Providing Internet training to teachers
Helping teachers craft thought provoking and engaging lessons using the Internet
Other _____

How much of your time is consumed with tasks related to the Internet?
90 to 100%
60 to 89%
40 to 59%
20 to 39%
0 to 19%

If you didn't have the Internet how much of your workload would be decreased?
90 to 100%
60 to 89%
40 to 59%
20 to 39%
0 to 19%

The Characteristics of teachers who use the web

Regarding the teachers who request your services the most, what subjects do they teach?
_____ (put in NONE if you don't interact with teachers)

How many teachers request you services?
0
1 to 5
6 to 10
10 to 15
15 to 20
20+

How often?

Every day
Two to three days per week
Once a week
Once every two weeks
Once a month
Once a year
None

What is the most common task they ask you to perform?
Fixing Connectivity problems
Providing a list of Internet sites for certain subject areas
Helping them logon
Making sure no one accesses restricted web sites
Upgrading machines used to access the Internet (software or hardware)
Providing Internet training
Helping them craft thought provoking and engaging lessons using the Internet
Other

What is the least (common task they ask you to perform)?
Fixing Connectivity problems

Providing a list of Internet sites for certain subject areas
Helping them logon
Making sure no one accesses restricted web sites
Upgrading machines used to access the Internet (software or hardware)
Providing Internet training
Helping them craft thought provoking and engaging lessons using the Internet
Other _____

What is the most common reason why teachers request your assistance? (eg Technological ignorance, Can't find a web site, Wants advice on how to best implement the Internet into their class etc.)

_____

Please list some of the most innovative uses teachers have implemented with the Internet in their classes (please list the related web site if known).

The Division of Labor

What do you consider the teacher's role in building lessons based upon or using the Internet?
Design requirements for an educational technology leader to implement
Design and develop the lessons and only seek help when needed
Design and develop the lessons and get help through the process
Just use what is out there
Other _____

What do you think your most important job **should** be in assisting teachers?
Building lessons based upon the teacher's requirements
Solving problems as needed
Instructing teachers
Upgrading computers
Other _____

How many hours per day do you spend on doing what you consider to be the teacher's job in building Internet based lessons?
Over 8
8 to 6
5 to 3
2 to 1
None

In approximate terms, how many hours of work you have backlogged?
Over 20
15 to 20
10 to 14
7 to 9
4 to 6
less than 4
None

On average, how much overtime do you work per week?
Over 20
15 to 20
10 to 14
7 to 9
4 to 6
less than 4

None

What would help you the most in doing your job?
- Better trained teachers
- Better guidance on what your role should be
- Good examples of successful uses of the Internet in education
- Other _____

What would help teachers the most in developing Internet based lessons?
- Better training
- Better guidance on what their role should be
- Good examples of successful uses of the Internet in education
- Other _____

In your opinion, what training do teachers need the most in building and using Internet based lessons
- Basic computer skills
- Building web pages
- Searching the web
- How to build lessons using the web

Again, thank you very much for your participation.

Internet Studies Office, College of Education, UNO, Omaha, NE 68182-0163