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Elementary educators use of the internet and the applications of information literacy skills to student use of the world wide web

Rhonda Greenley Spearman

To the Graduate Council:

I am submitting herewith a dissertation written by Rhonda Greenley Spearman entitled "Elementary educators use of the internet and the applications of information literacy skills to student use of the world wide web." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Education.

E. Dale Doak, Major Professor

We have read this dissertation and recommend its acceptance:

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

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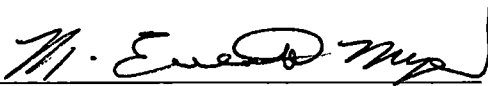
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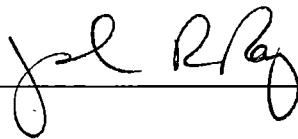
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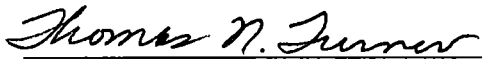
Accepted for the Council:

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Interim Vice Provost and
Dean of the Graduate School

ELEMENTARY EDUCATORS USE OF THE INTERNET AND THE APPLICATION OF INFORMATION LITERACY SKILLS TO STUDENT USE OF THE WORLD WIDE WEB

A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee, Knoxville

Rhonda Greenley Spearman
December 2000

DEDICATION

This dissertation is dedicated to my parents

John and Catherine Greenley

who have provided me with the means to achieve all my goals.

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I owe gratitude to many people for their support, love, and patience during my time at the University of Tennessee. Their constant presence from both near and far sustained me through difficult times. Even when I did not believe I would finish this endeavor, their belief in me endured and gave me reason to keep moving forward. I am particularly grateful to my Dissertation Committee Chair - Dale Doak for his support during this very difficult and bizarre process. He was truly the "Lion" of my committee.

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ABSTRACT

The purpose of this study was to examine how nine elementary school teachers, grades fourth and fifth, reported using the World Wide Web with their students, and more specifically, how they incorporated information literacy skills in Web-based activities. The following research questions were investigated:

- What is the teacher's understanding of the importance of the Web?

- What assignments or equivalents do they place on students that demonstrate the students' knowledge of information literacy and the Web?

- What information literacy instruction do they give students concerning the Web?

- How do teachers view students' abilities to use that knowledge in assessing what they find on the Web?

- What is the teacher's understanding of information literacy?

The qualitative research method used was a phenomenological study based on interviews structured around open-ended questions with spontaneous, related questions used to probe and illicit explanation and clarification. The transcriptions were filtered and analyzed using the software package NUD•IST. Findings of this study revealed that while participants viewed the Web and Web activities positively they did not feel their students were developmentally ready for information literacy instruction. The following conclusions were made:

- Teachers view the Web as an important resource for students and themselves and incorporate its use in assignments and activities.

- The participants in this study were unable or unwilling to provide opportunities for students to demonstrate knowledge of information literacy during web activities.

- The participants' understanding of information literacy was absent at the conceptual level and not demonstrated in any student related activities.

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CHAPTER I

INTRODUCTION

> Before you become too entranced with gorgeous gadgets and
> mesmerizing video displays, let me remind you that information is
> not knowledge, knowledge is not wisdom, and wisdom is not
> foresight. Each grows out of the other, and we need them all.
> Arthur C. Clarke (1993)

As more and more classrooms go "on-line" and teachers and students access

information on the World Wide Web, the need for information literacy increases. At one

time writing a research paper in fifth grade meant a trip to the school library to locate one or

two books on the subject. Now that same assignment could conceivably have hundreds of

sources accessed via the World Wide Web. Having access to more resources is a double-

edged sword. Students have access to libraries and experts that they have never had before,

but there are also resources that may not be accurate or legitimate. The students not only

need to know how to search for information on the Internet, but how to evaluate it as well.

The purpose of this study was to examine how nine elementary school teachers,

grades fourth and fifth, reported using the World Wide Web with their students, and more

specifically, how they incorporated information literacy skills in Web-based activities. This

chapter will provide a background of the problem, statement of the problem, restate the

purpose of the study, identify the need for the study, discuss methodology and

participants, define terminology and study limitations.

BACKGROUND OF THE PROBLEM

To meet the purpose of identifying the need for this study, the phrase "information

literacy" required defining. Additionally, the conception and evolution of the Internet and

World Wide Web and its impact on K-12 classrooms needed explanation. Defining the

terms "literacy" and "information" is important to understanding the more recently coined

phrase "information literacy" and the skills associated with it as they are applied to the

World Wide Web. Webster's Dictionary (1983) defined literacy as "the condition of being

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educated." To become literate one must be "instructed; furnished with knowledge and principles; trained." Wresch (1996) provided an overview for five different types of information to be consumed by the individual. The next section explores these five information types.

Types of Information

In his book Disconnected: Haves and Have-nots in the Information Age, Wresch (1996) went beyond the traditional definitions of information as data fitted into schemes or categories. Wresch took another approach to information.

> My assumption is that information is not a neutral object to be discovered and counted, like atoms or zebras, but an expression shaped from the very beginning by the creators of that information. In short, information comes from somebody, and that somebody determines from the beginning how much information there will be, what form it will take, and even if it will exist at all (p. 7).

Although there are potentially millions of sources of information, Wresch focused on five major sources of information we may encounter; public information, personal information, organizational information, professional information, and commercial information. His reason for breaking the sources down into these categories is to illustrate "how much information is really out there, what form it takes, and how good it is" (p. 8).

Public information is made of traditional sources such as television, newspapers, radio, movies, and books. Access to those sources may be limited by geographic location, money, or the ability to read and write. Another concern has to do with a country's economic status. For example, the United States is an exporting country and has little opportunity to hear the public information voices of other countries. Personal information is limited by whom you know, according to Wresch. Since personal information is one of the largest and may be culturally determined, these sources are prone to errors that cannot be corrected because few outsiders know what is said. Organizational information comes from businesses, universities, government agencies, and research groups. Although "Electronic data interchange (EDI) systems connect companies and government agencies in

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ways never attempted before" (p. 10), these organizations still withhold vast amounts of information from one another. Professional information is one of the major sources of information. Professional associations keep members apprised of current trends and issues; however, Wresch stated they have biases as to "who they will let in, who they will listen to, what they will say to the public, and how they will relate to each other" (p. 10). This is easily seen in the medical profession where conflicting reports about vitamin supplements, surgical procedures, and new drugs are reported in medical journals. The associations that publish these journals may have different theoretical beliefs and the information may be biased by those beliefs. Commercial information has always been with us. Information is a commodity to be bought and sold. The competitive edge of a university or business lies in the size and contents of their information databases. Basically the commercialization of information means that "Profitable information is available from many sources; nonprofit information struggles to survive on handouts."

Literacy and Information

Being literate of the different types of information identified by Wresch is a task in and of itself. However, it illustrates how saturated with information our society has become. Berenfeld (1996) used the analogy of an "infosphere" to discuss this information saturation and its influence on information literacy skills. He addressed how this "emerging infosphere is changing how we work and how we find, access, analyze, process and exchange information (p. 82)." Berenfeld also pointed out that information literacy has many definitions, regardless of which definition used; the educational objectives remain the same. Doyle (1994) expanded the definition of information literacy into goals and objectives for an information literate person. "An information literate person is one who:

- recognizes that accurate and complete information is the basis for intelligent decision making
- recognizes the need for information
- formulates questions based on information needs
- identifies potential sources of information

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- develops successful search strategies
- accesses sources of information including computer-based and other technologies
- evaluates information
- organizes information for practical application
- integrates new information into an existing body of knowledge
- uses information in critical thinking and problem solving (p. 3)."

The Memex and Hypertext

Thus far information literacy has been addressed in relation to the Internet and World Wide Web, which have not been discussed in detail. The *idea* for a mechanism that would help a user to make connections between the types of information was introduced by Vannevar Bush (1945) in *The Atlantic Monthly*. Bush conceived of a device that would be able to link information in the same way the human brain does, by association. He called his device a "memex" and saw its main purpose as being storage and retrieval system for personal libraries. His explanation of how the memex would look and operate is strikingly similar to the computer station that accesses the World Wide Web, making a trail of links as the user jumps from one source of information to another. Bush's device was not limited to text; it would also access movies, audio files, and pictures, just as the Web does today (Carvin, 1997).

Bush's device was performing a task of linking related sources of information. In the early 1960's Ted Nelson coined a word for this kind of activity, hypertext. Nelson saw hypertext as the way we would eventually come to access and present information on the Internet. His reasoning was based on the high capacity data storage offered by computers. Hypertext is a non-linear presentation of information with the potential for each user to create unique paths through the same documents. Nelson was about 30 years ahead of himself when he coined hypertext, but the past has caught up with a vengeance in the past ten years thanks to advances in microcomputing and telecommunications technology (Carvin, 1997).

The Internet

Bush conceived of the memex, Nelson coined the term hypertext and expanded on this idea, and both ideas became reality due to the Cold War. Sterling (1993) provided a history of the Internet that emphasized that regardless of what the government intended the Internet to be; the people using it drove its evolution. It was America's primary think-tank, the RAND Corporation, which generated a solution to the strategic problem of maintaining successful communication between US authorities after a nuclear war. The answer, thanks to Paul Baran of RAND, was a network with no central authority that was to be assumed unreliable at all times. All nodes on the network would have equal status and "authority to originate, pass, and receive messages." If part of the network went down the rest of the network would be able to function and send messages to other functioning parts. Collectively, RAND, UCLA and MIT contemplated this "intriguing concept of a decentralized, blast-proof, packet-switching network."

The development of the Internet continues with the installation of the first node in UCLA. December 1969 saw the birth of ARPANET with four nodes on the network, named for its Pentagon sponsor. ARPANET allowed scientists and researchers to share computer resources long distance, a much-needed service during the early seventies when computer-time was coveted. The network grew to fifteen nodes in 1971 and thirty-seven by 1972. The Internet allowed users to send electronic mail (e-mail), conduct discussion groups, long-distance computing, and file transfers (Sterling, 1993).

It was the second year of operation that foretold the future of the Internet. ARPANET users had turned the "computer-sharing network into a dedicated, high-speed, federally subsidized electronic postoffice." Sterling went on to say that even though personal use of ARPANET accounts was frowned on by the network administrators, this didn't stop the activity that grew into mailing lists for fans of science fiction. The scientists

and researchers were not only sharing important research information and data, but also their thoughts on the latest works of science fiction.

The National Science Foundation joined the ever-growing network of networks in 1984. NFSNET set the pace in telecommunications with technological advancements in linking supercomputers through better, faster transfer mediums that were upgraded again and again. This led the way for other government organizations such as NASA, Department of Energy, and the National Institutes of Health to jump in. In 1989 ARPANET's passing into the greater network beyond was hardly noticed because its functions continued, the organization behind had simply disbanded.

The World Wide Web

By 1992 the Internet was growing by twenty percent a month. There were tens of thousands of nodes scattered across the globe and more countries, more people, were getting hooked into it everyday. It was also the year that the Internet would be dramatically altered. Wiggins (1995) discussed the "webolution" that was a direct result of the collaboration between Tim Berners-Lee and Robert Cailliau. In 1990 they co-authored a design document for a hypertext browser and outlined five fundamental ideas that exist in the "Web" as we know it today:

- The ability of links to cross machine boundaries.
- A simple, common protocol for exchanging hypertext documents (a concept later embodied in the Hypertext Transfer Protocol or HTTP).
- A common document protocol for the suppliers of information (later embodied in the Hypertext Markup Language or HTML).
- Support for index searches.
- The widely deployed ability to view these documents via browser programs supporting at least text dissemination, if not graphics (p. 36)."

This was the seed for the development of the World Wide Web, something that would allow people all around the world, on different types of computers, with different access set-ups, to search and share documents on the Internet. Berners-Lee, inventor of the World

Wide Web, was given funding to work on the CERN hypertext project and released the WWW for use at CERN in May 1991.

Graphical Browsers

Wiggins (1995) went on to discuss the various browsers that began popping up all over the country at universities and technology industries based on Berners-Lee's work. Although Viola, developed by Pei Wei at the University of California at Berkeley, was one of the earliest full screen browsers it was an X/Window Web browser called Mosaic that launched the World Wide Web into the mainstream.

Marc Andreessen, a student at the University of Illinois, and Eric Bina, a programmer at the National Center for Supercomputing Applications (NCSA), developed this easy to install, multi-protocol handling, and highly functioning Web browser. Since the first release was limited to those using UNIX workstations, NCSA made plans to release Macintosh and Windows versions of the browser, thus producing a multi-platform product. Mosaic wasn't the only browser developed during this period of time and many of these browsers are still popular today, but Mosaic seemed to set a standard in browsers.

So what is so important about browsers and the Internet? Serim and Koch (1996) provide a simple explanation,

> The World Wide Web is a global network of information servers. Individuals or organizations publish documents on their own Web servers; anyone on the Internet can access these documents. Documents usually contain hypertext links to other documents or images. A Web browser is used to retrieve the pages from Web servers and display them on your computer screen. Most documents today include graphics and text, with an increasing amount of multimedia data as well (audio, animation, and video). In addition, a Web browser can get information from other types of servers, including FTP and Gopher. (P.57-58)

WebTV™

A recent development concerning the Internet is WebTV™ that allows users to access the World Wide Web through their televisions, without a computer. According to the technical specifications provided at the WebTV™ home page, this product is "a no-

compromise, high-performance solution that provides east-to-use, affordable Internet access wherever there is a television and a standard phone line (http://www.webtv.net)."

Why WebTV™ came about is summed up in the company's mission statement: "To make the Internet as accessible and compelling for consumers as broadcast television is today (http://www.webtv.com)." Steve Perlman seems to have had WebTV™ on his mind since he left college. During his work with such companies as Atari, Coleco and Apple Computers he "tinkered with the idea of providing consumers with easy access to e-mail capabilities and information resources (http://www.webtv.net)." After developing a product for playing video games over phone lines he began to watch the World Wide Web's growth. After spending three days building the first prototype for WebTV he showed it to his friend Bruce Leak. The two men realized there was a product here and after adding their third partner, Phil Goldman, on board they set out to create WebTV™'s proprietary technology. They unveiled their product July 10, 1996, in New York City. Perlman and his partners struck lucrative deals with Sony Electronics Inc. and Philips Consumer Electronics Company to manufacture the set-top boxes for wide-scale distribution.

Essentially, this product is a set-top box that attaches to a television and phone line. Philips Magnavox, one of the manufacturers of the set-top box, provides a FAQ (frequently asked questions) page at their marketing site. One of the most important questions people are asking about this product is how is it different than a computer. Philips answers this question by first addressing the low cost of the system compared to a computer system, the Plug and Play design or ease of set-up, and no need for a modem, browser, or an Internet provider. These are not the only reasons they feel consumers would prefer this method of Internet access to that of a computer. The quality of the display on the television, fast modem technology, and expansion ports for future technologies and optional add-ons like keyboards, printers, and joysticks all make WebTV more attractive to

consumers than purchasing a desktop computer with on-line capability, so believes the marketing firms. (http://www.magnavox.com)

The set-top box is only one half of the equation. There is also the WebTV Network™, "a subscription based on-line service that provides and easy-to-use front-end to the Internet (http://www.webtv.net)." This service provides the customer with a graphical user interface browser that provides links to services and resources on the Internet and World Wide Web. This browser is specific to the WebTV™ product and also provides access to help and technical assistance. Perlman purposely used the television as the medium for his product because it is the most "pervasive, far-reaching and high-impact information tools of the 20th century (http://www.webtv.net

Connected Classrooms

Although there have been K-12 teachers accessing the Internet since its early days it has been reaching a wider audience with the introduction of the World Wide Web. The use of hypertext and the HTML authoring language creates a user-friendly environment for surfing the Web. It is also apparent by the number of educational resources available that educators and their students have an interest in the Web.

This relationship between educators and the Web has also been recognized at a political level. Persons running for political positions at local, state and national levels include sound bytes in their speeches about networking schools and getting kids connected to the Internet. Former President of the United States, Bill Clinton, and his Vice President, Al Gore, were both strong advocates of the World Wide Web and its educational possibilities. During his 1997 State of the Union Address Bill Clinton specifically addressed connecting classrooms to the Internet and World Wide Web. In his crusade for national standards in education, Clinton proposed a plan, a Call to Action for American Education, based on 10 principles dealing with establishing national standards, nationally accepted teaching credentials, reading, Head Start, school choice, good citizenship and

character development, school construction, 13th and 14th years of education (2 years of college for everyone), lifetime learning, and the Information Age. The 10th principle in Clinton's plan calls for all schools to have an Internet connection as he stated:

> We must bring the power of the Information Age into all our schools. Last year, I challenged America to connect every classroom and library to the Internet by the year 2000, so that, for the first time in our history, children in the most isolated rural towns, the most comfortable suburbs, the poorest inner city schools, will have the same access to the same universe of knowledge. (1997 State of the Union Address)

There have been many articles and books published in the popular Educational Technology literature about why the Internet and World Wide Web is so important in education, acceptable use policies, the pace at which schools are getting on the Web, and educational resources available on the Web.

Serim and Koch (1996) summarized the educational value of the Internet and how it helps students, teachers, schools, and communities. According to the authors, having access to the Internet can alter a teacher's beliefs about learning and teaching. The authors viewed the Internet as a "catalyst and enabler of systemic reform" to help educators alter how we teach and learn, the school structure and its community interaction. (p. 5). Students who use the Internet are no longer passive recipients of knowledge; they can direct their own learning by pursuing their interests and can manage their own projects. Students also become collaborators through the Internet by communicating with peers and experts around the world. Teachers, too, can collaborate with others, thus ending the isolation prevalent in this field and furthering their professional development. School administrators also benefit from the Internet because of the ease of record transfers, communication with other schools and administrative offices, and parental contact. Publishing student projects on the Internet lets communities know what is going on in the school. It also fosters cooperation between community organizations and businesses and the schools.

The previous discussion has illustrated how the Internet benefits educators and students, but others point out the dark corners of the Web of which educators must also be aware. News programs and popular talk shows have received a lot of mileage from these child-unfriendly sites. Yet, the concern is legitimate and has prompted schools to work with parents on acceptable use policies (AUPs) in order to protect students and teachers. An AUP is "a written agreement signed by students, their parents and their teachers outlining the terms and conditions of Internet use–rules of on-line behavior and access privileges" (Keeping Students, 1995, p. 12). Day and Schrum (1995) listed six important components of effective AUPs and offer recommendations for developing an AUP. The authors felt that all AUPs should: 1) define the Internet, 2) provide a code of conduct for on-line activities (netiquette), 3) discuss legal and ethical issues such as copyright, privacy, and mischievous acts, 4) define objectionable material and make clear that it is "almost impossible to absolutely guarantee that students will not be exposed (p. 10)", 5) state that access to the Internet is a privilege not a right, and 6) contain a section on penalties and consequences informing parents of repercussions should a student violate any policies.

Sanchez (1995) emphasized the fact that the benefits of having students access the Internet far outweigh the potential drawbacks. However, these concerns mean schools approach the Internet differently: some take their time and their efforts are tentative, others plunge in and take the tiger by the tail. Sanchez gave examples of various schools' efforts to demonstrate the diversity in approach. One home page Sanchez described presents a beautiful photo of two children and then proceeds to discuss the school buildings and adult staff and faculty. Students are not mentioned within the rest of the site. Sanchez viewed this as a demonstration of how some educators see the Internet and Web as "forbidden (or forbidding) to children" (p. 72). On the other hand consider this glowing review of another school's project:

> Organizers called the Hillside project extremely successful, and no wonder.
> Mrs. Collins' sixth graders used the Internet to produce research papers on

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such topics as Antarctica and the Shoemaker-Levy comet. They conducted career interviews, studied the wind, wrote stories, and created home pages. Just a few of the skills they developed included conducting research and creating HTML documents. (p. 72)

Another indicator of how the Internet is becoming an integral part of education are the publications dedicated to teachers and students. One of these resources, <u>Classroom Connect</u>, publishes articles on how to teach with the Internet and World Wide Web, lesson plans, evaluations of Internet tools, site reviews, activities to use in the classroom, and information on grants and government resources. Older educational technology journals have established regular columns devoted to teaching and the Internet. Then there are the actual on-line resources such as the Department of Education's Web page, Yahoo's educational directory, and educational publishers Scholastic, Houghton Mifflin, and others providing curriculum information and links to interesting sites, that are just a very small sample of what is available. It is not just the publications and Web pages that demonstrate the popularity of the Web and its growth; it is also becoming a regular part of our media and information resources. The adoption of the Web by corporate America, its ease of use, and relatively affordable access has made its integration into the classroom seemingly faster than the computer.

STATEMENT OF THE PROBLEM

Instructional technologists and information scientists emphasized the need to teach students how to use the Web and apply information literacy skills to its use. Serim and Koch (1996) pointed out that "becoming information literate has been an educational goal for students long before the emergence of the Internet, but now it is a necessity" (p. 134). Understanding how teachers use the Internet and World Wide Web for themselves and with their students is important as classrooms go on-line. The Internet is like any other technology, an understanding of how to use it is important if it is to have any positive influence in the classroom. How are teachers incorporating information literacy skills as

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they instruct students in the use of the Internet? Are teachers making the connection between information literacy and the Internet in lesson design?

PURPOSE OF THE STUDY

This study examined how nine elementary school teachers, grades 4th through 5th, in the greater Knoxville area reported using the World Wide Web with their students and, more specifically, how they incorporated information literacy skills in Web-based activities. Educators are at the threshold of using the World Wide Web as a teaching tool, a fact that was taken into consideration in this study. The broader goals were to understand how participants in this study use the Internet and World Wide Web in their classrooms and to attempt to identify commonalties among them. Each participant was interviewed for 30 minutes to one hour. Information revealed during the open-ended qualitative interview sessions included how teachers gain access to the World Wide Web, how they and their students use the Web, which search tools they employ, and how students assess the value of the information they have gleaned from the Web. The researcher used the definition for an information literate person to identify the skills and concepts the participants should have been incorporating into their Web activities with students. According to Doyle (1994) "an information literate person is one who:

- recognizes that accurate and complete information is the basis for intelligent decision making
- recognizes the need for information
- formulates questions based on information needs
- identifies potential sources of information
- develops successful search strategies
- accesses sources of information including computer-based and other technologies
- evaluates information
- organizes information for practical application
- integrates new information into an existing body of knowledge
- uses information in critical thinking and problem solving (pg. 3)."

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RESEARCH QUESTIONS

The following research questions were investigated:

1. What is the teacher's understanding of the importance of the Web?

2. What assignments or equivalents do they place on students that demonstrate the students' knowledge of information literacy and the Web?

3. What information literacy instruction do they give students concerning the Web?

4. How do teachers view students' abilities to use that knowledge in assessing what they find on the Web?

5. What is the teacher's understanding of information literacy?

These questions served as the basis for the development of the interview guide used with each participant. The research questions themselves were not presented to the participants.

NEED FOR THE STUDY

Computers are accepted as a daily part of the lives for a growing majority of Americans in professional or technical jobs. The Internet and World Wide Web are part of the corporate and academic routine. The way we present and access information has been modified many times over from the passing of oral histories and teachings to the printing press to the radio to the television to the computer to the Internet. The ability to access and apply information has been a skill since those first oral histories were told to the younger members of the clan to remember and pass on. Now information has taken on a new dimension in that it is not only multimedia information, but non-linear as well. Compound this with the multitude of documents published on the World Wide Web by anyone with a computer and an Internet connection and you have an information explosion. Educators and students will need to learn and apply information literacy skills to their use of the World Wide Web if they are to make sense of what is available to them.

The World Wide Web is a relatively new information source, but the skills needed to determine an information need, find the information, evaluate the information, and apply

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the information were educational goals long before the Web came into being. By understanding how teachers are approaching the use of the Internet and World Wide Web in the classroom, consideration can be given to preservice and inservice teacher training. Specific skill sets and concepts may be designed and implemented in the classrooms so all students will have the same abilities to utilize this powerful tool efficiently and effectively to bypass the litter on the Information Super-Highway.

METHODOLOGY

Theoretical Perspective

Kafai and Resnik (1996) stated that constructionism builds on Jean Piaget's theories about how children construct knowledge through their interactions with the environment. It is "both a theory of learning and a strategy for education" (pg. 1). One of the main tenets of the theory is that when learning has personal meaning, students are more likely to be intellectually involved, especially in the construction of a project. There is also the strong connection made between "design and learning" (pg. 4). The final product is not necessarily the only indicator for learning, for the design process also demonstrates that learning has occurred. Kafai and Resnik pointed out that "constructionist theory goes beyond Piaget's constructivism in its emphasis on artifacts, asserting that meaning-construction happens particularly well when learners are engaged in building external and sharable artifacts" (pg. 4).

The World Wide Web is made up of hypertext links to resources on just about anything one can imagine. Surfing is a term used to describe the somewhat random way people navigate the Web through hypertext links. The Web can also be searched for specific information using search engines and key words or phrases. Gaining an understanding of how teachers use the Web in their classrooms and how they teach students to access the information can be accomplished in many ways, but qualitative interview studies allow the participants to bring their own meaning to why they do things.

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Participants

The principal investigator solicited volunteer teachers by sending a letter explaining the study with permission forms to elementary and middle schools in the greater Knoxville area. Invitations to participate were mailed to every elementary and middle school in the four systems with any combination of grades fourth through sixth. The search for volunteers was limited to four East Tennessee public school systems: Knox County; Oak Ridge; Maryville, and Alcoa. Participants were elementary school teachers teaching in grades fourth and fifth. These grade levels corresponded to the introduction and implementation of reference skills into the curriculum. After two calls for participation, there were twelve volunteers, however three were eliminated from the study because they did not meet the criteria listed below. The nine participants selected met the following criteria:

1. They had an Internet connection and World Wide Web browser in their classroom.
2. They had been using the World Wide Web with their students for at least a year.
3. They had been teaching in the elementary classroom setting for at least three years.

Methods

The qualitative research method used was a phenomenological study based on interviews. The interviews were structured around open-ended questions with spontaneous, related questions used to probe and illicit explanation and clarification. Each interview lasted approximately thirty minutes to one hour and was conducted at a location agreed upon by the participant and principal investigator.

The principal investigator explained the purpose of the study to each participant and obtained written consent for their comments to be used in the study prior to beginning the interviews. Participation was voluntary and participants could withdraw from involvement at any time without penalty. The identity of the participants was kept completely confidential through the use of pseudonyms.

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The interviews were audio-taped and transcribed to facilitate capturing the experience in the exact words of the participants. Only the principal investigator retained access to the tapes, transcripts, consent forms, rough drafts, and any other material relating to the study which were stored in a locked filing cabinet in the principal investigator's office for three years upon completion of the study, after which they were destroyed.

Data analysis has three components according to Miles and Huberman (1994), data reduction; data display; and verification. Data reduction occurs before data collection begins, during data collection, and once analysis has begun. Qualitative research studies are renowned for the large amount of data collected and difficulty in managing it, thus the need for data reduction. Question design is the first step in reducing the amount of data. The questions in this study deal with a specific component of technology in the classroom, the World Wide Web. The second component is data display. Once categories are established the data can be displayed for further analysis in matrices or diagrams. Weitzman and Miles (1995) pointed out that computer-assisted analysis allows for attaching keywords to data, maintaining an organized database, linking data segments together, content analysis, and displaying data in charts or matrices. Verification, also known as drawing conclusions, is the final part of data analysis. Developing themes from the data and interpreting meaning occurs after the data displays have been studied. These are not three discrete phases that begin and end one at a time; they overlap and repeat as the research proceeds.

DEFINITION OF TERMS

The following terms were used with particular meaning in this study:

Application

> (a) Software that performs a useful function on a computer.
> (b) The useful function itself.

AUP (Acceptable Use Policy)

> An agreement about the appropriate use of the Internet and World Wide Web for learning that is typically created by a school or school system and signed by teachers, parents, and students.

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Bookmark

A placeholder created in the Web browser by a user to quickly access a site previously viewed.

Hypertext

Text within a document that is linked to another document; selecting a link automatically displays the second document.

Information literacy

The ability to locate, access, evaluate, process, apply, and exchange information in critical thinking and problem solving.

Internet

An interconnection of two or more networks that allow users of different computer networks to communicate with each other across geographic boundaries. Commonly refers to the hardware and wiring that applications and the World Wide Web are accessed through.

Search Engine

A Web-based tool that locates Web pages based on words or phrases specified in search criteria.

Surfing

Randomly navigating the World Wide Web by clicking on hyperlinks. There is no directed search or pattern to this type of navigation.

Web browser

A software program that allows users to view, search, download, and bookmark Web pages.

Web Directory

A Web-based resource of links to Web pages that have been identified, categorized, and reviewed for relevant content.

Web Page

A file containing text, images, sound, movies, and hypertext that is accessible by a Web browser.

Web Site

A set of Web pages interconnected by hyperlinks. Web sites contain information about individuals, corporations, organizations, and other entities.

World Wide Web

> A hypertext-based system for finding and accessing Internet resources in the form of Web pages or sites. Also referred to as WWW or Web. The WWW is the visual representation of information stored and accessed on the Internet.

STUDY LIMITATIONS

The researcher had to assume the participants were being truthful during the interviews. This study was limited to nine Tennessee elementary classroom teachers teaching grades fourth and fifth, who have had Internet and World Wide Web access in their classrooms for at least a year, and had been teaching for at least three years in an elementary school. While the initial participant pool was twelve, three were eliminated because they did not meet the requirements stated above. Of those eliminated, two had not been teaching for three years and the other had only been using computers in the classroom for six months. Other limitations of this study have to do with the methodology. The one time, one-hour interviews did not allow for in-depth understanding of what participants are doing in the classrooms, simply an overview. The limited number of participants and the fact that this was a phenomenological study means the information cannot be generalized to a broader population.

CHAPTER SUMMARY

This chapter provided a background of the problem, statement of the problem and the purpose of the study, identified the need for the study, discussed methodology and participants, and defined terminology and study limitations. While information about the World Wide Web and information literacy was presented in the background section of this chapter, a more thorough literature review provides insight into several areas surrounding the use of computers and the World Wide Web in the classroom. Six major areas of research are reviewed in Chapter II of this study: computers in education; Internet and Web activities in the classroom; adoption and integration of the Internet and Web; computer and information literacy; computer use in Tennessee; and the qualitative research method.

CHAPTER II

REVIEW OF RELATED LITERATURE

INTRODUCTION

The literature review provides a background to the study by presenting research and trends for the use of technology in the classroom and current thoughts on information literacy. The purpose of this study was to examine how nine elementary school teachers, grades fourth and fifth, reported using the World Wide Web with their students, and more specifically, how they incorporated information literacy skills in Web-based activities. Educators are at the threshold of using the World Wide Web as a teaching tool, a fact taken into consideration in this study. The broader goals were to understand how teachers were using the Internet and World Wide Web in their classrooms and to attempt to identify some commonalties among the participants.

A review of the literature provided insight into several areas surrounding the use of computers in the classroom and more recently, the use of the Internet. Six major areas of research were reviewed for this study:

- Computer use in education;
- Internet and Web activities in the classroom;
- adoption and integration of the Internet and Web;
- computer and information literacy;
- computer use in Tennessee; and
- the qualitative research method.

First, computer use in educational settings is discussed. The potential for technology to be an agent of change, training teachers to effectively use technology in the classroom, and show computer technology is currently being used in classrooms gives a basis for understanding the introduction and implementation of the Internet into the classroom.

Second, the Internet and Web can be integrated into the curriculum in many different ways and teachers utilize this resource based on their experience and established learning goals. Berenfeld (1996) identified five educational functionalities of the Internet while Roerden (1997) discussed twelve Internet activity types teachers can use to integrate the Web into the curriculum. Teachers use the Internet in a variety of ways, from e-mail communication projects to publishing student materials on the World Wide Web.

Third, teachers go through specific stages of adopting the Internet and technology in general. Students and teachers both express enthusiasm and frustration with Internet activities. Planning, establishing goals, and setting time limits rank highest in concerns for use of the Internet. Motivation, student ownership and involvement in research and publication are the positive results reported by both teachers and learners.

Fourth, the two types of literacy focused on in this study, computer and information, are discussed. Computer literacy goes beyond knowing how to turn the computer on and use software. It also encompasses the ability to incorporate computer technologies into the classroom and curriculum. Information literacy is the ability to identify an information need, locate resources, evaluate their fitness for purpose, use them to create knew knowledge, and apply the knowledge to solve a problem. Information literacy is not new to education and has had a variety of labels.

Fifth, there have been two main initiatives in the State of Tennessee to further the integration of technology in the classroom: 21st Century Classrooms and ConnecTEN. 21St Century Classrooms was an initiative designed to place teacher and student computers in classrooms where students would have daily access. ConnecTEN's goal was to establish an Internet point of presence in every school system. Each school would have at least one Internet connection, in the school library, and access to the World Wide Web via the Netscape browser.

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Sixth, the qualitative research method of phenomenology is discussed. Inquiry is the staple of the qualitative researcher because of the emphasis on socially constructed realities. A relationship must exist between the researcher and what is being studied; this brings value to the inquiry. It is important to reiterate that qualitative research focuses on processes, not causal relationships between variables as quantitative research does.

COMPUTER USE IN EDUCATION

Technology as an Agent of Change

Cuban (1993) discussed three impulses for using technology in the classroom. First, the desire to bring schools up to date with what is in the work place. Students entering the work force need to be prepared to compete and adjust to the changes in the marketplace. The second impulse comes from ". . . a diverse coalition of academics, educators, and foundation officials . . ." that believe in self-directed learning for students (pg. 190). These educators see children as active learners who are creating their own knowledge and with the aid of computers can share that knowledge with a diverse community. The final impulse is productivity. The belief that it is better to teach more in less time has been a driving force in education since the early nineteenth century. Cuban pointed out that it is no surprise that computers have been hailed as the answer to the problem. Cuban cited figures that show mixed results of teachers' use of computers and technology and their effects.

Since technology is fast becoming a standard part of the regular education class-room, society expects teachers to be computer users and model this for their students. Teachers receive computers, printers, and modems from school systems, businesses in partnerships with the schools, and PTA donations. What happens once the technology is dropped off is another matter. Many computers are left in the box because the teachers lack knowledge of how to make use of them. Henry (1993) gave three reasons for this: (1) teachers do not perceive themselves as prepared to teach with technology; (2) a lack of

administrative encouragement; and (3) teachers do not have enough time to learn and use the new technology on their own. To overcome these obstacles, Henry identified what teachers need: (1) facilities and an environment that allows for exploration and mastery; (2) training that is conducted over years, not days or hours; and (3) continuous technical support. If these three needs are met then, according to Henry, teachers will be better able to begin incorporating technology into their classrooms.

Miller and Olson (1994) also reported that there seems to be a common belief that technology will revolutionize teaching. They focused their research on teaching practices and whether there was a significant change brought on by computers. They found that the computer did not influence the teacher but that the teacher's practices prior to the computer influenced their use of technology. The teachers integrated the computer into their rooms in ways that best enhanced their teaching. The teachers were not radically changed, but adapted the computer to fit their own ideas and philosophies.

Technology Training for Teachers

Delcourt and Kinzie (1993) found that teachers' attitudes and self-efficacy are directly related to their experiences with technology. They highly recommended training teachers in technology in teacher education programs so that teachers will more readily adopt and model technology use. The teachers already in the field need workshops and inservice training provided so they too may become comfortable and competent with technology.

Koontz (1992) found that formal training in technology was a factor on positive attitudes towards technology. Teachers who had received formal training were more likely to use and request computers, televisions, and laser discs for their classrooms. He suggested that states should have policies concerning the development of a "standardized formal course of study in the selection and utilization of instructional media (pg. 12)."

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According to Handler (1993), one way that teachers may receive technology training is through teacher education programs. The focus of teacher education programs is preparing the new teacher for the classroom. Courses in classroom management, parent-teacher relations, child psychology, and methods prepare new teachers for their first year of teaching and allow for them to build on this knowledge as they gain experience. Handler pointed out that courses in technology should be no different. She stated that pre-service teachers should receive instruction through modeling by professors and technology methods that demonstrate how to integrate computers and curriculum.

Hurst (1994) interviewed hundreds of teachers and principals concerning the technology training they have received. He found that though their training experiences had been positive they were too short and infrequent. The teachers expressed a need for continuous, adaptable inservice training that is individualized. According to Hurst the teachers and principals are the ones that should develop the technology-training program for their schools. By giving ownership to the teachers and administrators of the buildings they are more likely to see the training as a matter of course.

Fishman and Duffy (1992) found that when teachers utilize the resources around them their anxiety about technology lessened. Some of the more helpful resources were: observing other classrooms; sharing with colleagues; and reading material on research and practice. The complementary resources they suggested were: university courses; release time for learning; workshops; and resource centers in the community. Fishman and Duffy stated that the teachers found these resources valuable because it eliminated the isolation they had previously felt. The teachers and administrators did not have to "reinvent the wheel" when there was someone to go to for ideas and help. The sharing between teachers served as a reinforcement of good techniques and for rethinking what had not worked. Sharing knowledge of where one has been allows others to catch up and not fall into the

same pitfalls already experienced by others. This makes the process of change occur more effectively.

Veen (1993) stated that change is a process. Practicing teachers and pre-service teachers alike need to gain experience with computers before they can integrate them. Change may take several years and teachers need support and training during this time. It is important to remember that the computer will be adapted to the classroom not the class-room to the computer. Veen suggested the process begin by introducing the computers so that they are a part of the day-to-day routine of the teachers. The computer should not become a source of change or difference. After the teachers have become comfortable with the technology they may begin utilizing it in more complex ways. Veen believed that inno-vators should always keep the teacher in the forefront of their minds. If a teacher uses a highly sophisticated piece of equipment for drill and practice, then she or he is fitting it to its best use.

Current Uses of Technology

De Acosta (1993) found that a school's philosophy of education influences how teachers use technology in the classroom. If teachers and administrators make decisions about technology based on what has worked for someone in another situation, it may not work for them. When teachers are able to look at their own teaching styles, students, and academic goals, they can make choices that best meet their needs. De Acosta pointed out that it is important for educators to recognize the pitfall of implementing a program just be-cause it worked somewhere else. Every school, teacher, and student are different and the needs for each vary.

Davis and Henry (1993) conducted a study on how teachers use technology in their classrooms. They found the majority of the teachers in their study use computers and technology in their classroom instruction. Some, but not as many, use computers to help with record keeping, classroom management, and professional development. The majority

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of instructional use is supplemental to regular instruction. Some teachers use drill and practice, tutorial, and educational games to reinforce what the students have already learned. Other teachers use the computer as a reward for good behavior or work done on time. How a teacher uses a computer in his or her classroom is dependent on the teaching style the teacher had prior to obtaining a computer. Davis and Henry found that even teachers within the same school used computers differently.

Wise (1994) provided a glimpse of what an ideal setting would be for teachers learning to implement technology. He pointed out that the changes made at Silver Ridge Elementary concerned everything from curriculum to multi-age classes, as well as technology. Training sessions are set aside on Thursday mornings for teachers and students in the various areas of reform. Technology plays an instructional role in the school and is an active part of the daily routine. The teachers were hired with this fact stated in their contract and with a willingness to embrace change.

Dockterman (1991) stated that a computer cannot make teachers' problems go away. It will help them with many of the mundane tasks of teaching and make the better parts of teaching more exciting. Dockterman gave a list of five things a teacher can do with a computer. They can: (1) manage responsibilities and paperwork; (2) make exciting presentations; (3) lead discussions; (4) manage dynamic cooperative learning activities; and (5) inspire self-discovery. These five things, with a little patience, can become a regular part of a teacher's daily classroom. Dockterman also gave eight tips for those teachers just beginning to use computers in their classrooms. He tells them: not to worry about breaking anything; start easy; be patient; not to be afraid to ask for help; stay in charge of it; always be skeptical; find programs that make your life easier.

Educational Functionality

Berenfeld (1996) identified five educational functionalities of the Internet that he lists in "ascending order of pedagogical sophistication and potential impact on student learning and school change" (p. 78): tele-access, virtual publishing, tele-presence, tele-mentoring, and tele-sharing. Tele-access is the use of on-line resources such as libraries, databases, government agencies, museums, art galleries, satellite data and other education resources. Virtual publishing authenticates students' learning by setting their work in a real world context. Students derive a sense of pride and ownership when they know their work may be accessed by others around the world and tend to put more effort into their products. Publishing is not limited to text documents, but can also include multimedia productions as well. Tele-presence puts students closer to real world events through remote access. Berenfeld gives the example of the students in the JASON Project who explored the ocean floor from their classrooms by remotely accessing a robot operated by the Woods Hole Oceanographic Institute. Tele-mentoring puts experts in touch with students. An environmental scientist could work with a group of students studying the effects of global warming in their community. A variation on this is the tele-course that allows schools to expand their educational opportunities to people who are unable to commute. Tele-sharing is the most advanced functionality identified by Berenfeld. It begins with something as simple as an e-mail chat between keypals and then grows to encompass more participants having more sophisticated interactions. This on-line cooperative learning offers "relevancy and the analytical challenge of comparative studies" (p. 79).

Web Activities for the Classroom

Roerden (1997) also addressed uses for Internet activities and functions. He identified twelve Web activity types: keypals; Web mentor; Web resource; Web collaboration; Web survey; cooperative challenge; social action; community connection;

simulation; Web publishing; multimedia; and student created projects. He also discussed curriculum planning. This is a vital step in determining whether the Web can meet your curricular goals and objectives. The five steps for curriculum planning are similar to all steps taken by educators when preparing a unit of study:

1. identifying the student outcomes and skills to be learned in the unit

2. developing a curriculum web of content to be covered and how it assists in meeting the student outcomes;

3. describe the strategies to employ in the unit;

4. evaluate the goals and strategies to be used in meeting the goals; and

5. create your plan. As a teacher goes through these steps in developing a curriculum, choosing a Web based activity to help meet stated goals and objectives becomes easier.

Table 1 illustrates how Roerden's activities fit within Berenfeld's functionalities. A broad description of these areas appears in the third column. . They range from easy to implement to complex and involved.

ADOPTION AND INTEGRATION OF THE INTERNET AND WEB

Teachers' and Students' Use of the Internet and Web

Just as there are patterns and phases for teachers adopting technology in general into their classrooms there are also patterns emerging for computer-mediated communications (CMC). Berenfeld (1996) described three patterns for how teachers adopt on-line activities into their classrooms and breaks them down into beginner, intermediate, and advanced:

Beginner Pattern: From Extracurricular Use to Curricular Augmentation

Once teachers have explored the use of telecommunications on their own and feel comfortable with it they begin to adapt it to their classroom. This is called telecommunications-augmented curricula "in which teachers supplement their existing curriculum with on-line activities" (p. 81). For example, downloading images from the

Table 1: Comparison of Berenfeld's (1996) Web Functionalities and Roerden's (1997) Web Activities.

Functionalities Berenfeld (1996)	Web Activities Roerden (1997)	Descriptions
Tele-Access	Web Resource Simulation Multimedia	accessing and retrieving information from remote sources using a Web browser or the Internet utility
Virtual Publishing	Web Publishing Student Created Projects	publishing Web pages or posting materials on the Internet for broad based on-line distribution
Tele-Presence	Keypals Web Survey	accessing others on the Internet as partners and participants
Tele-Mentoring	Web Mentor Community Connection	accessing on-line experts in subject areas as information resources
Tele-Sharing	Web Collaboration Cooperative Challenge Social Action	cross-classroom or school collaboration for resource sharing or team projects

Hubble Telescope to supplement a science unit on the solar system. This activity does not alter their teaching practice; it simply gives them another resource.

Intermediate Pattern: Augmentation to Added-on Telecommunication-based Curricular Insert

Once teachers experience success with supplementing their activities with on-line resources they take the next step by incorporating telecommunications into their courses. NGS Kids Network provides telecommunication-based modules to teachers. These modules are designed to fit into regular units of study in earth science, biology, chemistry, etc. The modules are implemented once or twice a week on a part-time basis. Berenfeld gave lack of training, limited connectivity, and teacher confidence as the reasons for this transitional pattern.

Advanced Pattern: Telecommunication Features Fully Integrated into Curricula

At this level the Internet, or infosphere as Berenfeld called it, is fully integrated to the classroom. The teacher has designed the curricula to "exploit its advanced functionalities" and students become both recipients and producers of information. At this level teaching becomes more of a challenge because teachers must redefine their role in the classroom, pedagogical goals, restructure courses and rethink their beliefs about how learning should occur.

Honey and McMillan (1993) identified four categories of Internet users among teachers in their research findings. The researchers conducted case studies of eighteen, nine women and nine men, educators using the Internet. "Nine of the respondents were classroom teachers, four were district technology supervisors/coordinators, three were technology specialists at the classroom or school level, and two were librarians/media specialists (pg. 5)." Questions on the survey dealt with Internet usage, connectivity, training, application to the

classroom, and predictions for future use. The spectrum of categories ranges from *Enthusiastic Beginners* to *Experienced Enthusiasts*, with *Evolving Understanding* and *Cautiously Optimistic* falling in the middle.

This continuum of Internet users represents various experiences with and attitudes about the Internet. The teachers who were just beginning to become familiar with the Internet were enthusiastic. The *Enthusiastic Beginners* expressed surprise at the amount of resources available to them and plan to make it part of their classroom activities. The two groups falling in the middle of the continuum, *Evolving Understanding* and *Cautiously Optimistic*, were mostly made up of self-taught users with minimal financial support from their schools. These groups are dealing with "technical and conceptual obstacles" as they become more familiar with the technology. Issues of low costs, training, ease of use, and curriculum integration are common concerns among these educators. The *Experienced Enthusiasts* differ from the other three groups due to their technical backgrounds. Those in this group held advanced degrees in technology fields or had a highly technical background. These educators are also involved with training other teachers in their schools are systems. Some of the participants are supported by their schools, but others provide the training independently and on their own time. The belief among this group is that all schools, K-12, should have access to the Internet. They place more emphasis on access for teachers and students than on training. Honey and McMillian proposed that this group's technological background makes the Internet a less abstract resource to understand than for those in the other groups, allowing them to easily embrace the Internet as a resource.

Changes for Students and Teachers

Bracey (1995), an elementary teacher in Arlington, Virginia, described her on-line experience in The ERIC Review. Bracey's first on-line experience was a

U.S. Department of Education sponsored program linking teachers in the Washington D.C. area and other teachers across the U.S. through e-mail. Since the teachers in her school shared one account Bracey didn't get much on-line experience. However she was enthusiastic about the technology and became involved with the National Geographic Kids Network. This program featured real life science, social studies, and math applications. Bracey's students created portfolios and personal files for all the data they collected from other students, on-line experts, and their own independent readings. The students' interest in the on-line activities encouraged Bracey to get involved with other projects such as Future Think on Prodigy writing contest. During this project one of Bracey's students, Benji, a candidate for special education, decided to write on acid rain. Benji won second place in the country. Bracey commented about how her students had a hard time leaving her classroom or moving on to other topics when certain on-line projects were over. The students had become so involved in the learning process they were hungry for more. Bracey began signing up for all available Kids Network projects and even translated some of the packages into Spanish for the ESL students.

It wasn't just Bracey's students who were affected by the on-line projects. Bracey herself changed as a teacher. She was no longer the fount of knowledge to her students. She had become a co-learner in her own classroom. Bracey states that through their mistakes and discoveries with the on-line projects, she and her students built a community of learners.

Rogan (1995) compiled the results of five projects funded by the Annenberg/CPB Math and Science Project with the aim of "using telecommunications and the Internet to foster the renewal of math and science education in rural schools (pg. 3)." The paper explored the extent to which these

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five projects were successful in meeting the goal of reforming math and science through the use of telecommunications and the Internet.

The five funded projects were Teacher On-line Projects, Creating Connections: Rural Teachers and the Internet, Tennessee Valley Project, Reach for the Sky, and Rural Community Alliance for Enhancing Science and Math Education. The common goals for all five projects were:

- to provide teachers with the tools to integrate telecommunications into their curriculum;

- involve students in locating information on the Internet for problem solving activities;

- link teachers to other teachers via e-mail; and

- educate the communities about the importance of providing schools with Internet access.

This is what one teacher had to say during the Tennessee Valley Project interviews, "this is really a boost for a small, rural community school, great for the students...good for public relations, fantastic for parents...and boy, is teaching FUN again! (pg. 24). The Tennessee Valley Project was designed to help teachers of grades 4, 5, and 6 improve their methods of teaching science by partnering them with scientists, utilizing the resources on the Internet, creating collaborative relationships between the teachers and higher education faculty.

The project allowed teachers to communicate with other teachers across the country and around the world. One of the most common themes that emerged after this project was the end to isolation felt by teachers in rural communities. Many of the teachers felt that they were isolated from resources, higher education, and other teachers in the same content area. The ability to locate teaching resources on the Internet, e-mail experts and other teachers, and in some cases continue their

education at state colleges through on-line courses helped the teachers feel more a part of the education community.

There were frustrations that came from the experience as well. Lack of time, access to hardware, training, and technical difficulties were the common themes throughout the project. Those teachers with computers and modems at home began to use the Internet and e-mail with greater ease than teachers with computers only in the classroom. Other difficulties dealt with the more abstract operations of the Internet such as file transfer.

Once teachers were on-line they were able to locate and use many of the resources available to them. The resources fell into two categories, programs and projects and instructional resources such as information, lesson plans, graphics, and experts. Some teachers found using the Internet made teaching more challenging and fun. One teacher in the project actually changed his plans to retire. After participating in the project he was more enthusiastic about teaching for a few more years.

Schnabel (1997) described how high school students "used the Internet as a major resource for an interdisciplinary unit on AIDS (pg. 11)" for ninth to twelfth graders. Students investigated causes and effects of the disease, past and current treatments, and testing procedures in health class, using information found on the Internet. Using the Net to locate statistics the calculus class did a statistical study on infection rates and number of cases reported from 1980 and projected into the year 2010. Using their calculators they then graphed the figure for the number of AIDS cases in any given year. Students in the video production class used the information provided by the other two classes to create a short video on AIDS/HIV for their peers.

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Although this was a successful venture for the students there were many other ideas that did not make it. According to Schnabel there were three major potholes on the Information Superhighway, limited Internet access time, poor team planning, and lack of effective distribution of the information.

Being part of Minnesota's InforMNs project, a statewide project providing K-12 schools with thirty hours of toll-free access each month, the teachers had to budget the time their students spent on the Internet. To assist the students with finding information more quickly they introduced them to Turbogopher and Netscape and had them search the Net in teams.

The lack of team planning on the part of the teachers was the most surprising to them. The team met at the beginning of the project to define their goals and objectives and set a time limit on the project that actually lasted four months. They did not foresee the need to meet as a team throughout the project. Hindsight told them they should have met for at least an hour a week as a team during the project to keep things running smoothly and stay on schedule.

Four months after the project first started Schnabel developed a Web page to distribute the information the students had gathered. Schnabel took a class on HTML to learn how to create the Web document. The reasoning behind disseminating the information this way was based on the fact that the students had used the Internet as their primary resource.

Schnabel stated that although the teachers are still "recovering" from their initial journey onto the Information Superhighway they are already making plans for their next trip. With all that they learned from the first experience they feel future projects will be even more successful.

Curriculum Integration

As teachers begin integrating technology into the curriculum many things become apparent, especially when the technology in question is the Internet. Some of the issues that teachers and students must deal with are access to Internet linked computers, altering class schedules to accommodate for computer time and research, rethinking the roles of the teacher and student, and how this technology can be used to enhance and meet curricular goals and objectives.

Cutler-Landsman and Wresinkski (1994) conducted a study on using the Internet for original student research. The researchers shared an interest in how to use technology to facilitate teaching and learning. They considered the potential for using telecommunications to enhance original student research. They "felt strongly that information must be more than something students find and then discard. Finding information is not an end but part of a process (pg. 135)."

The research group consisted of 42 sixth grade students, from two homerooms, from a suburban elementary school. The majority of the students came from middle to upper-middle class homes where both parents had college degrees and education itself was highly valued. Students participating in the project were of all ability levels and ranged in age from 11 to 13.

To make the project more meaningful and stay within the focus of the study, original student research, the students were asked to think about their own original research. The students brainstormed in class discussions for ways to use telecommunications in their research. The majority of students were interested in the day to day school activities of students their age in other countries. Once the focus had been decided upon the students came up with a survey to gather the information.

The researchers grouped and combined questions based on questions developed by each student to develop the survey. 25 countries were chosen based on available teacher Internet addresses. Surveys were sent via e-mail to the 25 countries and to encourage responses the students included their own answers to the survey. This provided the recipients of the e-mail with information about the elementary school the participants went to and also with sample answers they were looking for in response to the survey.

Responses gradually arrived, but only five countries responded: Australia, New Zealand, Russia, Iceland, and Denmark. In large and small group discussions students analyzed and compared the information they received. During this process students identified the need to clarify questions and gather additional information. Students continued to follow-up on information received and also utilized the computer to put together research reports on their countries.

Once the project was over the researchers surveyed the students and teachers to learn more about their reactions. The teachers felt the topic of education was very appropriate since it was something the students were already familiar with. The Internet offered the greatest potential for contacting students in other countries in a reasonable amount of time. Conventional mail would have taken too long and been more expensive. The teachers did express some frustration with locating Internet addresses for schools in other countries and some leads from Internet resources proved fruitless because some addresses were no longer valid. The management and logistics of using telecommunications proved difficult since the school used a central computer lab with scheduled class times. Switching lab times with other classes had to be done in order to get all the students access. Using conventional forms of research, encyclopedias and books, also helped keep students on task when computers were not available. Another area that presented a

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challenge to teachers was scheduling the project. "Traditionally, the curriculum is divided into units of instruction with specific times for completion (2 weeks, 6 weeks). Using telecommunications as the main mode of data collection can take anywhere from a semester to the whole school year. This type of research represented real life though and students were enthusiastic about doing follow-up questions. There was not a problem with keeping the students or the teachers engaged in the process. The project did make the researchers and teachers rethink how they define the content of curriculum and their method of instruction, since they were focusing on using the information in a project and not memorizing facts for a test. The completion of the project was not defined by a scheduled test date but on the analysis and sharing of information learned.

Students surveyed reflected many of the reactions given by the teachers. The students preferred this type of research to traditional modes and stated that they had learned more about other countries from the communication with students there than from their readings. Since the teachers were the only ones allowed to log-in to the computers the students did voice that they would like more control in the process. There were some disadvantages to the project noted by the students such as length of time for responses and in many cases lack of response. The students were also troubled about the lack of computer access to not only send their communications but to produce their reports using word processing and graphics software. Overall the students responses echoed the need to rethink curriculum planning for original student research. Taking into account planning the project and obtaining responses via e-mail is necessary since they do not necessarily fit into the traditional class schedules.

Successes and Failures

Neal's (1995) study suggested that not all Internet projects are successful and knowing what information is available is critical to launching a successful project. The particular topic of study for the fifth graders was the formation of the United States. Each student was to write a report concerning one of three categories: political leaders, three branches of government, or battles of the Revolutionary War. At the writing of this report Neal stated that the Web had not yet developed into an effective enough research tool for students. Of the seventeen students searching the Web only three of them found information relating to their topics. This information was not used in their final report since it was also located in traditional print resources. However, publishing their reports on the World Wide Web and cross-linked their reports with one another.

By providing the students with a wider audience for their work the teachers noted that their writing greatly improved and they took more care in the publication of their reports. Utilizing the hypertext nature of the Web allowed students to organized their information in a new way. Making physical connections between the three categories reinforced their understanding of the subject they were studying. Abstract ideas became more concrete as they shared ideas and information with their teachers and peers.

One of the major findings of this study was that although the information found on the Internet was not used in the final products, the students learned how to access information on the Web using search engines search strategies. The school days and class periods were also found to be too short to do effective searching on the Web and the lack of computer access during needed times was also deterrent to effective Web research. The students were more motivated about

publishing their reports when they realized they would be sharing their work with a larger community via the Web.

To further illustrate the change in students' roles from passive to active participants in their learning it is necessary to discuss a precedent setting event that took place at the World Future Society's Seventh General Assembly in Washington, D.C. in 1993. Seth J. Itzkan (1994), director of the Global Classroom Youth Congress, summarized the proceedings from the first meeting of this group comprised of "student leaders from exemplary networking projects (pg. 60)." The major outcome of this meeting of students was a list of recommendations for the future of global networking in classroom settings. The students also established that they were "full intellectual participants at such events (pg. 60)."

They gave recommendations in three areas: language and cultural issues; curricular and academic issues; and technical and implementation issues. The students pointed out that the understanding for cultural and political issues in many countries could make or break networking activities. Another area to address was translation in foreign language correspondence. The students recommended integrating telecommunications with cultural-awareness programs and involving foreign language departments in correspondence activities.

The second area of concern, curricular and academic, dealt more with the credibility of information found on-line. To resolve this students suggested establishing multi-disciplinary teams between school departments to facilitate multi-curricular activities and creating credible on-line resource listings.

The third area, technical and implementation concerns, included lack of hardware, connectivity problems, and system abuse by students and teachers. They recommended looking into more efficient Internet connections and designing school or system wide acceptable use policies.

These students not only demonstrated they were exemplary participants in on-line projects within their local communities, but were also intellectual contributors to the educational community at large. Their recommendations demonstrated they were more than ready to be involved in the learning society and that students are not only consumers of education, but contributors as well.

COMPUTER AND INFORMATION LITERACY

Computer Literacy

Technological literacy is broader than computer literacy. Understanding how technology, not just the computer, influences our daily lives and how we make decisions is the concern of many educational organizations. Croft (1990) wrote that differences between the technology "haves" and "have-nots" will be measured in terms of technological literacy or the understanding of technology. Literacy is more than the ability to read, write, and count. Literacy, in a technological society, also includes the ability to sort, analyze, and synthesize information from various sources in various forms.

The National Science Board Commission, in 1984, defined a technologically literate person as one who understands:

- the role of technology in the history of human development,
- the relationship between human values and technological decisions,
- choosing technologies and knowing the risks and benefits,
- developments in current technologies, and
- assessing technology to make choices for future technologies.

The Technology Education Advisory Council issued a report in 1988 regarding objectives for promoting technological literacy:

> Because the American culture is distinctly characterized as technological, it becomes the function of our educational system to provide every student an insight and understanding of the technological nature of the culture. All persons must be knowledgeable of their technological environment so they can make rational decisions about their own lives on a day-to-day basis and participate in controlling their own destiny. As technological development continues at an accelerated rate, it will become increasingly difficult for

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people to understand these changes. Extreme action must be taken to prevent us from becoming a technologically illiterate nation. (p. 2)

It has been established that literacy encompasses more than computer skills. However, it is important to look at the technology standards for pre-service teachers established by two organizations, the National Council for Accreditation of Teacher Education (NCATE) and the International Society for Technology in Education (ISTE).

NCATE is the official body responsible for accrediting teacher preparation programs in American schools. In 1994 NCATE approved eight skill areas in Instructional Technology for teacher licensure with the understanding that these skills be integrated in the teacher preparation program. Four of these skills relate to this study:

- Ability to integrate instructional technology into the classroom to facilitate interdisciplinary teaching and learning, supplement instructional strategies, design instructional materials, and enhance hands-on experiences and problem solving.
- Ability to manage different learning strategies and develop higher level thinking skills using various instructional technology tools; ability to select, use and integrate appropriate technology-based resources relative to specific grade level and content of subject(s) being taught.
- Understanding of types, characteristics, sources, and use of quality instructional software and other technology-based learning resources.
- Ability to use a modem for communication and access to the Internet with computer technology; knowledge of the uses of audio, video and optical technology for capturing and incorporating information and data for computer technology. (pg. 3-3)

The International Society for Technology in Education (ISTE) is the organization responsible for recommending guidelines to NCATE as well as other educational organizations K-12. In 1992 ISTE adopted a set of standards for instructional technology that apply to three groups of educators; teaching candidates seeking initial certification, individuals seeking or holding leadership roles in technology education, and those currently teaching who want to upgrade their training. There are thirteen areas of skill development recommended by ISTE. Three of these skill areas relate to information literacy:

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- Apply instructional principles, research, and appropriate assessment practices to the use of computers and related technologies.
- Demonstrate knowledge of uses of computers for problem solving, data collection, information management, communications, presentations, and decision making.
- Use computer-based technologies to access information to enhance personal and professional productivity. (pp. 7-8)

Computer literacy is more than knowing how to use a computer. The aforementioned standards and definitions have shown that it also encompasses the instructional strategies needed to effectively use the computer as a teaching and learning tool in the classroom.

Information Literacy

Shapiro and Hughes (1996) posed some interesting questions about the future of educational curriculum and the information society. "What does a person need to know to be a full-fledged, competent and literate member of the information society . . . . are we looking at a broader and deeper challenge - to rethink our entire educational curriculum in terms of information? [On-line]" The authors went to say:

> Some will reply that living in a society based on the automobile doesn't require the population to learn either auto mechanics or the philosophy of the automobile. But the automobile is only a component of transportation; information is a component of knowledge, the human mind and human communication. That is why it should be part of the expanded trivium for the same reason that grammar, logic and rhetoric were part of it originally: it is something fundamental to our humanness. [On-line]

Defining information literacy and what it means to be information literate is necessary if it is to be included in the curriculum. Doyle (1994) pointed out that Paul Zurkowski used the term "information literacy" in 1974 in a report to the National Commission on Libraries and Information Science. The report marked the beginning of a "national program to achieve universal information literacy by 1984." (p. 5) Since that time those in the information science world have worked towards giving substance to the

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concept of information literacy. In 1994, the American Association of School Librarians (AASL) outlined "seven basic elements for an information literacy curriculum:

- defining the need for information

- initiating the search strategy

- locating the resources

- accessing and comprehending the information

- interpreting the information

- communicating the information

- evaluating the product and process" (p. 11)

Serim and Koch (1996) emphasized that information literacy is a necessity since the emergence of the Internet and World Wide Web. Students are accessing information beyond the local library and classroom. The information available on the Web comes from "raw data and unpublished sources." (p. 134) The definition of an information literate person is broader now that sources are not evaluated through peer review, committee, or publisher. Students must be knowledgeable about biases in information, establishing author credibility, and identifying the intent of the publication.

Eisenberg and Berkowitz (1990) provided a model for school research. This model addressed the processes students should go through when using the Internet for research purposes. It is referred to as Eisenberg's Big Six:

1. Task Definition 1.1 Define the problem 1.2 Identify the information requirements of the problem

2. Information Seeking Strategies 2.1 Determine the range of possible sources 2.2 Evaluate the different possible sources to determine priorities

3. Location and Access 3.1 Locate sources (intellectually and physically) 3.2 Find the information within sources

4. Use of Information 4.1 Engage (e.g., read, hear, view) the information in a source 4.2 Extract information from a source

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5. Synthesis 5.1 Organize information from multiple sources 5.2 Present information

6. Evaluation 6.1 Judge the product (effectiveness) 6.2 Judge the information problem-solving process (efficiency) (p. 35)

McKenzie (1994) warned that this model may "perpetuate the information-gathering and topical research patterns" [On-line] and raises two issues concerning Eisenberg's Big Six:

- Information is not the same as knowledge or insight. We are overwhelmed suddenly with information. What we need is insight. Insight answers the "So what?" question. Insight helps to guide decision-making. Eisenberg's model tells us too little about the path from information to insight.

- Information problem-solving is not the same as problem-solving.

The information gathering McKenzie warned against was the traditional schoolhouse research asked of students by teachers. The traditional book report is little more than an essay of facts taken from the encyclopedia or a book in the school library. Students are able to locate information and they are able to parrot the information in a report, but is there really an application to demonstrate their understanding of that information? The real goal for information literate students is for them to be able to compare, contrast, sift, sort, and weigh information, then use what they have learned to make a decision or solve a problem.

McKenzie continued by discussing problems students encounter when faced with mountains of data available on the Internet. These problems are with the search engines, search strategies and the information sources. The students must be taught how to chose a search engine, create a search strategy, and evaluate the information source as part of their information literacy skills. Often relevant articles or documents are missed because students have encountered the following:

- Flawed search strategies. Using the wrong search term or not knowing alternatives limits the number of hits.
- Biased databases. Some groups avoid or ignore certain aspects of history by sanitizing the text.
- Overloaded databases. Searches that are too broad can yield results not related to what is being researched.

- Wrong database. Search engines on the Web are not comprehensive. Duplicate searches on multiple search engines will produce various results. [On-line]

Doyle (1994) expanded the definition of information literacy into goals and objectives for an information literate person. "An information literate person is one who:

- recognizes that accurate and complete information is the basis for intelligent decision making
- recognizes the need for information
- formulates questions based on information needs
- identifies potential sources of information
- develops successful search strategies
- accesses sources of information including computer-based and other technologies
- evaluates information
- organizes information for practical application
- integrates new information into an existing body of knowledge
- uses information in critical thinking and problem solving (p. 3)."

All the definitions presented here overlap or expound on one another. The emphasis is not only on how to find the information, but how to use the information as well. Students can no longer assume that the information they are using in a report is accurate if it didn't come from the library. Information from the Internet should be view critically, as all information should be, and assessed for biases, intentions, and author credibility.

COMPUTER USE IN TENNESSEE

21st Century Classrooms

To better understand what 21st Century Classrooms are and what they include the *Technology Planning Handbook in Tennessee Public Schools* was consulted. According to the Tennessee Department of Education the increased use of technology in schools will help the state achieve the goals of excellence set forth in the Education Improvement Act of 1992. The *Handbook* stated that effective use of technology would improve the teaching and learning process; it will also prepare students for the world, in which they will live and work. The use of technology along with other changes in the structure of our schools will

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ensure that students will become successful and productive citizens of the state and nation. The *Handbook* is provided to schools and administrators about to receive these classrooms in their buildings. The *Handbook* does not state where the training should come from or how many hours, beyond the thirty hours provided by the state, the teachers should receive. Teachers learn about the use of technology through specific training sessions, conferences, and inservice workshops. The Tennessee Educational Technology Conference held in Nashville each year will also be an opportunity for teachers to attend workshops and view the latest in technology.

In 1992 the Education Improvement Act (EIA) established a K-12 funding system called the Tennessee Basic Education Program (BEP). Two components, classroom and non-classroom, determine the state and local share of funding per school system. Essentially the state is required to "pay 75% of the statewide cost of the classroom components and 50% of the statewide cost of the non-classroom components (http://www.state.tn.us/education/rptcrd96/bepform.html)." Based on this system the state averages 75% of the technology funding, with the school systems providing the remaining 25%.

Teachers or school systems could choose between the Macintosh or MS-DOS platform when selecting hardware. This meant that a school or school system could have two different types of computers with different software needs, hardware requirements, etc. The teachers then followed guidelines for the teacher workstation and the student stations. They each had approximately twenty thousand dollars to spend. The teachers were to buy computers to accommodate a teacher workstation and several student stations. These stations were to be compatible with one another and network ready for the future. Each school or system received the *Handbook* with the minimum guidelines for teacher and students' workstations as well as suggestions for several peripheral devices. The guidelines not only covered the suggested choices, but non-recommendations as well. The

Handbook also covered facilities planning for the classroom layout, wiring, furniture, and security measures. Suggestions for inventory taking, software, upgrades, copyrights, and ethics were also included.

ConnecTEN Project

On June 18, 1996 Jane Walters, Tennessee's Commissioner of Education, sent a memorandum to Tennessee principals concerning the Netscape Advance Team. Principals were encouraged to select one or two representatives from their school to participate in the Netscape Advance Team. The only requirements were that the members had e-mail and some experience using the Internet.

The participants received one hour of training at nearby National Guard Armories. Software and other necessary components needed for connecting computers to the building router would be provided along with Netscape 3.0, a list of educational bookmarks, and software to limit student access to inappropriate sites.

During the 1994-1995 school year Tennessee received first year funding from *Goals 2000: Educate America Act*. According to the Tennessee Department of Education Progress Report the majority of the 1995-1996 funds were spent on the ConnecTEN project. The progress report stated,

> The ConnecTEN project, designed to give Internet access to all 900,000 students across the state of Tennessee, is the biggest technological advance Tennessee schools have ever seen. This concept of joining a student from West Tennessee to a student in East Tennessee via the Internet fits well with *Goals 2000* National Goals #3, 4, and 5. The idea is that all students should be able to learn differently than students did ten years ago and be ready for 21st Century. The ConnecTEN project does just that.
> (http://www.state.tn.us/education/glsannul.htm)

The National Education Goals declared by Congress referred to in the ConnecTEN project are:

- Student Achievement and Citizenship-
    - The challenges of this goal deal with students exiting grades 4, 8, and 12 demonstrate competency in English, mathematics, science, foreign language,

government, arts, history, geography, and economics. The ability to demonstrate problem solving skills, apply knowledge, and communicate effectively through writing and speaking are important aspects of this goal. Students will also be knowledgeable concerning the diverse cultural communities of this Nation and the world community.

- Teacher Education and Professional Development-

    - Teachers will have access to programs promoting continuing education and improvement of their professional skills and knowledge, enabling them to prepare their students for the 21st century. Through community partnerships, preservice education, and continuing professional development teachers will have access to information, strategies, methods, and emerging technologies needed to assist them in this preparation.

- Mathematics and Science-

    - The overall goal is for American students to be first in the world in mathematics and science by the year 2000. The objectives for this goal are to introduce and improve math and science education in the earlier grades, increase the number of teachers with mathematics and science backgrounds by 50 percent, and increase the number of undergraduate and graduate students, particularly minorities, who graduates with degrees in the mathematics, science, and engineering fields.
    (http://www.ed.gov/legislation/GOALS2000/TheAct/sec102.html)

By providing students and teachers with Internet access they are able to communicate with others at far ends of the state, across the country, and around the world. Teachers have access to professional organizations, archives of lesson plans and instructional materials, other teachers with similar backgrounds, and professionals at universities and colleges. Students have the chance to communicate through e-mail with students in other states and countries, thus learning about other cultures and practicing their writing skills. The ConnecTEN project recognizes the value of resources found on the World Wide Web. Government agencies post congressional proceedings, legislature, and reports. Museums share information about new exhibits and offer students, parents, and

teachers educational materials. Research groups post findings and e-mail addresses for those interested in learning more about a particular study. One of the most popular activities on the Internet for teachers and students is to follow the NASA Space Shuttle missions through the World Wide Web, with daily updates on experiments and astronaut life. These activities help teachers make information more accessible to students for understanding diversity of cultures, workings of the government, and scientific research.

METHODOLOGY

Qualitative Research

Denzin and Lincoln (1994) recognized that qualitative research has many definitions and is interwoven with various terminology, assumptions, concepts, historical perspectives, and methods. The authors gave a general definition for qualitative research that applies to this particular study. "Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter (pg. 2)." Since those involved with qualitative research attempt to interpret "phenomena and the meanings people bring to them (pg. 2)," they conduct the research in natural settings using a variety of data collection techniques. Empirical materials collected and studied by the qualitative researcher may include case studies, personal experiences, life histories, interviews, observations, and interactions. All these techniques are aimed at capturing and describing the phenomena in question and interpreting the meanings to gain a better understanding. Inquiry is the staple of the qualitative researcher because of the emphasis on socially constructed realities. A relationship must exist between the researcher and what is being studied; this brings value to the inquiry. It is important to reiterate that qualitative research focuses on processes, not causal relationships between variables as quantitative research does.

Phenomenological Strategies

Phenomenological studies fall under the umbrella of qualitative research. The type of research questions proposed for this study are aimed at "eliciting the essence of

experiences (pg. 224, Denzin & Lincoln)" the participants have had incorporating information literacy skills as they use the Internet and World Wide Web in their classrooms. Data collection will consist of tape recorded in-depth interviews with participants. Results of the data analysis will consist of participants' reflective experiences and their perceptions of information literacy skills and the use of the World Wide Web.

CHAPTER SUMMARY

The purpose of the literature review was to provide a background of the study. How computers have been used in classrooms is evolving with the introduction of the Internet and World Wide Web. The potential for the World Wide Web to be an agent of change is apparent in the ways that teachers have integrated its use into the curriculum. Berenfeld identifies five educational functionalities of the Internet while Roerden discusses twelve Internet activity types used to integrate the Web into the classroom. This integration is a process that is based on a teacher's experience and level of comfort. Emphasis on literacies for technology and information is growing. Information literacy is the ability to identify an information need, locate resources, evaluate their fitness for purpose, use them to create new knowledge, and apply the knowledge to solve a problem. With its 21st Century Classroom and ConnecTEN initiatives the state of Tennessee will be encountering the issues described in the literature review surrounding information literacy.

Chapter III restates the purpose of the study and the research questions addressed. It also covers, more in depth than previous chapters, the methodology used in this study. Qualitative research, data analysis, and the use of the qualitative analysis software package, NUD•IST are discussed.

CHAPTER III

DESIGN OF THE STUDY

STATEMENT OF THE PROBLEM

Instructional technologists and information scientists have emphasized the need to teach students how to use the Web and apply information literacy skills to its use. Serim and Koch (1996) pointed out that "becoming information literate has been an educational goal for students long before the emergence of the Internet, but now it is a necessity (p. 134)." Understanding how teachers are using the Internet and World Wide Web for themselves and with their students is important as we continue to "hook-up" classrooms. The Internet is like any other technology, an understanding of how to use it is important if it is to have any long-term positive influence in the classroom. How teachers incorporate information literacy skills as they instruct students in the use of the World Wide Web to a great extent determines the impact of Internet access as a powerful learning tool. The purpose of this study was to examine how teachers use the World Wide Web with their students and more specifically how they incorporated information literacy skills in Web-based activities.

RESEARCH QUESTIONS

The purpose of this study was to examine how nine elementary school teachers, grades fourth and fifth, reported using the World Wide Web with their students, and more specifically, how they incorporated information literacy skills in Web-based activities. Educators are still at the threshold of incorporating the World Wide Web as a teaching tool, a fact that was taken into consideration in this study. The broader goals were to understand how teachers are using the Internet and the World Wide Web in the classroom and identify some commonalties among the participants. The research questions included:

1. What is the teacher's understanding of the importance of the Web?

2. What assignments or equivalents do they place on students that demonstrate the students' knowledge of information literacy and the Web?

3. What information literacy instruction do they give students concerning the Web?

4. How do teachers view students' abilities to use that knowledge in assessing what they find on the Web?

5. What is the teacher's understanding of information literacy?

METHODOLOGY

Participants

The principal investigator solicited volunteers for the study by sending a letter explaining the study with permission forms to elementary and middle schools in the greater Knoxville area. The search for volunteers was limited to four East Tennessee public school systems: Knox County; Oak Ridge; Maryville, and Alcoa. Participants were elementary school teachers teaching in grades fourth and fifth. These grade levels corresponded to the introduction and implementation of reference skills into the curriculum. After two solicitations for participation, there were twelve volunteers, however three were eliminated from the study because they did not meet the criteria listed below. Of those eliminated, two had not been teaching for three years and the other had only been using computers in the classroom for six months. The nine participants selected met the following criteria:

1. They had an Internet connection and World Wide Web browser in their classroom.

2. They had been using the World Wide Web with their students for at least a year.

3. They had been teaching in the elementary classroom setting for at least three years.

The participants in this study were all female. Their ages ranged from the mid-thirties to the mid-fifties. Time in the classroom for these participants ranged from 6 years to 20 years. While they were all confident in their content areas and classroom teaching in general, they had varying degrees of comfort incorporating the computer and using the Web with their students.

Fourth Grade Teachers. Connie's fourth grade class shared two Macintosh computers, only one of which has access to the Internet. She did not have an Internet connection at home for browsing the Web and does most of her online work on the classroom computers after the students leave for the day.

Diane G. had 27 fourth grade students sharing 3 Macintosh computers, only one of which had Web access. She did her Web research at home and then brought the information in to share with her students. She posted sites of interest for her students on a bulletin board by the computers.

Kay had 26 students sharing five computers in her classroom. Two of her computers had Web access, one was an I-Mac purchased through a school program designed to place one Internet connected machine in every classroom. She used her connection at home for educational and personal use.

Fifth Grade Teachers. Cindy taught in a small elementary school that was heavily equipped with computers from Goals 2000 monies and the 21st Century program. Her classroom has thirteen desktop computers and four laptops, five of these computers had Web access.

Dixie's twenty-seven students shared three computers and only one of these had Web access. She hoped to have additional computers and connections in the years to come, but there was a waiting list at her school.

Deborah had an I-Mac and one older Macintosh in her classroom connected to the Internet. She also utilized four older model Apple computers for word processing and older educational software so her twenty-seven students could make better use of their limited computer time

Diane H. had twenty-five students sharing two Internet connected Macintoshes. She, along with her fellow teachers, encouraged parents to save their grocery store receipts for purchasing more computers for the school.

Jane had twenty-six students and five Internet connected Macintosh computers. Her students found having access to the Web in class "cool."

Susan was highly confident in her computer use and spent much of her own time learning more about the Web and integrating technology into her classroom. She had eighteen computers in her classroom with eight connections to the Web. Her computers were funded by the 21st Century program and a Goals 2000 grant.

Procedures

The qualitative research method used was a phenomenological study based on audio taped interviews. The interviews were structured around open-ended questions with spontaneous, related questions used to probe and illicit explanation and clarification. Each interviews took approximately one hour and was conducted at a location agreed upon by the participant and principal investigator.

The principal investigator explained the purpose of the study to each participant and obtained written consent prior to beginning the interviews. Participation was voluntary and participants could withdraw from involvement at any time without penalty. The identity of the participants was kept completely confidential by using pseudonyms.

Each interview was audio taped and transcribed to facilitate capturing the experience in the exact words of the participants. Only the principal investigator had access to the tapes. The tapes, transcripts, consent forms, rough drafts, and any other material relating to the study were stored in a locked filing cabinet in the principal investigator's office for three years upon completion of the study, after which they were destroyed.

Data Analysis

Huberman and Miles (1994) define data analysis with three linked subprocesses; data reduction, data display, and conclusion drawing. The three subprocesses occur before, during and after data collection.

Data reduction begins before the first interview takes place. By choosing a theoretical framework, research questions and participants the researcher has already reduced the "potential universe of data (pg. 429)." After data collection has begun and the process of summarizing, clustering, coding, identifying themes the data is further reduced.

Data display is the visualization of the themes or summaries. By graphically representing the information in charts, matrices, vignettes, or coded text the researcher begins to collapse categories and process the information presented.

Conclusion drawing is the researcher's interpretation of the data collected and analyzed. This may be accomplished through comparison/contrast, identification of patterns or themes, clustering, applying metaphors, singling out negative cases or surprises, and checking the results with participants. Conclusion drawing is not limited to a single tactic, several of the aforementioned tactics may be employed by the researcher.

There are ten steps described by Guba and Lincoln (1981) for analyzing interview studies: initial data analysis; unitizing the interviews; categorizing; characterizing; assessing the category sets; making preliminary adjustments; member checks; dealing with misinformation; recycling; and validating and prioritizing. These ten steps may be looked at as an expanded view of the three subprocesses described by Miles and Huberman.

Initial data analysis occurs after the first interview when the principal researcher has determined that the research design is acceptable. Once this is established the researcher then evaluates each interview transcription to assess the need for further inquiry by individual participants.

"Unitizing the interviews is a line by line process where the researcher looks for information that can "possibly be construed as a descriptor, a concern, or an issue (pg. 314)" and set aside on an index card and cross-referenced to the interview so the context of the item may be reassessed at a later time. At this step the preliminary categories begin to take shape. These categories are broad and fluid in nature.

Categorizing is the sorting phase. Once all the transcripts and field notes have been unitized they are sorted into piles. This first sort forms the category and then anything added to that pile is assessed for similarities or differences. This process is repeated until all information has been assigned to a pile. There is also room given for a miscellaneous pile to occur for information that is either not related to the focus of the study or is unique from the other piles.

The researcher must now review the piles and characterize them. Each pile is given a title or name that captures the essence of the information. The researcher then looks for similarities among all the piles that would warrant collapsing them into one another. The miscellaneous pile is then reassessed to see if any of the information there may be placed into the other piles. Any information that still cannot be placed should remain in the miscellaneous pile.

Now that the categories have been given names they are ready to be reassessed once again. The information under the categories should be as homogenous as possible at this point and each category should be distinctively different from the others. Themes should emerge at this stage and replace the categories. Themes come directly from the data and accurately portray the essence of the sorted data.

Preliminary adjustments can be made at this point. Making note of categories that were anticipated but did not occur and categories that were not anticipated and did occur is important to the logic of the research.

Using a sample of the participants in the study to review the categories and information obtained establishes credibility to the analysis. Member checks allow the participants to check the researcher's interpretation of what they said. Data analysis should reflect the participants' thoughts and perceptions and be in their own words.

Since interview studies rely on a human instrument mistakes can occur. There may still be errors in information even after the member checks. This is when the researcher

must realize that the participants may not have shared information or not been able to express information to the researcher. Misinformation comes from three areas: self; others; and institutions (pg. 318). There are two types of misinformation, intended and unintended. Intended misinformation may be a lie, cover-up, or front. Unintended misinformation may be self-deception, misconception, or myth. Dealing with misinformation may call for follow-up interviews and seeking information from other resources.

Recycling any of the aforementioned steps may occur throughout the data analysis process and more than once. It is necessary to repeat the process until the researcher has isolated and categorized all the relevant information.

Validating and prioritizing may require the use of a questionnaire that outlines the researcher's analysis and provides the participants with an outline of the categories. The researcher can match priority categories established during analysis to what the participants feel are the priorities. This also gives the participants another chance to validate the information collected during the interviews.

NUD•IST 4.0

To aid in the process of data analysis this researcher utilized a qualitative software package, NUD•IST 4.0. Weitzman and Miles (1995) stated, "NUD•IST (for Non-numerical, Unstructured Data Indexing, Searching and Theorizing) is a program designed for the storage, coding, retrieval, and analysis of text (pg. 238)."

There were two parts to the NUD•IST project, the Document System and the Index System. The Document System handled the data and the Index System stored the codes and notes for the data. The most powerful part of this package was the Index System. It holds the actual categories of data developed by the researcher. The researcher used the memo application to record thoughts or ideas about the categories. The Index System also allowed for graphical display of data, browsing the coded text, altering codes, and organizing coded

text. The researcher displayed coded data in hierarchical trees to show the relationships between categories and subcategories. The Index Systems also included seventeen search tools for complex analyses. By combining category codes in a search the researcher could quickly determine relationships between categories, and the information is stored in the Index System for future searches or analysis. This package also allowed for data to be manipulated, edited, printed and saved in various word processing formats.

CHAPTER SUMMARY

A qualitative interview study was used to capture the participants' own words about their experiences using the World Wide Web. The principal investigator interpreted the interviews and used the data to explain and gain understanding of these experiences. Transcripts, coded text and memos were stored and organized in the qualitative analysis software package NUD•IST. Themes related to the interview questions emerged during the data analysis stage of the study, thus enabling the principal investigator to describe and interpret the participants' experiences.

Chapter IV presents the findings from the study. This chapter is organized by themes that emerged from the data collected. Quotes from the interviews are used to capture the essence of the participants' experiences.

CHAPTER IV

FINDINGS OF THE STUDY

The purpose of this chapter is to present the findings of the study. The chapter is organized by themes that emerged from the data and the research questions. A context of the study is provided to introduce the participants of the study and describe their particular classroom settings and Web access. To enhance the reading of the findings and ensure that the participants' voices are heard, quotes from the interviews are used throughout the discussion of the findings.

OVERVIEW OF THE STUDY

The study of how fourth and fifth grade teachers in the greater Knoxville area use the World Wide Web with their students and more specifically how they incorporated information literacy skills in Web-based activities, was conducted during the fall of 1998 and spring of 1999. Information was gathered through open-ended interviews with nine elementary school teachers. The participants in this study responded to a letter sent to elementary and middle schools in and around the Knox County area. Participants were selected based on the following criteria:

- They had an Internet connection and World Wide Web browser in their classroom.

- They had been using the World Wide Web with their students for at least a year.

- They had been teaching in the elementary classroom setting for at least three years.

The original pool of participants was twelve, but three were eliminated because they did not meet the requirements listed. Two volunteers had not been teaching for at least three years and one had only been using technology for six months.

The research questions that guided this study were:

1. What is the teacher's understanding of the importance of the Web?

2. What assignments or equivalents do they place on students that demonstrate the students' knowledge of information literacy and the Web?

3. What information literacy instruction do they give students concerning the Web?

4. How do teachers view students' abilities to use that knowledge in assessing what they find on the Web?

5. What is the teacher's understanding of information literacy?

While the themes presented in this chapter closely parallel the research questions, it took three iterations of data analysis and presentation for them to solidify. Initially the information was organized according the interview guide and then by commonalties among the participants. What was lacking was cohesion in the presentation of information. The researcher then looked at the data as it related to the research questions, and the themes took shape as the following:

- Understanding the importance of the Web in the classroom

- Incorporating the Web into the classroom

- Providing information literacy instruction

- Evaluating students' ability to apply information literacy skills

- Teachers' understanding of information literacy

CONTEXT FOR THE STUDY

To understand how teachers in this study thought about and incorporated information literacy into their classrooms, it was important to gain an understanding of who they were, how they came to have computers and Internet connections in their

classrooms, and the training they received to apply these tools. The history of each teacher and her technology-enhanced classroom provided a complex backdrop to her integration of the Web in her classroom.

This section introduces each teacher, reviews how technology and connectivity varies in distribution from school to school and system to system, and examines the training issues these teachers faced when using technology and the Web in their teaching.

Participants of the Study

The participants for this study were fourth and fifth grade teachers in public elementary schools in the greater Knoxville area. Their experience with the Web and computers in general ranged from very little to high. Each participant was very comfortable with her content area and teaching in the classroom. Their comfort with the computer and the World Wide Web varied.

Fourth Grade Teachers. Connie's fourth grade class shared two Macintosh computers, only one of which has access to the Internet. She did not have an Internet connection at home for browsing the Web and does most of her online work on the classroom computers after the students leave for the day.

Diane G. had 27 fourth grade students sharing 3 Macintosh computers, only one of which had Web access. She did her Web research at home and then brought the information in to share with her students. She posted sites of interest for her students on a bulletin board by the computers.

Kay had 26 students sharing five computers in her classroom. Two of her computers had Web access, one was an I-Mac purchased through a school program

designed to place one Internet connected machine in every classroom. She used her connection at home for educational and personal use.

Fifth Grade Teachers. Cindy taught in a small elementary school that was heavily equipped with computers from Goals 2000 monies and the 21st Century program. Her classroom has thirteen desktop computers and four laptops, five of these computers had Web access.

Dixie's twenty-seven students shared three computers and only one of these had Web access. She hoped to have additional computers and connections in the years to come, but there was a waiting list at her school.

Deborah had an I-Mac and one older Macintosh in her classroom connected to the Internet. She also utilized four older model Apple computers for word processing and older educational software so her twenty-seven students could make better use of their limited computer time

Diane H. had twenty-five students sharing two Internet connected Macintoshes. She, along with her fellow teachers, encouraged parents to save their grocery store receipts for purchasing more computers for the school.

Jane had twenty-six students and five Internet connected Macintosh computers. Her students found having access to the Web in class "cool."

Susan was highly confident in her computer use and spent much of her own time learning more about the Web and integrating technology into her classroom. She had eighteen computers in her classroom with eight connections to the Web. Her computers were funded by the 21st Century program and a Goals 2000 grant.

How Participants Received Funding for Computers and Internet Access

There was no consistency in number, type, or access among the classrooms in the greater Knoxville area. How teachers received computers in their classrooms had little to do with socio-economic situations, and more to do with school system policies and grants awarded to individuals. Funding for computers and Internet access tended to come from the following sources: school coupon-book sales, grants, grocery store receipts, PTO fund-raisers, and the 21st Century program.

In many cases the level of funding from school coupon money, grants, and store receipts depended on the individual initiative of the classroom teacher. Some participants strongly encouraged students and their families to save their grocery store receipts. In some situations store receipts were collected school wide and the computers were awarded to the school and then assigned to classrooms by the administrator. The use of school coupon-book money varied from school to school. In some schools teachers were given an equal share of school wide profits from coupon-book sales plus a percentage of their sales.

21st Century and Goals 2000 Funding. 21st Century programs were funded by the Tennessee State Department of Education. Knox County, as well as other counties in the state, designated 21st Century programs to individual schools based on student population. The school administrators made the decision as to which grade level and which teachers would receive the equipment.

Cindy and Susan taught in the same elementary school and co-wrote a Goals 2000 Grant to receive additional computers, hardware, software, and Internet connections in their classrooms. Susan received five student computers and one teacher station from the

21st Century program. In addition to this she had two computers from coupon-book money, as did Cindy. Based on their Grant proposal their school was awarded ninety-seven thousand dollars to be used for technology and science equipment. These teachers were able to purchase thirteen computers, four lap-tops, and Web access for each of their classrooms. The grant also provided funding for wiring the whole school and purchasing an Internet hub. Two computers, one with Internet access, were purchased for the school Science Lab as well. Between the two classrooms there were thirty-five computers shared among fewer than sixty students. This was not a typical situation for classroom in the greater Knoxville area systems.

Funding Through Coupon-book Sales, Fund-raisers, and Donations. Other schools and systems recognized the importance of computers in the classroom, and even more importantly, computers with Internet connections and Web access. How computers and connections were distributed differed from system to system and school to school. The teachers in this study had received them from the school system, donations, and through fund-raising efforts by the school.

> Connie:
> Um. [school system], about five years ago, started delving into computer literacy and skills and they picked one teacher from each grade level in our school to be trained in computer skills and that person had a computer in his or her room. And then the next year they allocated a larger amount of money and the school could decide how they wanted to spend that money and we started putting computers in everybody's room. And we were still at that stage last year, everybody has at least two computers in their room.

> Diane G.:
> We pretty much purchase them through the school different ways like by fund-raisers and things like that. My two smaller computers are from different people, they didn't come through the school. I think most of the teachers have two.

Deborah:
I was interested in it [World Wide Web] and applied for it. The principal asked for anyone that was interested and said he would try to get the computers that we needed.

This patchwork quilt of providing computers and Internet access in the classroom emphasizes that there is little consistency from school to school or system to system. The teachers in this study expressed an interest in using the World Wide Web with their students, and found ways to obtain the hardware, software, and access they needed.

Teacher Training

Teacher training in one school system consisted of workshops or classes conducted during the summer or after school. Concerns related to the amount of time existing between training and the application of new learning was expressed. Several participants also identified a need for enough training time to allow them to become comfortable with the use of computers and the Web. A need for a building level technology expert was also expressed.

The teachers in this study did have opportunities for training provided by their school systems, however some stated that time is a barrier to attending. Others learned how to incorporate the Web into their teaching by working with fellow teachers in the school who have more experience or have attended the training themselves. Some teachers preferred reading about using the Web with their students, and still others do not feel comfortable with this type of self-directed learning because they do not feel confident about their computer skills.

By knowing who the participants in this study were, how they came to have Internet and Web access in their classrooms, and how they received training for

technology use with their students, the researcher was better able to interpret responses

related to the research questions.

THEMES

There are five broad themes that emerged from the data analysis. Following is a

structural overview of the presentation of themes and sub-themes in this chapter.

1. Understanding the importance of the Web in the classroom
   - What the World Wide Web Means for Teachers
     - Research and professional development
     - Expanding curriculum resources
     - Alternative tool for outside experiences
   - What the World Wide Web Means for Students

2. Incorporating the Web into the classroom
   - Web functionalities and activities
     - Tele-Access
     - Tele-Presence
     - Tele-Mentoring
     - Tele-Sharing and Virtual Publishing
   - How teachers learn about Web Sites and Activities
   - Managing Web activities in the Classroom

3. Providing information literacy instruction
   - Teacher comfort with, and control of, student Web searching
   - Teaching students to search the Web

4. Evaluating students' ability to apply information literacy skills

5. Teachers' understanding of information literacy
   - The ability to locate resources
   - The ability to evaluate resources for fitness of purpose
   - The ability to use information to create new knowledge
   - The ability to apply information to solve a problem

Understanding the Importance of the Web in the Classroom

What is the teacher's understanding of the importance of the Web? This question

and theme was not meant to imply that the Web has been deemed important by some

great governing body, but simply to address the "perceived" importance placed on it by

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the state of Tennessee's technology and connectivity funding initiatives and grant programs. The interview questions that relate to the research question were "What does having the World Wide Web mean to you as a teacher?" and "What does having the World Wide Web mean to your students?" The responses to these questions overlapped in that some teachers were unable to separate themselves from their students, but some teachers were able to speak to what the Web meant to them as individuals. Access to resources predominates in both areas as the most significant factor of Web access in the classroom.

What the World Wide Web Means for Teachers

"What does having the World Wide Web mean to you as a teacher?" The purpose of asking teachers this question was to achieve an understanding of how this tool had influenced their personal growth, development, teaching practice, or pedagogy, if at all. This question was answered in many different ways. The teachers spoke about the Web in reference to their classrooms and students. They discussed how the Web broadened their access to resources beyond the school and community and as a means for students to experience people, places, and things they might not otherwise have the opportunity. One teacher deviated from the others and spoke of the Web as a resource for supporting her graduate studies in education.

Research and Professional Development. Only one self-identified herself as using the Web for her professional development while the others spoke of how it had changed their classrooms.

> Kay spoke about her professional development:
> Because I'm a graduate student I have used the Internet quite a bit locating specific articles that correlate with what we are studying at UT. Right

now we are visiting schools so after the school visits on Monday night we are supposed to go back and look up an article with some corresponding program that we heard about on the previous night and write a summary of that article. So yes I do use it as a personal tool also.

The other teachers who responded in reference to the Web's influence in their classroom spoke about research for teacher information, using the Internet as an alternate to other activities or to supplement the regular curriculum as well as provide students knowledge of current events.

Expanding Curriculum Resources. Reference was made to how the World Wide Web expanded their classroom as they used it as a teaching tool for research papers and reports. Various techniques such as teacher identified Web sites and worksheets were used to direct research activities. Some teachers used bookmarks while others made use of search engines and directories like Yahooligans, Lycos, AltaVista, and AskJeeves. Teachers used information from the Web to supplement the regular program.

Cindy stated:
Well, it opens up the whole world as far as resources, uh...I think you can find out anything you want to know, now, if you have the time to look. And the time to look, I think, is where I have gotten a little bit stumped, because sometimes it takes me longer than I have you know to find what I need to find.

I started keeping a list, a folder and just as I read things,
and come across things in the newspaper, professional journals, anytime I
find a Web site that looks like its related to something that I do, I
take it out and stick it in this folder. Um. Now I am to the point
though, that my folder needs to be sorted into like my units of study.
Like if I would take everything that's related to electricity and
magnetism or whatever and put it in my folder that I actually teach that
unit from that would be better. So, that's the next step I need to take
in my spare time. [laughs] And then too, those are sites I am comfortable
with the kids going to, um, because I don't just let them sit down and
surf. I feel like I have to know where they're going.

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Deborah:
What I usually try to do with it is I try to find a program or an
activity that I can include somewhere in the curriculum at least once a
week. It's been a...it's been great, very great teaching tool especially
when it comes to science, math; I've been able to find a...numerous
sites that my children have been able to use.

Fun Brain is one. The Discovery channel is just awesome. I have a
lot of uh, weather students in my room so we are counseling on weather
dot com. We are always trying to track storms and see how things are going.
Now that the season is getting started with the tornadoes...things of that
nature...we've already gotten interested in looking for some things that may be
happening with that so... I really feel like, because of my students and a lot of kids
in my classroom that are uh, just science buffs that we are always doing
something with science.

Alternative Tool for Outside Experiences. One teacher made reference to using the

Web rather than taking costly field trips to gather information about local historical sites.

Susan:
We use it every single day. We're online, right now we're doing a
project across the United States that connects our Social Studies
curriculum and since we have pretty much been told we can't take field
trips this year, we did a study of the history of [the area], and we have
done a study of all the places that I feel like are significant, and we
have taken pictures, had parents take pictures, I have taken pictures,
gone online and researched to find a lot of our information.

Researcher:
Do the kids in your class typically have chances to go on summer
vacations with their parents and travel outside of state?

Susan:
Some of these kids I don't think ever have the opportunity to go
anywhere. I think I have two in my class that have never been to the
Knoxville Zoo. So, I think we have some people that do travel but I think
it's a real diverse group and there's a whole lot of kids who don't go
anywhere. Some of them have never seen an ocean. They don't
have what others have....that's why I think it's real hard for them to understand
there are other people outside of Northwest Knoxville, because they have never
been there and they have never seen that.

Family vacations in the summer may be commonplace in some households, but the traditional one or two week excursions to the Grand Canyon or United States capitol are trips the children in Susan's class may not experience until they are adults, if ever.

What the World Wide Web Means for Students

It appeared that this particular focus was answered by some of the statements made in the previous section; however, this question still evoked interesting comments. While the most concurrent response among participants to this question was "access to current information," perhaps the most intriguing came from Susan as she described how significant having access to the world via the Web was for her students.

> Susan:
> I think it opens up the world to them. Most of the kids, and that's what's so amazing, and I don't know if it's just this area, but they don't understand that there's something beyond us...they have a real hard time. I guess that's part of being ten years old. But, when I tell them that something happened in another state, they've heard that all their lives, but I don't think they can really conceptualize that. So, by actually seeing these things online and talking to people in these other states, I think it makes it more real and they realize that we're all connected and we all live pretty much the same in this country, you know. It was just... I think it just opens up the world to them. This spring our project is going to go Spain and Paris, so I think that'll help them too. That's outside of the curriculum, but I thought it would be good. We had two people wanting to do that. Since they really don't have any concept of another country. I mean they know it's there, but they just don't understand at this point.

Comments from other teachers in the study deal with students having access to current information, that the technology is here to stay, and the kids enjoy using the Web.

> Dixie:
> They have a wealth of information at their finger-tips basically that they can access and it certainly holds their interest (laugh). They'd rather do that than open a book. But yeah, as far as current information and all that it's been great.

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Diane G.:
Just another source of information other than the media center. More
Up-to-date information, it's all very current so they are getting like
current information as opposed to you know, something that's just a
little bit older that's in the media center. It's giving them more
access to information that they normally wouldn't have. But like I said,
a lot of these kids are doing all this stuff at home too. I'm sure they
all surf the Net at home.

Jane:
I think it has a lot to do with just being current and being on top of
everything. A lot of the children have computers and technology at home
and it just carries over and plus those children that have it at home
they can share what they know with their classmates on web sites or
software with each other and it just really is, you know, everybody
really kind of learning together and being current with what's going on.
I think it gives them a little edge, I really do.

Kay:
Well, I think it's definitely here to stay. And for them to have
access really opens up all kinds of channels for them to explore what's
going on in other places. And I really think as a fourth grade student,
once they understand how to do this they are much more likely to get on
this than to read a newspaper cover-to-cover or a magazine
cover-to-cover.

Diane H.:
They use it quite a bit and they really enjoy it. I think it adds to the classroom.
There's a lot of good information on it if you can find it. I mean there is so much
out there, and it's hard to find exactly what you need...but they love it
and they are good with it so...

Well, I mean...I guess with this being the information age...my fifth
graders are I guess, in tune with what's going on out there, I mean more
so than I am because you know, I didn't grow up with having Internet and
all that other thing. I mean my kids know so much about it it's
unbelievable and... I mean we use it...like I never did a research paper
and they're using the Internet as one of their sites, one of their
references and gosh, I don't know, I mean we use it everyday.

It is apparent from the statements above that it is difficult for the teachers to

separate the significance of the Web for them and their students. The two are intertwined

and the teachers see this as a digital doorway to resources, historic places, and broadening

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students' horizons beyond the classroom. Currency of information was the predominant

factor in all their statements as well as student enthusiasm for using this technology tool.

It is important to note the positive tone of these responses and that these comments

occurred early in the interviews. As the researcher explored further into ways they

incorporate the Web into classroom activities and provide information literacy instruction

the participants' responses altered.

Incorporating the Web into the Classroom

"Describe ways you integrate the World Wide Web into classroom activities." The

purpose of this question was to assess how teachers were using the Web with their

students and how they were obtaining ideas and lesson plans. Berenfeld's (1996) five

functionalities of the Internet in conjunction with Roerden's (1997) Web activities were

discussed in Chapter III. The majority of the teachers in this study operated in Berenfeld's

tele-access functionality, using the Web as a resource for information, simulation

activities, and access to multimedia materials as described by Roerden.

Table 2 presents how Berenfeld's five Web functionalities corresponded to Roerden's

classifications. The last column presents the specific uses found in this study. The

purpose of this table was to simplify the presentation of this information for the reader.

The teachers relied heavily on bookmarks of sites and "teacher approved" Web

directories and search engines to assist students in finding information on the Web. Their

ideas for activities typically came from other teachers and resources like teaching

magazines and the newspaper.

Table 2: Comparison of Berenfeld's (1996) Web Functionalities, Roerden's (1997) Web Activities, and the Activities Employed by Participants in this Study.

Functionalities Berenfeld (1996)	Web Activities Roerden (1997)	Descriptions	Classroom Uses of Teachers in this Study
Tele-Access	Web Resource Simulation Multimedia	accessing and retrieving information from remote sources using a Web browser or the Internet utility	• Author information • Web directories • Worksheets • Reference for research • Curriculum links • Textbook publisher sites • Newspapers and magazines • Educational TV
Virtual Publishing	Web Publishing Student Created Projects	publishing Web pages or posting materials on the Internet for broad based on-line distribution	• Online book reports
Tele-Presence	Keypals Web Survey	accessing others on the Internet as partners and participants	• Keypals
Tele-Mentoring	Web Mentor Community Connection	accessing on-line experts in subject areas as information resources	• Corresponding with authors online
Tele-Sharing	Web Collaboration Cooperative Challenge	cross-classroom or school collaboration for resource sharing or team projects	• Co-author book with distant peers

Web Functionalities and Activities

Tele-access was the most basic form of Web integration in the curriculum. Teachers in this study had students use the Web to search for curriculum related information, locate references for research, and access materials at textbook publishers' sites. The materials the students were accessing on the Web were typically reviewed by the teachers and bookmarked. There was little or no searching performed by the students.

Diane:
We could be searching for...if they are going to have a report on beriberi, scurvy, and rickets and so I just gave it today so I'll be getting on it and seeing if I can find any information on the web on that. I just try to make it go along with what we are doing at the time.

Deborah:
The Discovery Channel is just awesome. I have a lot of weather students in my room so we are constantly on Weather.Com. We are always, especially during this period, trying to track storms and see how things are going. Now that the season is getting started, with tornadoes and things of that nature. We've already gotten interested in looking for some things that may be happening with that. As a matter of fact, on this particular day we just started talking about some things because we just got a new program in today. Because of my students and a lot of kids in my classroom that are just science buffs that we are always doing something with science.

Connie:
Last year we used it to have the kids get on the computer and we bookmarked certain sites for them to go to and had projects for them to do tied directly to those sites. With questions they had to answer and write on paper.

Susan:
We get online at HBJ [textbook publisher]. I've got the site down there and every week they change the math questions for them and they get online and do that. Also they get on Scholastic and I give them extra credit in Social Studies from the Scholastic site. They have all these, like one week was Titanic research. They have different things they can do every week and they do their research on it and come back and answer the questions and I give them 10 extra points in Social Studies if they take the time to do it. Also Scholastic has a lot of authors that we click into see. We use it for about everything.

Several teachers connected classroom activities like Odyssey of the Mind to Web

searching and in some cases "theme" weeks were augmented with Web activities and

information sites. Classroom themes often centered around school-wide topics of study

such as seasons, ecology, famous people, government holidays, safety issues, or

scholastic projects sponsored by the school system.

Kay:
We just finished Odyssey of the Mind and so the groups that were
working with that...there was one problem where they had to incorporate
some Shakespeare play so they went and looked up Shakespeare on the
Internet and then they could go down and find some of his plays and also
biographical information about him and his wife. So usually when my
children use the Internet they do have a specific purpose they are
looking for. Odyssey of the Mind, is a problem-solving competition and
it's for the higher achieving students...A lot of critical thinking skills so
they see transference and applicability very easily.

Researcher:
You've mentioned using the World Wide Web for projects and the
"Time for Kids" online. What are some of the other projects you've done
with them? What's a typical lesson where they're going to incorporate the
World Wide Web?

Connie:
For example this week it's Fire Prevention Week and the fire
department gives us sites that they developed with fire safety that the
kids can get on that site and answer questions, learn more about fire
prevention. A lot of the kids have Internet at home so they use it for
projects at home and use their graphics and pictures to make their
projects with. A few of the kids are identified gifted so they use the
Internet with the Gifted teacher.

As indicated in the earlier section about searching the Web, teachers bookmarked

sites or provided search guidelines for the students. Rarely did the students locate

information on their own.

Susan was the only teacher in this study who moved beyond tele-access activities into

the more advanced uses of Berenfeld's functionalities and Roerden's Web activities. Her

students were involved in placing book reviews online at sites designed for children to access and read about an author or particular book. They learned about other cities across the United States by sending a stuffed toy of the University of Tennessee's mascot, Smokey the Dog to other schools requesting information. The students would email one another with questions and answers about their school, city, and state. While the students themselves were not authoring the Web page, Susan used their input for content and design.

Tele-Access
We haven't done it for book reports, but I did get a great project
the other day where they're asking students to be...you know, report on
books. And I thought that would be a pretty good thing for us to do,
because we've got AR right now, accelerated reading. And I thought, since
they were reading so many books then they probably could get on and do a
real quick summary and give their opinion of the book and that probably
would help that project.

We use it every single day. We're online, right now we're doing a
project across the United States that connects our Social Studies
curriculum. We did a study of the history of Knoxville, and we have
done a study of all the places that I feel like are significant, and we
have taken pictures, had parents take pictures, I have taken pictures,
gotten online and researched to find a lot of our information.

It has made the research process so much easier in my classroom. I use it
constantly for Social Studies. We're doing, right now, they're doing a
project using, well actually they're using KidPix and Microsoftworks to
do a brochure on a group of Indians, and they did all their research,
they had to use the Internet to get their research. And then I have to
teach them how to cite their research. I use it all the time and I use it
for Math Studies. We've got all kinds of sites we use constantly.

Tele-Presence
We have e-pals, that are not real regular emailing us, and I
think the problem on their end is, probably they don't have as many
connections, and they have to go to a lab once a week, and I see that as
a real problem, or maybe just one computer in their classroom, I am not
really sure. But, they don't email us as often as we email them.

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Tele-Mentoring
I also use email to tell my kids what to do that day. They get online every morning, so I don't have to tell them. I write one note, send it to everybody, and they all get online and read their message. I also, you know, give them clues on tests and stuff, just to keep them using their email, cause they don't get a whole lot of mail from other people.

Tele-Sharing and Virtual Publishing
And then we bought a little Smokey dog, and he's gone all over the United States this year and I got online and put our project up online and I got 21 hits the first day we were up. Which I thought was pretty amazing. And we've him got until the end of the year and he's going all across and their doing the same thing in their city, get the same type of information.

Susan's use of the Web was quite different from the other teachers, as was her classroom set up. Where other teachers in this study had one to three computers online, Susan had eight with World Wide Web access. Susan also indicated a high comfort level with using computers for personal use and learning new skills on her own.

How Teachers Learn about Web Sites and Activities

The participants in this study obtained ideas for integrating the Web from other teachers, educational Web sites, and educational magazines and journals. Connie represented how many of the participants in this study share ideas with others and look for resources in magazines and the local newspaper.

Connie:
Yes, yes. We keep a file of URLs that we can go to, and we never have time enough, but they are always there. I always think I will get to them sometime. [laughter] And last year we used "Time for Kids" the magazine and they always had three or four sites that tied directly to the articles we used in class and they were wonderful. They were really kid oriented and activity based for the kids.

Researcher:
The sites that you usually visit, how do you gain access to those? Do you find out about them through teacher magazines and journals?

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Connie:
Every place. She just brought me "Christmas on the Net." We'll hand
that out to the teachers in the school. Thanksgiving URLs. Dena and I
are um, designated Computer Specialist, quote, unquote in this school, so
that we kind of funnel things to the other teachers because they don't
have time. And we get paid a little extra money for doing that and
troubleshoot their computers. So, um, we'll go to a conference, usually
once a year on computers in Nashville, the state conference on technology
[referring to TETC]. We get a lot there. I get them every place. I cut
them out of the newspaper.

Managing Web Activities in the Classroom

Given that the teachers in this study had only two to three computers with Web access

in their classrooms and approximately twenty-five to twenty-eight students, how they

managed Web activities was of interest. Debra and Diane described how they used time

limits and actual timers to ensure that all students had equal access to the Web. This

relates back to earlier discussions about time constraints in the classroom. In this case, the

teachers were using the Web with their students, but it was an extra element to contend

with in their classroom management.

Debra:
They go into a center that is part of their center-time. But at the same time, if
there is something that I need to pull up to include in their lesson then we go
back to that some time of the day and I pull that up too. So the computers are on
all day, everyday in my classroom.

Researcher:
Ok. Now is that fifteen minutes for the team or fifteen minutes in
your classroom?

Debra:
That's fifteen minutes for each student. Each student rotates fifteen
minutes a day on a particular computer on a particular program. So they
get a chance to go and search or look at something. If they have other
free time after they finish some assignments they can go back to work on
them but everybody is required to get on the computers fifteen minutes;
even the older computers, they get a chance to do that. And then they
have an hour out of the classroom on Thursdays to go into the computer lab.

Diane:
You know and what I do is...we've got timers back at our computer and
I give them you know, fifteen minutes, I have to set the timer when they
get back there. And they know when their fifteen minutes is up they have
to go back to their seat and it's somebody else's turn. So that kind of
hinders them because they get into something and their finding out what
they need to know and then it's...their buzzer goes off and it's time for
them to go back to their seats. So it's really not a lot of time but
that's all that I can give them. Right now with them doing their research
papers I'm giving them twenty minutes which is not a lot more but...

Given the time limits some teachers in this study have applied to student use of

the Web, it is not surprising that they remained in the tele-access phase of Web

integration. The other types of integration and Web activities were more involved and

required more planning, time, and skills beyond what some teachers were able to

provide their students.

Providing Information Literacy Instruction

"Discuss the strategies you have used to help your students find and deal with the

information on the Web." Being an information literate person is having the ability to

formulate and conduct searches for information. Whether in the library or on the Web,

searches entail identifying your information need, developing a list of terms or categories

associated with this theme, and then using the database resources, card catalog or search

engine, to find the location of the information. All participants had their students using

the Web to locate information for specific projects, but not all participants were covering

search techniques with their students. When reading the interviews in their entirety, it

appeared that the amount of instruction students received about conducting searches on

the Web was directly related to the teachers' own knowledge and comfort levels. There

was also a control issue emerging from the teachers' comments.

Teacher Comfort with, and Control of, Student Web Searching

     Cindy stated she was more comfortable giving the specific sites as she considered

this approach a safer way to go than search engines. Cindy also stated "I don't just let

them sit down and surf. I feel like I have to know where they're going."

> Cindy:
> We've tried that. We've done that. Um....the specific sites is probably the safer
> way to go than the search engines. Although they need to know how to conduct a
> search...um....at this age level and just the....I am just more comfortable with
> giving them the sites to go to.

     This reluctance to allow students free use of the search engines may have

stemmed from the her need to maintain control over what the students were accessing and

what they were doing while they were on the computer. The need for some form of

search control was driven by the fear of students accessing information that was

inappropriate whether it is intentional or unintentional. All school systems represented in

this study exercised control in the form of an Internet Acceptable Use form requiring

parents' and students' signatures. These forms outlined the required guidelines for use.

> Researcher:
> Ok. Now, you have them go through Yahoo, how do you feel about
> their searching abilities, do you think that they can handle searching the
> Web on their own?
>
> Deborah:
> Not yet. [*Q: Not yet?] I think they're still young, uh, they are
> still new. I'm a little afraid, even though I have permission from
> parents, I am still a little afraid about it. They are getting a little
> comfortable. They've only been at this now roughly a half a year. I first
> had to make sure that they knew how to use a mouse at the beginning of
> the year. So, I feel like probably at the end of March they might be ready...
>
> Cindy:
> Yeah, and I don't want...I've not had a bad experience that has made
> any of the parents say, "Hey, I don't want my kid on the Internet." At
> this point all my kids have permission except one and I think its cause

she keeps forgetting to bring back the form. I really don't think the parent has a problem with it. But, I don't want it to become a problem.

Teachers use a variety of techniques to control Web searches. Jane uses the signed agreement as well as informing her students of how she could "go in and tell where everybody's been on the computer..."

Researcher:
Right. Now when they go to the site, do you review the site before they pull information off of it or do they...

Jane:
Most of the time they'll ask. You know they will go to this and they will say: Do you think this is a good site? And that's usually what I...In the beginning we start like that and so I can get a feel. And I show them at the beginning of the year how I can go in and tell where everybody's been on the computer so they know and of course they have to sign agreements about appropriate use and if they don't then they lose their privileges. But they have done very well with it.

Kay describes herself as dictatorial in her efforts to control student searches. She allowed her students to access only the sites she has previewed. She also stated she became nervous and concerned if she was "not able to stand right there and see what the new place is."

Kay:
I guess I haven't really done as much leading them as I would like to. I've done more dictatorial; "this sites ok because I've previewed it." I say things like that to them. I can think of an instance I guess two years back where a student did bring up something that wasn't appropriate and of course, I just immediately said: "Oh, get that out of there right now, you didn't have permission to dah dah dah." So you know it was the authority and make them feel guilty and... It's because I said it was wrong not because I gave them any credit for being able to decide themselves, I certainly decided for them. And I think I would do that more with an elementary age child for sure than a High School student.

Susan was motivated to control due to a distrust of her students to use the Web appropriately. She controlled her students' use of the Web by giving them an outline to guide their Web search. She assigned specific things to be found during their search.

Susan:
They were awful, I mean...if I had let them on it...I mean we would have nudies up in three minutes. And that's the truth...it was just the worst year I have ever had and I couldn't...there was no way I could monitor 8 online at one time. So we just didn't use it very often. I mean, rarely did we use it. Even for research, because if I gave them a site, they were the kind of kids that they would go there long enough for me to be looking at them and then immediately they'd be into something else. So, it was just not the kind of class you could trust.

Most of the things they find....they know...and usually we do it
in such a hurry they know they don't have time to just sit and read
garbage. So they know what they're looking for. They have specific things
they have to find too. I give them an outline of what they're looking
for, so they know...they don't have time to sit and read something that
doesn't pertain to them. And then I tell them if they get on something
where there's naked people doing what naked people do they can't stay on
that site. That's our rule. [laughter]

Susan's teammate, Cindy, had first hand experience with students accidentally accessing inappropriate materials. She did not comment on whether she felt her students would intentionally search for non-educational sites and seems to give this particular child the benefit of the doubt when he accessed a nude photo.

Cindy:
I looked into special software at one point, CyberPatrol, and the advice I was getting from the people that were telling me about it, and I think this was at the state level, was "don't put it on unless you really think you have to." Because evidently it brings along its own set of problems, so I kind of shied away from doing that, and so far so good, but I'm still treading very softly. Because I did have a kid go in and pull up something. I mean very innocently, he was on like a first or second grade reading level and he was typing in "WebCrawler." And I still don't know what he typed in, but he got this big picture of a naked lady. And so you know, it's very easy for them to access stuff accidentally. So, from then on, it had to be something that I had written down and they were typing it. I mean, I

went in and I tried myself "WebCrawler" or something, you know what did he do to get that? And I still don't know.

One reason why the Web was important to students and teachers discussed in previous sections was having access to current information quickly. This was not always a positive factor as Diane H. made the decision to control the students' access to sites that discussed former President Bill Clinton and Monica Lewinsky based on her belief that it was inappropriate material for fifth graders to be viewing. She stated that the administrators "haven't really given us any instructions as to how to handle that."

Researcher:
So you've talked about using it for research and that they go and the look at the new sites. Now when you mentioned Clinton, I know...I mean I can make the assumption as to why they weren't allowed to read anything about Clinton, was that from...coming from your parents or was that a decision you made or was that school-wide or...?

Diane H.:
No, that's a decision I made. They've...it's really funny because with everything that's been going on I mean Dr. (NAME) and Ms (NAME) haven't really given us any instructions as to how to handle that. But I mean I just...you know like with the web site like ABC dot com I mean that's going to be...you know if there's information in it about President Clinton some of it may be kinda graphic, you know. I don't think that as fifth graders that is something that they need to be looking at and going home and telling their parents that they read about President Clinton's whatever escapades in my fifth grade class (laugh). So they know if it has anything to do with President Clinton they can't even click on it because I don't even want to go there with them (laugh). (Pause). We talked about it a little bit.

Researcher:
The transcripts of the trial...

Diane H:
But not to the extent...I don't feel comfortable about this. I remember reading it in the newspaper going: "My gosh, they are printing this stuff.

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Here was an example of a traditional information source, the newspaper, being compared to the Web. While Diane was able to maintain control over what the children accessed via the Web, she did not have control over what they saw in the newspaper or periodicals they had access to at home. While having access to information was something the teachers in this study deemed important, critical in some cases, teaching students how to interpret information and apply the information was not a skill they felt their students were ready to learn. Accessing, searching for, and applying information are very different skill sets as defined earlier in this study, yet the teachers interpreted these terms as synonyms.

Teaching Students to Search the Web

When asked about specific instruction related to searching the Web there was little consensus among the responses. Whether fourth grade or fifth grade, each teacher had a different thought abut whether her class was ready for that type of skill or not. During Connie's interview it was revealed that while her fourth graders were actively using the Web, she was not introducing search techniques until later in the school year.

> Researcher:
> Have you gone over search strategies with your students, talked to them about Boolean searches and things like that?
>
> Connie:
> No. We'll show them. And we haven't started this year, but we'll show them how to type in the descriptive words and with quotation marks and plus symbols. And say, it's looking for the article that has all three of those descriptive words first. That sort of thing, but nothing more.
>
> Researcher:
> Ok, so you're phrasing and using descriptive words.
>
> Connie:
> It's really just a concept scheme to help them understand what it

is....it is really hard for them to understand, so we try to relate to the library because they know about that.

Researcher:
Have the students expressed a desire to search on their own?

Connie:
Not too much. They're not really ready. A couple of them are mature enough to know that its there and the fun they could have with it, but the others are just not mature enough. This is kind of the age they are going from the concrete examples to abstract examples. And at the beginning of fourth grade they are really still third graders, and they're not matured enough yet. So, they're really not able to understand that wealth of information out there yet. They will in the next few months, but it's kind of a transition at the beginning...so a couple understand it.

Connie's decision is based on her students' developmental level. She assessed their readiness for the information based on experience with her previous fourth grade classes and through observation.

Dixie, a veteran teacher of several years, had confidence in her fifth grade students. She was not afraid to admit they knew more about the Web and searching than she did, and allowed her students to keep looking until they were satisfied.

Researcher:
Have most of them had success with locating information on the web?

Dixie:
They are pretty...they are very good at doing that kind of thing I think (laugh). They are better than I am.

Researcher:
Ok (laugh). When the students are searching do they ever get frustrated and say: "I couldn't find anything, is there something else I could look for?" Have you ever suggested different ways of going at it?

Dixie:
Um, I haven't heard that comment: They'll sit there and play with it until they can. Although we did help one little girl, she was having a problem finding things so we helped her.

Diane H. was just as confident in her students' abilities. She spent some time at the beginning of the school year teaching the students about the different search tools available on the Web and then allowed them to practice. She attributed their ability to having Web access at home.

Researcher:
Now, when you have them go to the new sites or you ask them to go and use a site as a reference for a research paper, are you pre-picking the sites for them or do they do searches on search engines?

Diane H.:
Yeah, they go to the search engine. The one that we mainly use is Yahooligans and they will go to that. We just started our research papers on Monday and yesterday afternoon I spent about an hour pulling each one of them to the computer and asking them who they were researching. Then they sat down with me and we tried to find a really good, like an ethical web site for them. I've not done it for all of them, they know how to do it you know, they can get up there, go to Yahooligans and then type in their person and search. That just kind of narrowed it down for them you know, for me to help them a little bit, made it a little bit easier for them.

Researcher:
So you helped them with their search skills and...Now do you do formal instruction with the search skills or is this more of the one-on-one?

Diane H.:
I did at the very beginning of the year, I kind of explained to them you know, the different search engines, Yahoo, Lycos, and gosh what else is there...? Altavista. And I would pull them like...I've got four different table groups and at the very beginning of the year I pulled them back as in table groups because I've got like five or six kids to a table group. And we went over you know, the Internet rules, computer rules and then I showed them the different search engines which I've got those book marked too, they can just bookmark that, hit that and go to that and type in what they want. [Interruption from some other people]. But yeah, I went over and explained to them how they use it and...but most of them knew already so...(laugh).

Researcher:
Now, do you feel like your fifth graders can handle searching on the web? Do you feel comfortable coming up with their own searching and getting out there and...

Diane H.:
Mm hmm. Yeah, they are pretty good. Like I said yesterday afternoon I spent some time trying to find some of the things for them but I didn't get to do it for everybody but...yeah, I mean they go back there all week and they go to some good sites.

The time that Diane spent with her students one-on-one addressing their search strategies was not uncommon among the other teachers in the study. However, some teachers provided information about search strategies indirectly, or as the need arose.

Evaluating Students' Abilities to Apply Information Literacy Skills

"Describe how your students evaluate information found on the Web for accuracy, reliability and appropriateness for purpose." Another important skill of an information literate person is the ability to critically evaluate information based on its source, relevance to the information need, and accuracy. Again, the response from the teachers was mixed. It is important to point out that reference skills were part of the required curriculum for fourth and fifth grade students in the Tennessee School System. These skills included searching for and gathering information and using it to solve a problem or need. One teacher recognized there was a need for her students to know how to critically evaluate a site, but didn't feel the students were ready for that type of activity.

Researcher:
Have you had any experience with dealing with information literacy as it applies to the World Wide Web? Um....in terms of there being so much out there, on the Web...anybody can publish anything....and how we take the printed word as fact and dealing with....when you go to a site that looks authoritative, or that it has an authority in that field...because it has nice graphics and is well written, their language is more along the lines of what we would consider professional or educational, and yet, maybe the information presented just doesn't seem quite right. Looking at information for accuracy, reliability, is it appropriate for what we want to use it for?

Connie:
I think, at this point, it is just an inherent skill that we do. Anybody who has been on the Net more than once understands that you have to pick and choose and look at it and evaluate it as you go. I think it just becomes, like brushing your teeth, you just automatically do it.

Other teachers did not share this view and worked with their students to select the best information available to them. Two teachers illustrated the reflections of the others concerning evaluating information. Kay and Susan both seemed to be speaking to the developmental readiness of their students. Kay went so far as to point out that only her students who were in an advanced program were capable of making a connection between information in the library and information on the Web, and that not all information on the Web was viable. Susan's students relied on her to help them choose the information they will use for their research papers.

Researcher:
Now do you think that they equate or that they relate that what they find on the Internet is similar to what they find in the library? Do you think they make that connection yet?

Kay:
Some of them do not all of them. But this year in particular, especially with my children who just did OM for instance; they do see the transfer and the relation.

Researcher:
And what is OM?

Kay:
Odyssey for Minds, it's a problem-solving competition and it's for the higher achieving students. They learn a lot of critical thinking skills so they see transference and applicability very easily.

Researcher:
Now when they are searching or finding sites, do you ever talk to them about the information that they find there? One of the teachers had mentioned that one of her students found information in a book and that another student found information on a web site and there were contradictions. Do your students ever come across that?

Kay:
Yes, I can think of a couple of examples. And so basically when we talked about it we looked at the publishing date in the book and it was an older book and so they all agreed that then what they found on the computer in that particular instance would have been more current and more up-to-date.

Researcher:
Did they look for the publishing date on the web site?

Kay:
Uh huh.

Researcher:
What are some ways that you've dealt with information on the Web, helped them work through the Web or locating information, or even deciding if a site is written by someone who knows what they are talking about. Did you ever talk to them about those things?

Kay:
I guess I haven't really done as much leading them as I would like to. I've done more dictatorial; "this sites ok because I've previewed it." I say things like that to them. Um, this is making me think though how...especially with good problem-solvers it would be great to have more interaction. Because one thing we do talk a lot about you know, is fact and opinion. So I try to bring that in when we are reading books or magazine articles and we've talked a lot about editorials. But as far as helping them establish judgement themselves or talking a lot about why something might not be appropriate, I guess I really haven't done that a lot with fourth grade.

Susan's students relied on her to make decisions about what was good information or bad information from the Web. She also encouraged her students to utilize the library and reference materials available on CD-ROM. Requiring them to incorporate information from various sources was both an instructional and managerial technique. She explained that her students would never use the library unless required.

Researcher:
Now, once they locate a site, how do they know whether they should use that site?

Susan:

I usually have them show the summary and they can tell if that is something that they should be interested in.

Researcher:

Ok...and then once they have read the summary and they go to the site, have you had any problems with them accessing sites where the information seemed iffy?

Susan:

Uh, uh.

Researcher:

Or politically pointed in one direction where it might be biased?

Susan:

No...most of the things they find....they know...and usually we do it in such a hurry they know they don't have time to just sit and read garbage. So they know what they're looking for. They have specific things they have to find too. I give them an outline of what they're looking for, so they know...they don't have time to sit and read something that doesn't pertain to them.

Researcher:

Now, do you find when they're doing research projects, do they still go to print resources?

Susan:

Mmm, hmmm! [nods head yes] Sure do! And I try to make them do that. We even have encyclopaedias on CD and I even have to MAKE them do that. They still go back to the bookshelf. To the ones that were probably published in 1948...and I have to fight it all the time.

Researcher:

So, do they ever make comparisons, have you ever had any of them say, "the information here doesn't match the information here." Or they see difference or ask you about it?

Susan:

No, they don't do much of that. That's pretty abstract for a ten-year-old. [laughs] One thing I had to make them quit doing, was writing exactly as they found it online, because lots of times it's written, you know, where it didn't sound whole lot older than them, and they tried to do it. So that has been a big fight, because if they do, especially a real nice little summary on something, then that is easy for them to copy and say "oh, those are my words," you know. And I have to get online and find it and say, "Now these words match these words. What can you

do? Put these in your own words." Then what they started doing was looking up synonyms for all the big words and putting them in smaller words.

Researcher:
Just on the last question. Describe how your students evaluate information on the Web for accuracy, reliability or appropriateness.

Susan:
I guess they rely on me to do that. I would think so.

Researcher:
Ok.

Susan:
I don't think at this point that they would know the difference. I hate to say that. Maybe as they get older.

Researcher:
Do you think that's something that just comes as they continue through school?

Susan:
You know...I think right now.... I don't know that they're ready to try to evaluate something like that. I don't know that a lot of people can evaluate how accurate information is unless they have some previous knowledge about it. But, when you don't know anything... When they have no background information on something how can they evaluate how accurate that information is? I think that would be a problem until they have some background information and until they get a little bit more mature too.

Based on the teachers' reflections, it appeared that even they debated the readiness of a child to evaluate information and whether it was a skill to be learned or something that came indirectly from experience.

Teachers' Understanding of Information Literacy

There was no singular question that relates to this section of the data analysis. It was a sum of all the questions and responses in this study that lead the researcher to the answer of the research question, "What is the teachers' understanding of information literacy?" Information literacy was defined for each of the teachers prior to the tape recording of

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each interview. Information literacy was defined as the ability to identify an information need, locate resources, evaluate their fitness for purpose, use them to create knew knowledge, and apply the knowledge to solve a problem. This term was also equated to the Tennessee Curriculum Guidelines "reference skills". While the researcher used this term during the interviews, the teachers did not in their discussions. The absence of "information literacy" from their vocabulary was a significant indicator that there was a fundamental lack of understanding. However, this is a relatively new term and in the past these skills have been related to reference skill sets.

Beyond their lack of using the term, breaking down the definition as prescribed by this study and how their use of the Web addresses each indicator provides evidence to their understanding. Abilities can also be defined as skills. Skills are learned through lessons or teachings. The teachers discussed what they do with the students in terms of using the Web, but not necessarily what they "teach" the students about the Web.

The Ability to Identify an Information Need

While students were accessing Web sites to complete tasks or gather information for a research paper, they were not necessarily actively defining their information need. Teachers defined this prior to students accessing the Web, and in some cases dictated how many references were to be from the Web. Diane G. discussed several ways her students came to access information from the Web and why she preferred this approach to simply using it as a resource like the encyclopedia or library. Her description was typical of how others in this study utilized the Web as a resource.

> Diane G:
> Well, I guess one of the best ways I make use of it is like when we do
> research papers and reports. I will try and get in there and find web

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sites on the subject that they are doing. Also, the kids go to a computer lab and the woman in charge of the computer lab has worked on several sites and she will in turn give me the web sites with worksheets and then I will book mark those on my computer and assign certain group...I'll say this is the web site, this is the place I want you to go today and sometimes they have a worksheet to do and sometimes they don't it's just that they can get on and browse and read and...Basically that's how I use it.

I don't let my students get on the Internet or surf the Net. There are two reasons, one is that I just don't know what they are clicking on when I'm not paying...you see I feel that to let students do that it needs to come up to the computer lab where somebody can keep an eye on them. Plus, some of these kids think they know more than they know and I have found too many weird things on my computers at the end of the day when I let them get on the web and start searching...in surfing the Net so I pretty much limit them; I say these are the bookmarks that you may go to and that is it, that type of thing. And I just try to choose things that...some of the things I choose to go with the curriculum, some of the things I choose because it interests me, and some I choose because I know they'll be interested and it's not really for a lesson, it may be something that I know they'll just enjoy. I try not to make it always a subject-oriented, have to do a worksheet, type of assignment. Sometimes it's just going there and this is the bookmarks and explore it and enjoy it, that type of thing.

Thus, the need for the information is predetermined in most cases, a worksheet must be completed, and the information itself is already located and bookmarked on the Web. There was very little left for the student to apply at this point. However, Diane G. did indicate that she attempted to select sites of interest outside the curriculum and without a worksheet assignment for the students to enjoy, much like the "free-reading" times offered in school libraries.

The Ability to Locate Resources

Locating resources ranged from selecting a potential information source such as the Web or encyclopedia to actually searching the library or Web for information. Some teachers in this study were teaching their students how to search the Web using search

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engines and Web directories. The majority of teachers taught their students how to search

for information and select resources for research based on the developmental readiness of

their classes or individual students. At times, searching techniques were discussed only as

the need arose for individual students or groups of students. Jane provides an example of

how several teachers in this study addressed searching the Web based on need, readiness,

and cross-curricular integration.

> Researcher:
> Ok, now do you ever go over search strategies with them? Do you
> ever...when they do searches do you ever talk to them about finding
> synonyms for words or is there another way to say it if they are getting
> too much or too little?
>
> Jane:
> Uh, just indirectly we do. Yes. And I have shown them on web sites
> where they can find those kinds of you know, hints. Sometimes at the end
> of the...or sometimes at the...they can go to help and type in, you know
> things that we had done in the past with encyclopedia's - the hard books.
> Usually, when we talk about reference materials we'll talk about those
> and then include the Internet in that too.

Diane G. also indicated that she pre-selects Web sites for her students in the previous

quote. Students were accessing the Web and finding the information on a particular page,

but they did not actually apply search skills to locate the information themselves. Of all

the skills associated with information literacy, searching was the most apparent and

concrete for the teachers and something they attempted to improve on themselves.

The Ability to Evaluate Resources for Fitness of Purpose

Being information literate requires the ability to evaluate information, a skill.

Interestingly, the teachers did not appear to cover this with their students. Susan and

Connie provided insight into their understanding of this particular skill. Students relied

on the teachers to tell them whether a Web site is suitable to address their information

need. In this case the teachers were modeling for the students, but whether students were

gaining evaluation skills is not known.

> Researcher:
> Describe how your students evaluate information on the Web for accuracy, reliability
> or appropriateness.

> Susan:
> I guess they rely on me to do that. I would think so. I don't think at this point that they
> would know the difference. I hate to say that. Maybe as they get older.

> Researcher:
> Do you think that's something that just comes as they continue through school?
> Susan:
> You know...I think right now....I don't know that they're ready to
> try to evaluate something like that. I don't know that a lot of people
> can evaluate how accurate information is unless they have some previous
> knowledge about it. But, when you don't know anything...just like Blount
> Mansion. We got online the other day and there were all kinds of
> sites...I gave them some and then they tried to find their own. They have
> no background information on that. So, how can they evaluate how accurate
> that information is? I think that would be a problem until they have some
> background information and until they get a little bit more mature too.

> Connie:
> I think at this point it is just an inherent skill that we do.
> Anybody who has been on the Net more than once understands that you have
> to pick and choose and look at it and evaluate it as you go. I think it
> just becomes, like brushing your teeth, you just automatically do it.

Diane H. did discuss basic site evaluation skills with her students, but it was

something she introduced towards the middle to latter part of the school year. It was also

information for their bibliographies, not for the qualitative evaluation of the site.

> Researcher:
> When they get to a site do you talk to them about where that site came from, who
> authored it or the information that's on there?

> Diane H:
> Well, we are talking about that now. We've been doing their
> bibliography information, you know, they know how to go and find the
> author of the web site and then they have to list the web site address

and different things like that they know how to do the bibliography on it. Actually this week is the first week that we've talked about that as far as who puts them together and...we haven't discussed anything like that prior to this week.

This is a small step toward the evaluation of a site. By having her students locate the author of a site Diane H. is bringing an aspect of information literacy into her curriculum.

The Ability to Use Information Create New Knowledge

As seen in the previous discussions, the teachers were not asking students to create new knowledge. Students use the Web to answer discrete questions on worksheets or for prescribed research projects. It is possible that some students were creating new knowledge, but the teachers in this study did not indicate that this was something being observed or measured. There was not a specific question aimed at addressing this level of applying information literacy and the responses to questions concerning assignments and classroom uses of the Web did not indicate that students were engaged in the creation of new knowledge while using the Web.

The Ability to Apply Information to Solve a Problem

Students were using information from the Web to answer worksheet questions, write research reports, and complete other curricular tasks. Teachers directed students to specific resources and guided them through the process of completing these activities.

Going back to the premise that abilities are skills and skills are learned actions, there was no direct instruction of information literacy skills provided by the teachers in this study, another indicator that they do not understand the fundamentals of information literacy as it applies to the World Wide Web. However, they do see the Web as a source

for information and use it extensively with their students given time and opportunities. But, that use does not imply an understanding of information literacy.

Another factor that indicated a lack of understanding of information literacy was the need to control what their students are doing on the Web expressed by several teachers. They were uncomfortable with allowing their students free access to the Web for fear of what they might look for, see, or do. This desire to control may have stemmed from their own lack of understanding how to use the Web for locating information to solve a problem.

CHAPTER SUMMARY

The purpose of this study was to examine how teachers use the World Wide Web with their students and how they require students to apply information literacy skills in the process. The broader questions of this study were, "how are teachers incorporating information literacy skills as they instruct students in the use of the Internet?" and "are teachers making the connection between information literacy and the Internet in lesson design?" Open-ended interviews with nine elementary school teachers were conducted on site in their schools. Participants volunteered for this study by responding to a letter sent to elementary and middle schools in and around the Knox County area. Participants were selected based on the following criteria:

- They had an Internet connection and World Wide Web browser in their classroom.

- They had been using the World Wide Web with their students for at least a year.

- They had been teaching in the elementary classroom setting for at least three years.

The participants taught fourth or fifth grade students on a variety of topics. They came to have computers and Web access in their classrooms in a variety of ways. Some participants received basic computer skills training or attended workshops on using the World Wide Web.

Five major research questions were addressed in this study:

1. What is the teachers' understanding of the importance of the Web?
2. What assignments or equivalents do they place on students that demonstrate the students' knowledge of information literacy and the Web?
3. What information literacy instruction do they give students concerning the Web?
4. How do teachers view students' abilities to use that knowledge in assessing what they find on the Web?
5. What is the teachers' understanding of information literacy?

Based on the research questions and data analysis themes began to emerge. The five themes discussed in this chapter were:

- Understanding the importance of the Web in the classroom
- Incorporating the Web into the classroom
- Providing information literacy instruction
- Evaluating students' ability to apply information literacy skills
- Teachers' understanding of information literacy

Teachers' understanding of the importance of the Web referred to themselves and their students. In general they saw this as an excellent resource for current information and essential to students' future scholastic endeavors. Assignments used in relation to the Web were either worksheet based or research paper related. Students were given worksheets with questions to be answered by locating information at Web sites pre-

selected and bookmarked by the teacher. Research papers were predefined topics accompanied by lists of teacher reviewed Web sites with related information. There is little or no information literacy instruction provided by the teachers in this study. Neither was it apparent that they received information literacy instruction themselves during any technology training provided by the state or school systems. Teachers in this study reviewed Web sites prior to students accessing them; therefore, students were rarely judging or evaluating Web sites for their appropriateness or relation to their specific information need. Participants in this study did not use the term information literacy, did not provide specific instruction for information literacy skills as defined by this study, and demonstrated a need for control of what their students accessed on the Web. These factors indicate a lack of understanding of information literacy and its importance to the use of the Web as an information resource in the classroom.

Chapter V provides a summary of the study, discussion of findings and conclusions, general recommendations, and recommendations for future studies.

CHAPTER V

SUMMARY OF THE STUDY, FINDINGS AND CONCLUSIONS, GENERAL RECOMMENDATIONS AND RECOMMENDATIONS FOR FUTURE STUDIES

SUMMARY OF THE STUDY

Purpose of the Study

The purpose of this study was to examine how teachers used the World Wide Web with their students and more specifically how they incorporated information literacy skills in Web-based activities. Information has taken on many forms since humans began communicating, from cave paintings to oral histories to hieroglyphics to printed books to radio to television to computers, and now, the World Wide Web. In its evolution information has taken the form of two-way communication to one-way delivery of stories, announcements, news events, and now, the hyperactive nature enabled by computers and the World Wide Web. Information found on the Web is not only in multimedia format, but it is also non-linear in its presentation. Add to this the multitude of documents published on the Web by anyone with a computer and an Internet connection and you have an information explosion with no editorial or governing body ensuring the information is credible. Access to millions and millions of information resources instantly is new to the education community, but how we locate, interpret, and apply that information has been a necessary skill long before the 21st Century.

Research Questions

Webster's Dictionary (1983) defines literacy as "the condition of being educated." To become literate one must be "instructed; furnished with knowledge and principles; trained." According to Doyle, "an information literate person is one who:

- recognizes that accurate and complete information is the basis for intelligent decision making;
- recognizes the need for information;
- formulates questions based on information needs;
- identifies potential sources of information;
- develops successful search strategies;
- accesses sources of information including computer-based and other technologies;
- evaluates information; organizes information for practical application;
- integrates new information into an existing body of knowledge;
- uses information in critical thinking and problem solving."

The research questions for this study were:

1. What is the teacher's understanding of the importance of the Web?

2. What assignments or equivalents do they place on students that demonstrate the students' knowledge of information literacy and the Web?

3. What information literacy instruction do they give students concerning the Web?

4. How do teachers view students' abilities to use that knowledge in assessing what they find on the Web?

5. What is the teacher's understanding of information literacy?

Participants

The principal investigator solicited volunteers for the study by sending a letter explaining the study with permission forms to elementary and middle schools in the greater Knoxville area. The search for volunteers was limited to four East Tennessee public school systems: Knox County; Oak Ridge; Maryville, and Alcoa. Participants were elementary school teachers teaching in grades fourth and fifth. These grade levels

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corresponded to the introduction and implementation of reference skills into the curriculum. After two solicitations for participation, there were twelve volunteers, however three were eliminated from the study because they did not meet the criteria listed below. Of those eliminated, two had not been teaching for three years and the other had only been using computers in the classroom for six months. The nine participants selected met the following criteria:

1. They had an Internet connection and World Wide Web browser in their classroom.

2. They had been using the World Wide Web with their students for at least a year.

3. They had been teaching in the elementary classroom setting for at least three years.

Procedures

A discussion of this research study would be incomplete without reflecting on the methodology. The qualitative research method used was a phenomenological study based on audio taped interviews. The interviews were structured around open-ended questions with spontaneous, related questions used to probe and illicit explanations and clarification from the participants. The interviews lasted approximately 30 minutes to one hour and were conducted in either the participants' classrooms or a conference room within the school building.

The principal investigator explained the purpose of the study and reviewed the definition of information literacy used in this study. Each participant selected a pseudonym, those who selected identical pseudonyms were differentiated by unique initials in place of a last name. Participants were encouraged to speak freely without fear of penalty, either perceived or real from their colleagues or administrators, as all transcripts were for the researcher's review only.

Data Analysis

After the interviews were transcribed, they were converted to digital text documents and processed using NUD•IST (Non-numerical, Unstructured Data Indexing, Searching and Theorizing), a qualitative software package designed to store, code, retrieve, and analyze text. There are two parts to a NUD•IST project, the Document System and the Index System. The Document System handles the data and the Index System stores the codes and notes for the data. The two systems are linked to one another via searching and theorizing functions.

Past qualitative research projects completed by the researcher were done the "old-fashioned" way by using index cards, cutting and pasting photocopies of interview transcripts, and using multi-colored highlighter pens. The process was tedious, time consuming, and wasteful as interviews had to be photocopied numerous times to ensure all parts were classified or cross-categorized. While the electronic method did save time in some respects, the researcher still kept printed copies of the interviews on hand for quick scanning and note taking.

Using the software package NUD•IST was difficult at first. The interface was confusing and not intuitive. After taking the online tutorial several times the researcher was able to begin the process of coding data from the interviews. It was the advise of a peer doctoral student that actually made the process of coding the data more accurate. NUD•IST allows the researcher to search for particular strings of text and then code it into separate documents. When you search for a particular word or string of words, the question and the response are added to another text document with their origin recorded above the quoted text. For example, the researcher first searched all documents based on

a particular question. The software located all occurrences of the question in the interviews, copied the question and the response to another text document, and coded where each one had come from based on the interviewee. For this process to work, the researcher had to know in advance that this was how the package functioned, prepare the interview guides carefully, maintain consistency in use of words and phrases between interviews, and carefully mark each tape by date and participant. By carefully organizing and structuring the interviews in the beginning, the researcher was better able to sort and analyze the results using the software.

Because these were open-ended interviews, the participants did not always answer the questions in the order they were asked, or the first time they were asked for that matter. There were also occurrences of teachers "running away" with a question and providing information on a myriad of topics that, while related to the research questions, were not necessarily cohesive. In these cases NUD•IST was invaluable as a searching and coding mechanism. Being that all participants are from the same professional field, their vocabulary was consistent and it was very easy to search long passages of text and isolate specific bits of data and code them for other categories.

Suggestions for the makers of the software package would be to tweak the interface design of the software and some of its functions. This researcher did find the investment in this package valuable and worthy of use in future research endeavors.

As for the interview process itself, the researcher was pleased with the results. The participants were interviewed, for the most part, during a regular school day. Planning periods were given up to assist the researcher with this study. While time was limited, having the participants in their environment was invaluable. Those who were

interviewed in their classrooms were able to flip through lesson plan books and file folders of activities to help jog their memories for specific questions. Many of them were also just returning from or about to present a lesson using the Web on the day of the interviews, and being able to probe fresh minds was very useful.

While the length of the interviews may appear to be short, there was an amazing amount of information given by the majority of the participants. The researcher's experience with interviewing educators is that they contain a flood of comments waiting for someone to open the dam. There were no questions in this interview that could have been answered with a simple yes or no. Not all responses were straight paths, some meandered around a bit, but that may have been due to the newness of the situation, and the fact that they had 25 students returning to the classroom at any minute. Regardless of the condition the responses were in, the data for this project was rich.

FINDINGS

The findings of this study reveal that while they viewed the Web and Web activities very positively participants did not feel their students were developmentally ready for information literacy instruction. The participants also stated they had not received information literacy training. The participants provided teacher-selected sources on the Web for students to access. The assignments given to students were low-cognitive level activities requiring little more than fill-in-the-blank answers. One of the key indicators that teachers did not have an understanding of information literacy was that they never used the term in their conversations. While the term may have been new to them, if they had an understanding of the concept they would have adopted it into their terminology. Not only was the term absent from their discussion, but they did not provide

specific instruction for information literacy as defined by this study, and they

demonstrated a need for control of what their students accessed on the Web.

CONCLUSIONS

Based on the findings, the following conclusions can be made regarding the research

questions for this study:

- Teachers view the Web as an important resource for students and themselves and incorporate its use in assignments and activities.

- The participants in this study were unable or unwilling to provide opportunities for students to demonstrate knowledge of information literacy during web activities.

- The participants' understanding of information literacy was absent at the conceptual level and not demonstrated in any student related activities.

GENERAL RECOMMENDATIONS

Looking back on the findings of the study and, more specifically, the profiles of

these participants, which set the context for the interviews, there are several key pieces of

information that address why there is a lack of understanding and application of

information literacy in Web based classroom activities. The researcher has identified

these as The Three T's. Training, time and tenet were barriers identified by participants as

they discussed their computer experience and use of computers and the World Wide

Web. These issues were echoed in all the interviews as each teacher described her

experiences in her own words. Following are suggestions for addressing these barriers.

Training

Careful design and implementation of a technology training program is crucial to

the long-term success of its participants. Within this study the teachers revealed two key

factors to consider in the design a training program, learning styles of teachers and

release time for training. The participants in this study discussed their personal preferences for learning new skills or techniques concerning the use of the Web. Some wanted time to read the instructions and time to practice. Others wanted classes organized according to teacher ability levels. Some teachers expressed a need for an on-site trainer who could guide them through new information and assist during practice. This on-site expert would also be available to answer questions and demonstrate skills. How does a system-wide training program address these three types of teachers? Beyond offering scheduled training events in a centralized facility, perhaps providing user guides, workbooks, and other self-guided activities would address the needs of participants less willing to travel to a training facility after school hours. An on-site expert could be a fellow teacher who is given extra-service pay to attend centralized training events and then disperse the information to peers back in the school. Some schools practice this method now.

For the teachers willing to attend centralized training events, release time was an expressed need. The participants in this study all worked eight hour days Monday through Friday. Receiving release time from the classroom for school-based training events was rare. For a teacher to be released from her classroom duties during the week, the school must hire a substitute. The teacher is still being paid for her workday and the substitute teacher is being paid as well. The school systems represented in this study typically avoided the money issue by offering training after school hours and half to full-day training on Saturday. Few teachers were able to attend training during these times on a regular basis.

Even if a solution to provide teachers release time during normal working hours was found, training must be designed to be continuous and providing time for practice and follow-up activities. As discussed in the literature review section of this study, formalized, continuous training throughout a school year is the key to raising a teacher's confidence, skill, and awareness in incorporating technology into the curriculum. Formal training implies an established curriculum with objectives that are sequential and measurable. Continuous or on-going training should be appropriately paced and scheduled so as to allow for time to practice, but not time to forget before moving to the next level.

It is important to consider what teachers would be learning in a training program. Once they move beyond the basic mechanics of operating a computer, how to incorporate this tool into the classroom is the next step. If we look at curriculum development in grades kindergarten through fifth, the "spiral approach" appears to have the best results. This is where the curriculum moves from the egocentric view of the child and spirals further and further from the core until the child has the ability to view problems from external perspectives. A similar approach could be taken with educating teachers on how to use technology, and more specifically, how to incorporate information literacy into their use of the Web. Once teachers understand how the computer and Web benefit their personal and professional growth either through production or research, they would be better apt to make a bridge into their classroom curriculum. The computer and access to the Web would become a tool in the classroom, not a learning center or "extra-curricular" activity for students to visit on a schedule. The Web would no longer be used for the sake of saying "our students log-on every day," but as a resource of information that is viewed

critically and not exalted as the answer to all problems. So, what the teachers learn is as important as the timing and scheduling of the learning. A solid curriculum looking at the use of the Web would begin by reviewing the definition of an information literate person, understanding the search tools available on the Web, the types of information available, and the proper design of lesson plans to achieve the goal of information literacy. Teachers would be not only come away with lesson plans and activities, but also the theory behind the practice and a reason for doing what they do with their students.

Time

Lack of time, not enough time, no time, etc. are common phrases recorded in the interviews from this study. Time for teacher training has been discussed previously in this discussion. Lack of time during the school day to instruct students in the use of the World Wide Web, and for students to practice these skills, is perceived as another barrier by teachers in this study. The school day for students is typically seven hours. Elementary teachers must teach all state mandated subjects (math, reading, language arts, science, social studies) for a mandated amount of time. Special area subjects (physical education, music, and library) must also be taught a special number of times per week. Some teachers have difficulty finding a regularly scheduled time for computer and Web instruction as they treat it as a separate entity. But, if teachers were to consider how the computer and World Wide Web were resources or tools that apply across the curriculum, their method of incorporating computer time throughout the day may alter.

Tenet

This is the real barrier to participants not integrating information literacy into their curriculum and students use of the World Wide Web. A tenet is a principle or belief

generally held to be true. The tenet in this case is that the computer and World Wide Web are separate pieces of the standard curriculum, that they are not tools with accessories applying to all areas of study. These entities are not viewed as a means to an end, but as the end itself. This is evident in how the teachers allotted time to their students for computer and Web access. Giving all students fifteen minutes a day on the computer is a statement that regardless of whether they are using that time to research a problem, write a paper, or generate a product, having that access has accomplished something in and of itself.

Once teachers begin viewing the Web as an information resource and the computer as a tool, perhaps the issue of time in the classroom will become moot. Time on the computer would be viewed as productivity time and not immersion time. However, this mindset can only come from experience and education. Going back to the first T in this discussion, training and educating teachers on the use of the tool will help them prepare for the inclusion of this tool into their classroom.

If computer skills and information literacy skills are to become an integral part of Tennessee's public schools, the initiative must come in the form of a mandate from the Department of Education. The State Department of Education must identify computer and information literacy skills as part of every subject area taught in a school curriculum. There must be no doubt that computer and information literacy skills are wholly integrated. The expectation must be present that these are essential skills for all students and not something that is inherent or picked-up along their way through the school system. At the same time, teachers must pay heed to these skills that apply to all areas of the curriculum and seek to incorporate lessons and activities where they may be applied.

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In this scenario the curriculum guidelines not only dictate what students should be learning, but what teachers should be learning during pre-service and in-service education. Thus, addressing the needs of learners from their first years in school through their tertiary educational experiences in terms of information and computer literacy is a goal for the academic community to address.

RECOMMENDATIONS FOR FUTURE STUDIES

This study looked at a small group of public elementary school teachers within the greater Knoxville area and the incorporation of information literacy skills as they use the Web with their students. The results indicate that this set of teachers, in general, do not incorporate information literacy skills into their curriculum, nor do they appear to have an understanding of the importance of these skills. The results of this study are applicable only to this group of participants, and to fully understand whether the educational community at large has and understanding of information literacy and applies these skills in the use of the Web warrants further study. There are several approaches that can be taken to broaden the research begun with this set of participants, as well as address a sample that better represents the general population. Recommendations for further research include:

- interviewing the participants of this study in a few years to look at changes in their practice;

- conduct a broader survey study; and

- designing a study to compare what teachers are doing in their classrooms prior to receiving information literacy training and after they receive training.

Follow-up Interviews

By doing a follow-up study to this one the researcher could assess whether the questions raised during the interview had an affect on the participants. Going back and reviewing what they said in this study would provide them with a base for measuring their own progress as well. Have they experienced growth in their use of the Web in their classrooms or are they using the same techniques? This is an interesting question that could be answered with a longitudinal study of the same participants.

Broaden the Study

Conducting a broader survey study with a larger population sample would provide a data source for identifying common factors related to why teachers do or do not integrate information literacy skills into their use of the Web. In addition to a broader survey within the Knox County and surrounding areas this study could be replicated in other regions of the state as well as taking it to another state in the southeast or elsewhere in the United States.

Conducting a Before and After Study

To test this researcher's premise that continuous and properly designed training could make a difference in whether a teacher incorporates information literacy into the use of the Web, a comparison study of teacher practice should be performed. This would be a study combining several qualitative methodologies from classroom observation to open-ended interviews and lesson plan reviews. Prior to offering a training opportunity the researcher would need to observe the teachers in their classrooms, tracking when and how the Web was being used. This would be accompanied by an interview with the teacher to assess their understanding of information literacy as it applies to the Web and

their self-assessment of their use of the Web for professional development, classroom assignments, and as an information resource. All participants would then attend a series of courses focusing on using the Web in the classroom and applying information literacy skills. After the training sessions have concluded a two follow-up interviews and classroom observations should be performed. The first should be conducted within three weeks of the course. The second should be conducted during the following school year to assess retention and continued growth. This time intensive study would require particular attention to design of interviews and the design of the training series.

CHAPTER SUMMARY

This chapter provided a summary of the study, discussion of findings and conclusions, general recommendations, and recommendations for future studies. . The purpose of this study was to examine how nine elementary school teachers, grades fourth and fifth, reported using the World Wide Web with their students, and more specifically, how they incorporated information literacy skills in Web-based activities. While the participants do view the Web as an important resource for information and an integral part of students' academic pursuits; the overall conclusions of this study were:

- Teachers view the Web as an important resource for students and themselves and incorporate its use in assignments and activities.

- The participants in this study were unable or unwilling to provide opportunities for students to demonstrate knowledge of information literacy during web activities.

- The participants' understanding of information literacy was absent at the conceptual level and not demonstrated in any student related activities.

BIBLIOGRAPHY

BIBLIOGRAPHY

Berenfeld, B. (1996). Linking students to the infosphere. T.H.E. Journal, 23, (9), 76-83.

Bracey, B.L. (1995). Classrooms online: How one teacher got started. The ERIC Review, 4, (1), 5-8.

Bush, V. (1945). As we may think. The Atlantic Monthly, 176, July, 101-108.

Carvin, A. (1998). The EdWeb Homeroom. [Online]. Available:
http://edweb.gsn.org/resource.cntnts.html.

Clarke, A. C. (1993) Reinventing Schools: The Technology is Now! [Online]. Available:
http://www.nap.edu/readingroom/books/techgap/media/aclarke.html

Clinton, B. (1997). State of the Union Address. [Online]. Available:
http://www.whitehouse.gov/WH/SOU97/index-plain.html.

Croft, V.E. (1990). "A National Study to Determine the Characteristics of Technological
Literacy for High School Graduates." Doctoral dissertation, Virginia Polytechnic
Institute and State University.

Cuban, L. (1993). Computers meet classroom: Classroom wins. Teachers College
Record, 95, 185-210.

Cutler-Landsman, D. & Wrzesinski, C.J. (1994). Internet: A vehicle for orginal student
research. Teaching and Change, 1, (2), 135-153.

Davis, M. & Henry, M. J. Technology implementation in two restructuring schools:
Past, present, and future. New Orleans, LA: Paper presented at the Convention
of the Association for Educational Communications and Technology, 1993.
(ERIC Document Reproduction Service No. Ed 362 162).

Day, K. & Schrum, L. (1995). The Internet and acceptable use policies: What schools
need to know. The ERIC Review, 4, (1), 9-11.

de Acosta, M. The impact of school wide and classroom elements on instructional
computing: A case study. Cleveland State University, OH: Levin College of
Urban Affairs, 1993. (ERIC Document Reproduction Service No. Ed 361 451).

Delcourt, M. A. & Kinzie, M. B. (1993). Computer technologies in teacher-education:
The measurement of attitudes and self-efficacy. Journal of Research and
Development in Education, 27, (1), 35-41.

Denzin, N. K. & Lincoln, Y. S. Ed. (1994). *Handbook of Qualitative Research.* Thousand Oaks, CA: SAGE Publications.

Dockterman, D. A. (1991). Great teaching in the one computer classroom. Cambridge, Mass.: Tom Synder Productions.

Doyle, C.S. (1994). *Information literacy in an information society: A concept for the information age.* Syracuse, NY: ERIC Clearinghouse on Information & Technology, Syracuse University.

Fishman, B. J. & Duffy, T. M. (1992). Classroom restructuring: What do teachers really need? Educational Technology and Research, 40,(3), 95-111.

Guralnik, D.B. (Ed.). (1970-1986). *Webster's new world dictionary* (2nd college ed.). New York: Prentice Hall Press.

Guba, E.G. & Lincoln, Y.S. (1981). *Effective Evaluation: Improving the Usefulness of Evaluation Results Through Responsive and Naturalistic Approaches.* San Francisco, CA: Jossey-Bass Inc.

Handler, M. G. (1993). Preparing new teachers to use computer technology: Perceptions and suggestions for teacher educators. Computers and Education: An International Journal, 20, 2, 147-156.

Henry, M. J. Profile of a technology using teacher. Clearwater, Fl: Paper presented at the Annual Convention of the Eastern Educational Research Association, 1993. (ERIC Document Reproduction Service No. ED 356 758).

Honey, M. & McMillian, K. (1993). Case studies of K-12 educators use of the Internet: Exploring the relationship between metaphor and practice. (ERIC Document Reproduction Service No. ED 372 726).

Hurst, D. S. (1994). Teaching technology to teachers. Educational Leadership, 51,(7),74-80.

International Society for Technology in Education. (1992). Curriculum guidelines for accreditation of educational computing and technology programs. Eugene, OR: International Society for Technology in Education.

Itzkan, S.J. (1994). Student recommendations for global networking in schools. . T.H.E. Journal, 21, (6), 60-63.

ed. Kafai, Y. B. & Resnik, M. (1996). *Constructionism in Practice: Designing, thinking, and learning in a digital world.* Mahwah, NJ: Lawrence Erlbaum Associates.

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"Keeping Students In Line, Online." December/January 1995. *Classroom Connect*, pp. 12-13.

Koontz, F. R. An assessment of teacher trainees' attitudes toward selected instructional media. Washington, DC: Paper presented at the Convention of the Association for Educational Communications and Technology, 1992. (ERIC Document Reproduction Service No. Ed 348 007).

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Newbury Park, CA: SAGE Publications.

Miller, L. & Olson, J. (1994). Putting the computer in its place: A study of teaching with technology. Journal of Curriculum Studies, 26, 121-141.

NCATE (1992). 38th annual guide to accredited education programs/units. Washington, DC: National Council for the Accreditation of Teacher Education.

National Science Board Comission on Precollege Education in Mathematics, Science, and Technology. (1984). *Educating Americans for the 21st Century*. Washington, D.C.

Roerden, L.P. (1997) *Net Lessons: Web-Based Projects for Your Classroom*. Sebastopol, CA: Songline Studios, Inc.

Rogan, J.M. (1995). The use of the Internet by math and science teachers: A report on five rural telecommunications projects. San Francisco, CA: Paper presented at the Annual Meeting of the American Educational Research Association, 1995. (ERIC Document Reproduction Service No. ED 384 509).

Sanchez, R. (1995). A wired education. Internet World, 6, (10), 70-74.

Schnabel, J. (1997). One school's adventure on the information superhighway. Technology Connection, 2, (9), 11-13.

Serim, F. & Koch, M. (1996). *Netlearning: Why teachers use the Internet.*. Sebastopol, CA: Songline Studios, Inc.

Shapiro, J.J. & Hughes S.K. (1996). Information literacy as a liberal art: Enlightenment proposals for a new curriculum. Educom Review, 31, (2), [On-line] Available: http://www.educom.edu/web/pubs/review/reviewArticles/31231.html

Sterling, B. (1993). A Short History of the Internet. http://www.ubicom.com/history.html.

Technology Education Advisory Council. (1988). *Technology Education: A National Imperative*. Reston, VA.: International Technology Education Association.

Tennessee Department of Education, Office of Education Technology. (1992). Handbook for technology planning in Tennessee public schools. Nashville, Tenn.: Author.

Veen, W. (1993). How teachers use computers in instructional practice--Four case studies in a Dutch secondary school. Computers and Education: An International Journal, 21, 1-2, 1-8.

Weitzman, E.A. & Miles, M.B. (1995). *Computer programs for qualitative data analysis.* Thousand Oaks, CA: SAGE Publications.

Wiggins, R. (1995). Webolution: The evolution of the revolutionary World-Wide Web. Internet World, 6, (4), 32-38.

Wise, B. J. (1994). Tomorrow is today at Silver Ridge. Principal, 73,(4), 44-46.

Wresch, W. (1996). *Disconnected: Haves and have-nots in the information age.* New Bruswick, NJ: Rutgers University Press.

Wurman, R.S. (1989). *Information anxiety.* New York: Doubleday.

APPENDICES

CONSENT FORM
Elementary Educators Use of the Internet and
Application of Information Literacy Skills to Student Use of the Web

This study will examine how teachers are instructing students to use the World Wide Web and more specifically how they require the students to apply information literacy skills in the process. Educators are still at the threshold of incorporating the World Wide Web as a teaching tool which will be taken into consideration in this study, therefore the broader goal is to understand how teachers are using the Internet and World Wide Web in the classroom and attempt to identify some commonalties among the participants.

You will be asked to participate in an informal interview that will last approximately one hour at a mutual location agreed upon by both you and the principal investigator. The interview will be audio taped and the tapes will be transcribed by an outside source (sworn to secrecy) to capture your exact words. Your identity will be kept completely confidential through the use of pseudonyms, and only I will have access to the consent forms, tapes, and transcripts. The tapes will be erased upon transcription and the transcripts, notes, etc. will be locked in a filing cabinet in my office and destroyed after the study is completed. The consent forms will be stored in a locked filing cabinet in my office, Dunford 2409, and will be destroyed after three years.

There are no foreseeable risks nor direct benefits involved in your participation in this project. Participation will be provide you with the opportunity to reflect on your own experience and will provide me, as the principal investigator, the opportunity to understand and describe more completely your 21st Century Classroom experiences. Also, you may indirectly benefit from the knowledge gained from the project findings.

Your participation is entirely voluntary and you may refuse to participate, refuse to answer any specific questions, or withdraw at any time without penalty. You may contact me at any time if you have further questions or concerns about the project or your participation.

Principal Investigator: Rhonda J. Spearman
Office: 2409 Dunford Hall, UTK
Knoxville, TN 37996-4050
(423) 974-7812

* *
I fully understand the explanation of the project and I agree to participate.

_____   _____
Name   Date

_____

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Signature

STATEMENT OF CONFIDENTIALITY

I, the undersigned, do hereby agree that I will not reveal the content transcribed from the audiotapes for the dissertation project *Elementary Educators Use of the Internet and Application of Information Literacy Skills to Student Use of the World Wide Web* conducted by Rhonda J. Spearman of the University of Tennessee, Knoxville.

I agree that:

- there will be no additional copies made of the audiotapes;

- all copies of the transcription both paper and digital will be given to Ms. Spearman;

- any questions concerning the transcription of the audiotapes will be referred to Ms. Spearman or her advisor Dr. Doak;

- the content of the audiotapes and transcriptions will not be discussed with anyone other than Ms. Spearman or Dr. Doak.

_____
Name

_____   _____
Signature   Date

INTERVIEW GUIDE

Elementary Educators Use of the Internet and
Application of Information Literacy Skills to Student Use of the Web

PHASE	ACTION
Preparation	Greet participant Explain and state purpose of study Explain anonymity/confidentiality Explain note taking/audiotaping

Interview	*Questions and Probes*
	Tell me how you came to have Internet access in your classroom.
	    Year Grant, 21st Century, etc.
	    Type of connection Number of connections
	    Browser used
	What does having the Internet and World Wide Web mean to you as a teacher?
	    Specific examples Home access?
	    Frequency of use Examples of sites or resources accessed
	What does it mean to your students?
	    Specific examples Frequency of use
	    Other access (library, another teacher, home)
	    Examples of sites or resources accessed by the TEACHER
	Describe ways you integrate the World Wide Web into classroom activities/curriculum.
	    Specific Examples
	    Modified lessons/curriculum or NEW
	    Process involved--Lesson Plan--
	Discuss the strategies you have used to help your students find and deal with the information on the Web.
	    SEE ABOVE
	    Does it relate to other areas of the curriculum?
	    Do you have a skill set?
	
	In what ways do your students utilize information found on the Web?
	    SEE ABOVE
	
	Describe how your students evaluate information found on the Web for accuracy, reliability and appropriateness for purpose.
	    SEE ABOVE

Conclusion	Transition to more informal conversation Thank participant Schedule follow-up interview/contact information

VITA

Rhonda Greenley Spearman has extensive and varied experience within the field of education. In 1993, she graduated Cum Laude with the Bachelor of Science degree in Elementary Education at the University of Tennessee. She completed her Master of Education in Curriculum and Instruction, with a Specialization in Early Childhood Development, in the summer of 1994. After completing a one year internship in the Oak Ridge, Tennessee Public School System, she returned to the University of Tennessee as a graduate assistant in the Instructional Technologies Group under the direction of E. Dale Doak, Ed.D. During her graduate studies she worked on a contract with CSX Railroad to develop a multimedia-based safety training program. She also served as an onsite technology trainer at West Haven Elementary School in Knox County. She received the Doctor of Education distinction at the University of Tennessee in December 2000 with a major concentration in Instructional Technology.

She is currently the Manager of the CourseInfo/Enterprise Systems Team for the Innovative Technology Center at the University of Tennessee, where she oversees the implementation of a statewide online academic portal system and consults with faculty who are interested in teaching and learning in an online environment. She also serves as Adjunct Instructor for the University's College of Education and the University Honors Program.