Introduction

"Independence is the real miracle of the Internet. It's not just that it lets you do things better; it lets you do things you couldn't even dream of doing before. The seduction of being online is that it really does put an awful lot of power in your hands. You can start with the simplest of questions – How do I buy a new sport-utility vehicle? – and step away from your PC in an hour with more information than you might gather in a month without a modem" (Cole, 1998). With the inception of the Internet in the 1960's, a whole new world of information opened to mankind. This information touched people in all areas of the world until even children in local schools were getting online to find content.

The year 1998 saw significant changes in the K-12 school network environment. It was during this year that the Federal Communications Commission began implementation of the Universal Service Fund (more commonly called eRate) that was to supply discounted funding to all schools and libraries in the United States for the purpose of connecting schools to the Internet. As schools began to make plans for Internet access, the United States Senate (lead by Arizona Senator John McCain) moved Senate Bill S.1619 through steps to become law. This bill was viewed as important because if passed, it would require all schools taking advantage of eRate funding to implement Internet filtering. This would place a burden on schools to implement some type of filtering strategy in order to receive the discounted funding.

Don Tapscott (1998), in Growing Up Digital, states "For the first time in history, children are more comfortable, knowledgeable, and literate than their parents about an innovation central to society" (p.1-2). Filtering of Internet sites has become a great

concern in the K-12 environment. Managing content on the Internet is a way that schools can have access to valued resources without exposing students to the multitude of material available online.

The Internet is comprised of over 30 million computers in 240 countries with 70 million users world-wide, 30 million users in the United States alone (Cerf, 1998). This constitutes a tremendous amount of content being made available to multitudes of individuals. How is that content delivered? What content is available? How does one manage the content?

Today, effective use of the Internet demands that individuals have knowledge of content delivery vendors, content providers, and content management companies. Content delivery vendors, companies such as Cisco, Sun, Netscape, Apple, and Microsoft, provide hardware and software that allow information or "content" to flow to the end users faster. Content providers, such as CNN, PBS, Playboy, and the Discovery Channel broadcast their messages to end users. Content management, or the methods of organizing access to the information available on the Internet is the third and perhaps the most controversial area concerning K-12 schools use of Internet resources.

Today as many schools move to place their entire network online, they must turn to content management as a way to use the Internet that will be acceptable to parents, teachers and students, and the community. Essentially they face three important issues in content management: efficiency, controllability, and accountability.

The first chapter of this document defines and illustrates critical issues related to the management of content in the K-12 education environment with an explanation of how the Internet works and how it is used. Chapter 2 allows us to look at how educational

content has been used in the K-12 learning arena, currently and prior to the use of the Internet. The methodology, in the third chapter, shows how the study was prepared and carried out. Chapter 4 presents the results of the investigation and unifies the previous chapters and presents possible avenues for further inquiry.

To begin, we will look at how the Internet works and why there is a need to manage content that is available on the Internet.

Chapter 1

Background

The Internet has been a resource for educators since it began in the 1960s. The history of this network has been well documented by writers such as Hafner and Lyon (1997) and Krol (1992). Only recently, has the popularity of the Internet, and in particular, the World Wide Web, made such an impact in the K-12 environment.

This impact has resulted in large part because the World Wide Web (or WWW) allows the sharing of both text and graphics in a visually appealing framework. Prior to the WWW graphics particularly, had to be downloaded, uncompressed, and opened to achieve the same effect that can now be viewed almost instantaneously (Krol, 1992). Managing access to the services on the World Wide Web is the focus of this research.

The Internet started as a joint effort between this country's military and select universities (Hafner & Lyon, 1997). As the network expanded to more and more universities and colleges, it also started to make it's way into the K-12 schools across the nation. In more recent years, the Internet, due in large part to the WWW, has become available to anyone with access to a computer, modem and phone line (Cohill & Kavanaugh, 1997). Once only found in higher education, now Internet Service Providers (ISP's) have begun to make Internet access available everywhere. As most K-12 schools have increased their access capabilities, they have begun to place entire local area networks (LANs) online with the Internet.

As the Internet developed into a rich resource base its use became more and more prevalent in the K-12 schools within the United States. Currently schools have begun to

employ various computer software programs and instructional strategies to manage student access to resources on the WWW (Warren & Seaton, 1996).

K-12 Access to the Web

In the 1990s, K-12 schools were obtaining access to resources on the Internet in greater numbers. This access came via a dial-up modem account to a system with full Internet connectivity, such as a local college or university. During this time, state departments of education also began implementing state-wide educational networks. One of the first to offer teachers free access to the Internet was the Virginia Public Education Network or Virginia's PEN (Bull, Sigmond, Becker, Cothern, Thomas, Morgan, 1994).

The increased use of the Internet by teachers meant that many were using the Internet as a classroom resource. In some instances both students and teachers had accounts on the Internet, and were able to communicate via email, outside of the school building. As more and more educators became "connected," the Internet was being used more as an instructional tool in the K-12 environment (Cohill & Kavanaugh, 1997).

In the mid 1990s, modem access by educators began to change to direct Local Area Network (LAN) and to Wide Area Network (WAN) connections. Schools with internal computer networks were hooking those networks to the Internet via a direct high-speed connection (Warren & Seaton, 1996). This allowed teachers to use a computer lab, with 20-30 computers to put an entire class online. In the "connected" school all students were ostensibly able to have access to the resources on the WWW.

How a web page works

To fully understand how the World Wide Web functions, it is necessary to explain how certain features work. When an individual uses browser software (predominately

Netscape Navigator or Internet Explorer) to access information on a WWW page, a number of requests are made. At the first mouse click on a link, a message is sent from the individual client computer, across a network (including the Internet) to the server hosting the information. This first request asks for the information on the web page. A time stamp message is sent from the server back to the client. The client computer uses the time stamp data to determine if the information is already in that part of the client computers cache. The size and location of the cache is determined by the browser and is where copies of previously requested information are stored (based on available space). If the browser determines that the information is contained in the cache, and also that the information has not changed (based on the time stamp data), the information requested is displayed in the browser directly from the cache of the local computer. If, on the other hand, the time stamp indicates that the information is not contained in the cache, or if the information has changed since the material was stored in the cache, the client computer sends a message back to the server, requesting the information. This information (the Web page) is then sent back to the client computer and displayed in the browser, all within milliseconds.

If a number of client computers in one location (such as a school) access the network through one connection, it is possible to have these client computers running on an internal network that has a connection to the Internet. Through the implementation of sufficient hard disk space, and special software, it is possible to create a proxy cache server connection (Warren & Seaton, 1996). In doing so, much of the information requested over the Internet can be stored on the hard drive of the local proxy server. This allows the individual client computers using browser software to access information from

the Internet over their internal network. The same browser requests are made when someone clicks on a web page link, but this time, the information has a better chance of being found on the proxy server. When it is, the information is sent to the client computer at the speed of the internal network (ethernet = 10Mb/sec.) instead of the Internet speed (T1 line = 1.5 Mb/sec.). The amount of resources, limited access, and decreasing bandwidth on the Internet, have made it extremely important for schools to make the most appropriate use of available connections.

Content Management only works if it is able to work efficiently. Web surfers quickly become familiar with the sites that find it necessary to put megabytes of images with animations on their first page. Banners, advertisements, control bars, all give way to what people now call the World Wide Wait (Warren, 1997). An interesting aspect of a local area network is that much of the traffic is repetitive. For example, the banner pages on search engines rarely change and can account for up to 70% of the data downloaded in a search (Warren, 1997). School buildings that have computer labs can see 80-90% cache hit rates in the lab since the traffic pattern is very repetitive. Even on other networks where you cannot predict any of the traffic, approximately 50% of the items being retrieved could come from a cache server (Warren & Seaton, 1996).

Using a Proxy Cache Server

A proxy/cache server should be part of a school's Internet server. It acts as a gateway between a school network (LAN) and the rest of the world-wide Internet. When a client computer on the school network requests a document, the client computer asks the proxy server to retrieve the document instead of having the client computer retrieve it directly. Most proxy servers have the ability to store the document they retrieve on the

server's hard disk, a process known as caching. Network-based caching removes repetitive traffic from a school's Internet connection and can greatly enhance the performance of the schools communication line to the Internet. Figure 1 shows how a proxy cache server works.

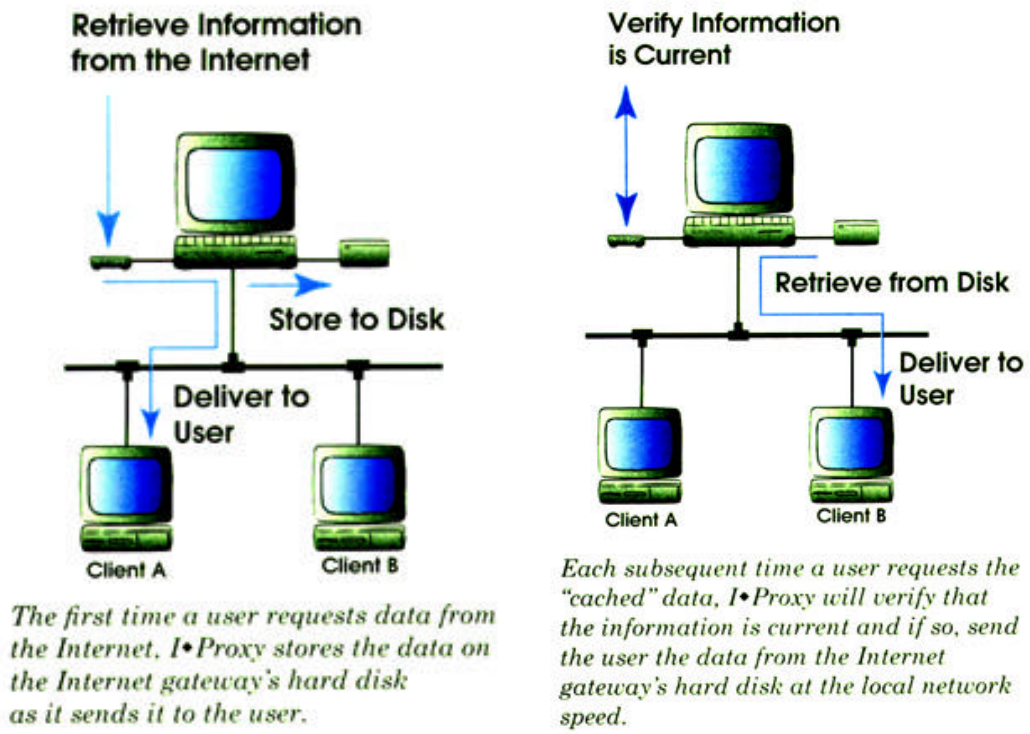

Figure 1. Proxy cache server.
Courtesy URLabs (http://www.urlabs.com).

Management of the Web by the User

The Internet user has a number of options available to control access to information. The more popular software browsers allow the user to set the cache on the individual client computer as high as the space on the hard drive will allow. Doing so displays frequently accessed pages quicker because they are found on the hard drive of the computer and the user does not have to wait for the information to travel over the Internet. Bookmarks and Favorite sites can also be stored by browser software making it

quicker and easier to return to a site that interests the user. As with anything, becoming a skilled user will allow one to obtain needed material at a much quicker rate.

Internet Searches - How They Work

A search engine is used to locate information on the Internet. Although each search engine has differences in the way they catalogue material, they all work in basically the same way (Isenberg, 1998). The user enters a keyword or phrase and the search engine displays information found in its data base relating to the user's input. If the appropriate material is found, the search was successful. If the user does not find sufficient information, they can enter a different keyword or phrase in an attempt to refine the results displayed by the search engine. Knowing how to search and how to use Boolean techniques will provide faster, more accurate results.

Unlike the library card catalog, which was created by human beings, much of the content of search engines has, by and large, been created by "spiders" or "robots," computer programs that surf the WWW cataloging sites in a systematic approach (Isenberg, 1998). Many search engine companies also allow a webmaster to submit their homepage for cataloging by that search engine. This allows the web page creator to select the categories under which the web page will be listed by the search engine. Example of a word search: With the present technology of search engines, asking for a search on the word "john" will list information for the following items: john (as in bathroom); hooker (as in client = 'john'); and individuals by the name John (first and/or last - historical, famous, and regular citizens). The user must sift through all of this 'john' material to locate the actual material that they were looking for.

Meta Name Tag

The computer language that creates a homepage is know as HTML (HyperText Markup Language). In an attempt to facilitate the search engine results, a special HTML code can be inserted into the homepage information. The code (in the form of a META tag) can be used by the web page creator to distinguish the content of the web page. The meta tags are invisible to the user, but serve an important purpose (Neou & Recker, 1996). The meta tag “keyword” provides information about the web page to search engine robots and spiders. For example, a web page on “frogs,” may have meta tag keywords that include “frog,” “toad,” “amphibian,” “tadpole,” “water lilly,” etc.
A search engine will use these words to help store the frog homepage under all of the keywords listed in the keyword meta tag (Isenberg, 1998). Here is an example of the correct use of meta tags found on a local county governmental web page:

```
<HTML>   <TITLE>Pulaski County on the Internet</TITLE>
<meta name ="description" content ="pulaski county">
<meta name ="keywords" content = "pulaski, pulaski county, pulaski county virginia,
Pulaski County Virginia, southwest virginia governor's school, swvgs, pulaski
community hospital, PCIC, pulaski county schools, Town of Pulaski, Town of Dublin,
Dublin, dublin, Claytor Lake, chamber of commerce">
.............remainder of the web page code follows here.........
```

Keyword meta tags area a helpful feature for web page developers interested in many visitors to their site. However, this keyword meta tag code has also been used by marketing departments to generate more responses to keywords that do not in any way have relevance to the actual material displayed on the homepage (Bremser, 1997). For example, if the meta tag on the frog homepage also contained the words sex, football, and whitehouse, the frog page would be listed in search engine queries on sex, football, and the whitehouse. The simple fact that the frog page is listed in the search responses, may

cause someone to view this page, adding to the number of visitors who have loaded the frog page into their browser.

Sites interested in promoting their material, for whatever reason, have also included words from current topics in their meta tag keyword code to generate a higher display prominence in search engine results. For example, during the Mars pathfinder mission, asking for a search on “rings of Saturn” or “pictures of Mars” produced a listing of inappropriate sites. More recently, a search for the popular television show “SOUTH PARK” or the movie “TITANIC”, provided the user with a listing of various sites containing material on the item as well as links to pornography. However, using the search engine Infoseek, the second result provided took the user to a hard core pornography site. Fortunately, a few days after this discovery, the search engine was filtering that site when requests for south park were made.

Using an IntRAnet

Internet access speed is a concern to the user who is required to access sites with a limited connection speed (still the case in many schools). In an attempt to alleviate this problem a number of companies have developed software products that allow the user to download and save entire web pages onto a local hard drive. By doing so, the user is able to access the same material found on the “live” Internet, from storage on their own hard drive or local server. As mentioned before, the speed of access from the local hard drive is much greater than access from the Internet proper.

Schools have made use of this downloading capability to allow networked computer labs access to information on the Internet without the need for more than a single modem/phone line connection to the Internet (Warren & Seaton, 1996). In setting

up this type of scenario, where web pages are accessed from a local hard drive on a network, an IntRAnet is created. An IntRAnet uses Internet technologies on a local network instead of on the world-wide Internet. IntRAnet's are becoming more and more necessary in the education field as information requirements increase and bandwidth capacities decrease on the Internet. Downloading, and storing Internet material on a local hard drive saves access time and conserves Internet bandwidth (McClain, 1997).

Example: Use of an IntRAnet in a 5th Grade Classroom Study of Frogs.

The teacher takes the class to the computer lab. Each student has access to a computer with browser software, however, the computers in the lab are not connected to the Internet. The day before, the teacher has used a software program called WebWhacker (http://www.bluesquirrel.com/whacker/) to "whack" two layers deep on five different web pages related to material on the frogs that he wishes his class to study. All of the material on these web pages is then stored locally on the school's server, including text, graphics, sound, etc.

Now, in class, the teacher directs the students to the first "frog" page (located on the school server), and the students start reviewing the material from this page. As students desire to learn more, they click on the various links. All of the web pages that appear on the student computers have been retrieved from the school server. This method not only allows the students in the computer lab to have fast access to the resources, it also limits the students' access to the teacher's pre-determined pages on frogs. If a student attempts to type in the web address for ESPN (to check the latest ball scores) the browser will not be able to access that site because the machines in this lab are presently not connected to the Internet. The students have access to all of the material that the

teacher intended them to see and at their own rate of interest during this computer lab time period. This material can be stored on the school's server for another class or it can be deleted to make room for additional material for a different class session.

State of the Art - Spring 1998

The Internet industry, those groups responsible for placing content on the Internet, have been looking at policing themselves. Software developers have devised programs that restrict a web user from going to pre-determined "inappropriate" sites, and the Internet community has begun to develop different types of self-monitoring measurers.

As an alternative to government regulation and censorship, the following content advisory systems have been implemented for the Internet.

PICS (Platform for Internet Content Selection)

PICS is an infrastructure for associating labels (meta data) with Internet content. It was originally designed to help parents and teachers control what children access on the Internet. PICS is a platform on which other rating services and filtering software has been built (http://www.w3.org/PICS). Just like the keyword meta tag, PICS is web page coding that is placed in the homepage and read by the browser and/or other software programs.

PICS sets technical specifications so that ratings from any source will work with all filtering software. Rating and labeling services choose their own criteria for rating. A content provider first needs to choose which rating vocabulary to use. Typically a self-labeling service. Next, connect your browser to the rating site web server and describe your document or web site by filling out an online questionnaire. After completing the questionnaire, the service gives you a text label in a special format, which you then

include in the header portion of your HTML document (or the homepage for your site) (see http://www.w3c.org). In the example below, the portion in bold is the actual PICS rating code assigned to the web page that this code is taken from, including the expiration date and the rating.

```
<html>
<head>
<meta HTTP-EQUIV="Content-Type" CONTENT="text/html;
      charset=iso-8859-1">
<meta HTTP-EQUIV="PICS-Labels" CONTENT='(PICS-1.1
"http://www.rsac.org/ratingsv01.html" l by"martinm@raleigh.ibm.com"
      on "1996.06.24T10:11-0500" exp "1998.06.06T08:00-0500"
      r (n 0 s 0 v 0 l 0))'>
<meta HTTP-EQUIV="PICS-Label" CONTENT='(PICS-1.1
"http://www.classify.org/safesurf/" l by "martinm@raleigh.ibm.com"
       on "1996.06.24T15:38-0500" exp "1998.06.06T08:00-0500"
      r (SS~~000 1))'>
     .............remainder of the web page code follows here.........
```

Rather than censoring what is distributed, as the Communications Decency Act and other legislative initiatives have tried to do, PICS enables users to control what they receive (Resnick, 1997).

RSACi (Recreational Software Advisory Council on the Internet)

In April 1996, the RSAC rating system was adapted for Internet content under the name RSACi using the PICS encoding standard. The Recreational Software Advisory Council (RSAC) is the group responsible for rating software and video games. The RSACi system is a web based questionnaire that queries the user about the content of a web page or directory tree based upon the content categories shown in Table 1.

Table 1. Recreational Software Advisory Council rating scheme. (http://www.rsac.org)

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
VIOLENCE Harmless conflict, some damage to objects	Creatures injured or killed, damage to objects, fighting	Humans injured or killed with small amt. of blood	Humans injured or killed, blood and gore	Wanton and gratuitous violence torture, rape
NUDITY No nudity or revealing attire	Revealing attire	Partial nudity	Non-sexual frontal nudity	Provocative frontal nudity
SEX Romance, no sex	Passionate kissing	Clothed sexual touching	Non-explicit sexual activity	Explicit sexual activity, sex crimes
LANGUAGE Inoffensive slang, no profanity	Mild expletives	Expletives, non-sexual anatomical references	Strong, vulgar, or hate language, obscene gestures	Crude, explicit sexual references, extreme hate language

Upon completion of the questionnaire, a PICS meta-tag, similar to the one shown previously, is returned to the user to be placed in the homepage file header. This is currently a free service, and the most widely used rating system on the Internet (Martin & Reagle, 1996) Webmasters who use the RSACi system are able to display the graphic shown in Figure 2. on their homepage to indicate to viewers that their site has been rated.

Figure 2. RSCAi webpage graphic.

Although rated, there is no indication of the rating received by the site. Browser software not set to read PICS code will display the web page for the user, regardless of the rating.

Software Filtering

There are two different types of software filtering programs in use today. The first category is software that runs on an individual client computer and must be installed on that machine to function. The other is server software which runs on a server connected to a LAN. Server software does the filtering for all client computers connected to the server. A brief description of these types of programs follows.

Client Software Filtering

The client filtering software programs go by names like Surf Watch, Cyber Patrol, Net Nanny, Cyber Sitter, etc. and are sold as individual programs. This type of program is excellent for one or two computers in the home, but become less effective in the K-12 setting. In general, the software comes with a pre-determined list of inappropriate sites with the option to subscribe to the list of updated sites. Some of these programs also have controls that can be set by parents to be “tighter” or “looser” at filtering based on certain words and/or phrases. Most of these programs have come under attack by free speech groups as the filtering companies do not publish the lists of filtered sites. Some of these programs have been found to filter gay and lesbian sites as well as free speech sites (Aftab, 1997). The popular press has made light of the fact that some of these programs, when used at a medical college, blocked the word “breast”, making it difficult for the medical students to obtain research on “breast cancer”.

These programs do give parents the capability to manage what content is displayed on their computer screen at home. However, without updating and continued monitoring by the parent, this type of software becomes less effective over time as additional inappropriate sites are placed online. One of the software companies,

WebSense, has indicated that they find one site every 30 seconds that they determine to be inappropriate for children under the age of 18.

The need to know who is creating the blocking lists and what type of sites are blocked becomes important when reading about the types of material the various companies have, in the past, blocked through their software. From Peacefire:

> If you download a page containing the phrase "gay rights", for example, the filtering program CYBERsitter will delete the phrase from the document. The program also blocks the web sites of the National Organization for Women, the International Gay and Lesbian Human Rights Commission, and the Penal Lexicon -- a UK-based web site dedicated to raising awareness of prison conditions in Great Britain. As a result of a page that was published on the Peacefire web site, "CYBERsitter: Where Do We Not Want You To Go Today?", CYBERsitter also blocks the Peacefire webpage. (see http://www.peacefire.org)

Server Software Filtering

While there are not as many companies providing server-based filtering software solutions, this type of configuration appears to be more feasible as a way to manage Internet content for the K-12 population (Warren & Seaton, 1996). The server approach involves a main computer (usually) designated for Internet-only applications. The server is the gateway between the schools network and the Internet. As the gateway, the server is able to function as a web host, an email host, and a filtering interface to all of the computers on the school network.

Because the server is a separate computer with software, these packages usually require a larger investment, however when compared to the price per computer for the client software filtering solutions, the cost appears to be more economical in the long run.

By having a server controlling all Internet features of a school's connection, there are many more options available for management of the content available on the Internet.

Server software has the capability to control which computers on the network can access the Internet and at what times, as well as the ability to cache web pages requested, thus increasing Internet bandwidth for those requests that have not been stored in the cache. In order to maintain an effective IntRAnet, a server with hard disk space is required. Server filtering software has the capability to regulate access by requiring the user to have a log-in account. The account can be tailored to meet the needs of students and teachers at all grade levels. As an example, one of the more popular server filtering programs, I-Gear, uses software "agents" to manage content traffic going through a school server (see Figure 3.).

When a web page from the Internet is requested, the List Agent compares the URL with a list stored in the I-Gear subject categories, the URL is either denied or allowed. Next, the DDR (Dynamic Document Review™) Agent reviews each page of web traffic looking for unconditionally vulgar words and replaces them with "----". The DDR technology allows words like "breast," "women," and "sexual" unless they are used in context that is deemed inappropriate. The Local DDR Agent also reviews the documents for any words that have been added to the category list based on local community standards or determined inappropriate for an educational setting (words such as "jokes," "humor," "games"). Finally, the Post Agent views words posted to the Internet and searches for items that have been rated unconditionally vulgar. Based on the

Figure 3. URLabs agents at work.

criteria set by the local school, the agents either allow the requested web page to be displayed in the browser or the user views a message indicating the reason that the requested page will not be displayed.

Chapter 2

Literature Review

With the increased use of the Internet and WWW in the K-12 classroom, the resources provided on the Internet take their place along with a host of other materials used by K-12 teachers in the instruction of students. There are many instances where individuals feel Content Management is a filtering program installed on a network so people cannot get to "naughty" sites. Although filtering can be a part of Content Management, there are many other facets to the issue than blocking pictures of sexually explicit imagery (Warren, 1997). To understand more clearly how the Internet and the WWW can be used efficiently and effectively, we must understand the larger context for managing curriculum prior to the use of the Internet. To begin, there are four areas to review: Pedagogy - how teaching and learning strategies are used; Censorship - how the community reacts to the content; Politics - how the community views content; and the Role of the Library or Media Center in the Instructional Program - what part school libraries have played in making content available. As we review the literature, we will also attempt to draw parallels between curriculum management and the use of the Internet as an educational resource.

Pedagogy

In *The Systematic Design of Instruction*, Dick & Carey (1985) describe a systems approach model in the design of instruction stressing the identification of skills students need to learn, and the collection of data from students that is then used to revise or evaluate instruction. As a part of this instructional model the evaluation component

determines how well the student performs; determines if the content being covered is useful; and evaluates content being covered. Thus allowing the instructor to design an appropriate instructional strategy, including the identification of content required to meet the instructional strategy, which is identified during the instructional analysis phase of the model. Such an evaluation has implications for the content the teacher will deliver to students.

Further Gagne, Briggs and Wager (1974), in discussing teachers as instructional designers, indicate that the teacher must choose the medium for delivery of instruction and also that teachers select material that will enable learners to master the desired curriculum objectives. (pp.206-207) This suggests that the content, medium, and materials must be managed by the teacher to support appropriate learning outcomes by the student.

With the continued push to prepare all students equally, state standards have arisen that make it a requirement for teachers to cover a set portion of material during each year of a child's schooling. Local citizens may cry-out at the use of a specific (not liked) book in the library, but they have not been heard as often complaining about the censorship of the content now being required and NOT required by a state's educational Standards of Learning (SOL's). Management of the content by groups of individuals representing different views has, over the years, been the driving force in the control of content delivered to America's children (Bryson & Detty, 1982). If a classroom teacher is required by the school system and/or state to teach specific standards of learning to the students in their classroom, are they not, then managing the content that will be presented? While it can be argued that the teacher may present the material in different

ways, having to teach the students to meet SOL goals will force the teacher to shape the content available so that the material required in the SOL's is covered. In this scenario you basically have the state or school system saying that here is the requirement, now shape your content to fit the SOL's.

The teacher presents content from different points of view for different individuals in effect managing the content around the modality of the individual learner. Howard Gardner (1983) in Frames of Mind, found that individuals may learn through the exploration of linguistic codes, of kinesthetic or spatial demonstrations, or of interpersonal bonds (p.334).

The Internet may bring a variety of learning modes to the student, for example; its capability of text, graphics, sound, and motion. However, if a student is doing research on honey bees, he will most likely find the material he needs in a standard encyclopedia. Why then use the Internet when an encyclopedia will do? The Internet may be necessary to locate a local honey bee farm or for more current data, if the student needs that material for his research.

Since educator's are held responsible for what goes on in their classrooms, part of managing content on the Internet must include teaching Internet safety. Over the years, schools have taught fire safety, traffic safety, bicycle safety, etc. Now they must teach appropriate uses (including safety) of access to Internet resources (Solomon, 1998). As Don Story relates, "Recently, a student in my classroom typed in the URL for a popular search engine but forgot one letter in the address and the browser window took him to a hard-core porn site" (Solomon, 1998). Actual examples have been found where the

following mis-typed common web addresses actually took the user to a site containing pornography:

REAL SITE	PORNOGRAPHIC SITE
www.yahoo.com	www.yahhoo.com
www.whitehouse.gov	www.whitehouse.com
www.four11.com	www.foureleven.com
www.angelfire.com	www.anglefire.com

Fortunately, some of these links no longer work, but for whatever reason, pornographic sites frequently change IPaddresses and/or domain names in an effort to avoid filtering software programs.

Managing content in the K-12 environment is not new. To be effective, content on the Internet must also be managed. Successful management of Internet content will be accomplished by both the teacher and the available technology (ie. filtering software).

Censorship

Censorship of material in the K-12 environment has been in and out of fashion in the educational community for many years. It has even been suggested that Dr.Seuss's The Cat in The Hat (Seuss, 1957) should be censored for it's portrayal of children letting a stranger into the house when their parents are away (Layne, 1995).

According to Ornstein (1992), it was in the early 1960's that school textbooks began to come under fire for the way they portrayed the American populace, at that time focusing on a white-middle class. Passow, 1970, found that most of the problems with the earlier material had been corrected. However, in our desire that all people and groups gain recognition and be shown as contributors to American history and culture, certain basic information and ideas are now deemed irrelevant (Aristotle's belief in the superiority of men for example) (Ornstein, 1992). Further, to accommodate the new

criteria of inclusion, some classic works of literature have been eliminated from the curriculum - the idea, being to please all and offend none. (Ornstein, 1992).

In the 1980's, covert censorship changed to overt censorship. Widely publicized textbook battles and school library book battles arose in various parts of the country. By 1990, 244 censorship incidents were reported in 39 states (People for the American Way, 1990). Ornstein (1992) reports that almost any book that contains strong political or economic messages, obscenity, sex, nudity, profanity, slang or questionable English, or ethnic or racially sensitive material or that is considered by a pressure group as anti-family, anti-religious, or anti-American is subject to possible censorship.

Teachers, who assign books for reading, may be censored if they fail to have adequate rationale for using the book. This line of thought follows those expressed in the pedagogy section where teachers need to manage the content of all material used in their classroom. Using material for the sake of having student's view something is not necessarily an appropriate use of that content. Likewise, having a student research a topic on the Internet when the necessary material may just as easily be found in the classroom encyclopedia may be an inappropriate use of the resources available. To protect students it becomes more appropriate to give teachers the power to control or manage the content that they and their students have access to through the WWW and electronic mail.

Controllability becomes an issue of content management. This is not always associated with banning students from naked pictures. For example, a physics teacher may find pictures of hot rod automobiles just as inappropriate in his class as he does pornography. If you have a class of students in the computer lab doing Web research on frogs, is it appropriate for one student to be sitting in the back corner checking the

basketball scores on ESPN's homepage? Being able to selectively guide groups of computers at scheduled times is very important in this environment. Another example of the need for content management is a school library that wishes to establish a reference area where computers can only go to preselected on-line newspapers and the library automation system but do not interfere with teachers getting unfiltered access in another section of the building.

In terms of content found on the Internet, the question is, who has placed the content, what authority can be given to the content, and at what level of understanding should an individual be viewing the content? Teaching the student to be critical of material is also an opportunity for the teacher to spend time on evaluation of data. Teaching the student to locate an authoritative source of the data found as well as cross-checking of material is an important curriculum concern.

Many Internet users are against the censorship of content online. However, in the K-12 area, schools do have the authority to manage what content a student will be exposed to while in that K-12 setting and sometimes while in a specific grade. As public, tax supported facilities, a school must be sure that all content, including Internet content being made available to its students, is appropriate for the setting (Bryson & Detty, 1982). School Boards have been found by the courts to be empowered through state statutes to prescribe curricula. Authority to select textbooks, library books, and other instructional materials including content to be read, are also covered under the state statutes (Bryson & Detty, 1982).

> Bradley (1978) writing in the Connecticut Law Review states: "Selection and censorship are distinguishable. Selection is a process whereby specific materials are chosen from all available materials, limited only by educational considerations, budget, and space. Censorship, on the

> other hand, permanently limits access to books and materials based on value or prejudice of an individual or group." (p.770)

The censorship issue becomes important to many different groups when pornography is not part of the picture. Are software companies who develop filtering, in effect, placing their own beliefs on the user if the company chooses to block sites related to hate groups? or to homosexual sites? or to other sites that they chose to include on their lists of 'blocked' sites? Knowing how the company filters and having the capability to select what type of material is filtered is an important criteria in selecting a filtering product.

Politics

In June, 1997, the Supreme Court overturned the government's attempt to control information on the Internet, called the Communications Decency Act (Solomon, 1998). Shortly thereafter, lawmakers in Washington began proposing various measures to insure the safety of America's children. Some state governments also attempted to enact state laws that would regulate the use of the Internet. When the Independent Council report on President Clinton's actions was recently released, some stories pointed out that, if the Communications Decency Act of 1996, had been upheld by the Supreme Court, the same Congress that passed the CDA would not have been allowed to publish the Starr document on the Web. Since the Supreme Court struck down the CDA in 1997, blocking software remains the method of choice to censor access to the report. As this document was being prepared the United States Congress had taken action that would require all schools applying for reduced telecommunications charges under the Universal Service Fund to use blocking or filtering technology on computers with Internet access. On

March 23, 1998, the following news headline appeared on the Techweb news page**:** **White House Backs Internet Filtering Legislation.** In the article by Mary Mosquera it was stated that

> Vice President Al Gore urged Congress to pass legislation that would require schools and libraries using federal subsidies for Internet access to block inappropriate material from children.
>
> The Internet School Filtering Act (S.1619) mandates that schools with federally funded Net access filter out improper content. The bill was recently amended to include flexibility so that the local community can decide which filtering system is used and what content is inappropriate.
>
> ‘The legislation is not a 'one-size-fits-all-approach' that mandates government values in our schools,‘ Gore said. ‘Instead, our plan will empower schools to make decisions based on local values -- protecting children from inappropriate material while also protecting the first amendment values we all hold dear.’ (http://www.techweb.com)

From various sides of the issue, arguments have been raised indicating that children know their way around a computer better then most parents and are thus able to hide better what they are doing. The very nature of the Web makes it difficult for parents to monitor their child’s access to inappropriate material. If it is true that parents instill values and teach children to be safe in the world, by extension, they should be helping them to learn safe conduct on the Internet (Solomon, 1998).

Some schools have felt the way Larry Magid, a cyber columnist with the Los Angeles Times, does when he said that, “Software does nothing to prevent kids’ access to their own bad judgment. The key tool is not going to be embedded in software, but in the minds of children. If you can teach kids how to protect themselves, that’s much better than any software tool (Kongshem, 1998). Managing content on the Internet will assure that students learn how to appropriately access material over the Internet and WWW.

Prior to Vice President Gore's announcement that the White House would back filtering, industry groups had met with government agencies to devise solutions mutually agreeable to all parties. Private software solutions must make it clear what filtering method is used and what sites are banned and why. There also needs to be a way for parents to communicate with those who are rating the sites (Solomon, 1998).

The literature show's, a long history of political activism in the schools of this nation. What one community may view as appropriate for their children has also been found inappropriate in other communities. No doubt children having access to the Internet will generate the same level of activism. With appropriate management of Internet content, the local community standards can be part of the equation, allowing the standards to be set locally, not nationally.

Accountability is another issue of content management. A system that is intelligent enough to know that the phrase "the hot topic of sexual harassment against women" has different meaning than "hot sexual pictures of women" is very important. Products that are popular in the home market today are gimmicky and block searches on words such as tr(uck), d(uck), and Kent(uck)y. However, if you type "hot women" (or some equally innocuous phrase) into a search engine, you can get through most of these systems.

The Cyberspace-Law for Non-Lawyers electronic discussion list posts various free speech bulletin's. Their email number 57, posted December 13, 1996, offered the following commentary on K-12 education:

> "The government has broad authority to control what children say in K-12 (kindergarten through 12th grade) schools.
> 1. The government may restrict profanity, sexual innuendo, and, probably, common rudeness (such as personal insults)

generally. The theory here is that part of the school's job is to teach kids to behave politely.

2. The government may also restrict other speech if there's 'solid evidence of likely disruption' to school activities from the speech. Thus, the government can probably punish students for wearing T-shirts that express a position which other kids might fight over (for instance, speech that's bigoted or otherwise insulting to many) or even be seriously distracted by.

So say that a school gives all students free e-mail accounts. What restrictions can the government impose? Note that the government is acting here 'both' as educator and as a proprietor, so it gets the benefit of both rules. Thus,

A. Taking away students' accounts for sending profane or sexually suggestive messages to other students is probably constitutional.

B. Taking away students' accounts for sending messages politely critical of the principal is probably unconstitutional, 'unless' there's solid evidence that these are likely to cause disruption to school activities.

C. Telling students that they can only use their e-mail accounts for class-related activities is constitutional; the government acting as a proprietor can define the designated public forum as being limited to class-related matters.

(Larry Lessig, David Post, Eugene Volokh - Cyberspace-Law for Non-Lawyers by the Cyberspace Law Institute at http://www.cli.org and Social Science Electronic Publishing at http://www.ssrn.com).

Library Influence

With the increased use of the Internet in public libraries and in school libraries, there is an increased interest from the library community regarding how filtering and or blocking software should be used.

Barbara J. Ford, president of the American Library Association (ALA) speaking at a recent online summit affirmed the role of libraries as key points of access for children and families who can't afford computers and ALA's commitment to protecting First Amendment rights.

> 'In the library setting, filtering raises complex issues,' Ford said. 'Librarians certainly want to see all appropriate laws enforced and follow legal guidelines. Our role is to help children and adults find great sites and

> see that they get the information they need. We don't want to put cyberblindfolds on our children.'
>
> Judith Krug (Director of the ALA Office on Intellectual Freedom) drew applause at a panel on filtering/rating when she asserted that historically the role of libraries is 'to bring people together with information—not block it.' She said ALA believes filtering can be a useful tool in the home but does not endorse its use in libraries because studies have shown that legally protected and useful information about sexuality, politics and other sensitive subjects may be blocked.
>
> http://www.ala.org/news/v3n8/v3n8a.html

One method of content management that the library community has endorsed is known as list filtering. Teams of educators review web sites and then describe the type of material available and the appropriate age range. These sites are then made available through one main web page. Teachers and students can 'surf' the material and use these Internet resources. While this type of method helps manage the content, once the user starts to surf to additional web pages outside the reviewed lists, the content is not necessarily going to be appropriate. Additionally, companies have used this list management scheme and are able, through special software, to control the users browser and only allow access to the sites that have been reviewed and have received an approval rating (Quinlan, 1997).

This paper mentions the need to instruct children in safety on the Internet. Many organizations, including the ALA, have published a list of safety rules. Figure 4, shows one such example.

My Rules for Online Safety

1. I will not give out personal information such as my address, telephone number, parents' work address/telephone number, or the name and location of my school without my parents' permission.

2. I will tell my parents right away if I come across any information that makes me feel uncomfortable.

3. I will never agree to get together with someone I "meet" online without first checking with my parents. If my parents agree to the meeting, I will be sure that it is in a public place and bring my mother or father along.

4. I will never send a person my picture or anything else without first checking with my parents.

5. I will not respond to any messages that are mean or in any way make me feel uncomfortable. It is not my fault if I get a message like that. If I do, I will tell my parents right away so that they can contact the online service.

6. I will talk with my parents so that we can set up rules for going online. We will decide the time of day that I can be online, the length of time I can be online, and appropriate areas for me to visit. I will not access other areas or break these rules without their permission.

MISSING & EXPLOITED CHILDREN

Sun microsystems The Network is the Computer

URLabs

Figure 4. Online safety rules.

"My Rules for Online Safety" is excerpted from from *Child Safety on the Information Highway* by Lawrence J. Magid. It is reprinted with permission of the National Center for Missing and Exploited Children (NCMEC). Copyright © NCMEC 1994. All right reserved.

Summary

In looking at how content has been managed in the K-12 environment over the years we have tried to draw parallels to the use of Internet resources in the K-12 environment. Much of the discussion has been slanted towards the ability to filter

inappropriate sites from view of the K-12 population. While this is an important concern, a better way to approach filtering is through the appropriate management of the content itself.

Just as teachers manage what visual aids they will show to their students in the delivery of content, they must become skilled at management of the resources available through the Internet. This will most likely include filtering software of some fashion, but also needs to include guided use, IntRAnet type access, and scheduled uses of Internet resources as appropriate for the situation. Teachers should become skilled at teaching students to harvest information in a selective manner.

If the bill requiring schools to use filtering software becomes a law, schools throughout the nation will have a need to investigate which of the many products available to filter sites best suites the needs of their community, their educators and their students. Using these software programs with the appropriate management of Internet content will ensure that resources on the Internet will be available, appropriately, for all students in the K-12 environment.

Chapter 3

Research Problem and Methodology

The Internet presents a new phenomenon to educators and students in the K-12 environment. Its ease of use and ready access to material provide an overwhelming resource for use in the K-12 classroom. Students have limited time during their school day to access material via the Internet. Thus, students need to be able to access material in the most efficient and timely manner. Conducting open searches on the web is not an efficient way to obtain data. The literature suggests that educational material used in the K-12 environment should be managed by educators. Likewise, the Internet material should be managed by educators. This study used an experimental design to determine if K-12 access to Internet resources provides a higher number of resources when students are presented with managed access, or open access to the Internet.

The research question is:

Given a set topic, students using managed Internet content will locate a greater number of web pages on a set topic compared to students accessing open Internet content.

Research Design

Setting and Participants

The study took place in the computer lab at Eastern Elementary School in Giles County. The participants were selected from one hundred thirty (130) students in grades six and seven. The students were selected for the study by the principal of the school and were comprised of all the 6th & 7th graders in the school. Human subject requirements at Virginia Tech required permission forms for participation in the study by both students and their parents (see appendix). From the 130 students, forty-one (41) completed

permission forms were returned by the students. The regular classroom teachers were present for the study. Students were in one of three class groups in each grade level. Giles County Schools have had Internet access at all schools since 1995. Students in this study had used the Internet for research and were familiar with the software browser that was used to identify web pages. Students had also used the Internet to locate resource material prior to the study. The study did not disqualify people on the basis of gender or ethnicity.

Data Sources

The primary source of data is the number of relevant web pages selected by the students. Students identified the web pages based on a Likert scale of 1-4 as follows:

1 point = poor material

2 points = adequate material

3 points = good material

4 points = excellent material

Relevant content for this assignment was defined as material related to the assignment at hand (American Civil War Battlefields). Quality was determined as a verifiable source of that content, the degree to which the page can be credited with the material, credentials of the web master, web page sponsor, etc.

Procedure and Data Collection

Prior to the experiment

The researcher, acting as a classroom teacher, spent four hours searching the Internet for American Civil War Battlefield web pages. Over twenty-five different search engines were used to locate web pages relevant to the topic. As a web page was identified by a search engine, the researcher went to the page and briefly reviewed the content of that page. If sufficient American Civil War Battlefield material was present, the page was added to the list of pages to use for the experiment. Once the web pages were identified,

they were compiled into a list. This list was then reviewed by the researcher and it was determined that from all of the web pages located in the search (263), there were thirty main web pages that contained all of the web pages located by the researcher. The thirty main web pages were placed in a master list for use during the pilot study (see Appendix). While this was an in-depth search for web pages dealing with American Civil War Battlefields, the amount of time and effort to identify relevant web pages by a regular classroom teacher would be much less.

Using WebWhacker software, the researcher instructed the software to retrieve, or whack, all web pages found at each of the thirty main web sites, three levels deep. The software then went to each web page, saved all of the material (text, pictures, graphics, sounds, etc.) from that page onto the hard drive of the researcher's computer. Additionally, the software followed any link on a web page and likewise saved all of the material from that page onto the hard drive, and so forth, following all links through three levels (or through three pages).

After the researcher had saved the Civil War material onto a computer hard drive, an experienced middle school social studies Civil War Specialist reviewed and rated the web pages. This was done to validate the process that the students would be using to rate web pages during the experiment. The expert reviewed the twenty-seven main sites along with the corresponding 400 individual web pages contained there in. The twenty-seven main site page URL addresses and rating given by the Civil War Specialist can be viewed in the Appendix.

During the experiment

The researcher explained the method that the student would use to rate web pages. The same instruction was given to each group (see script in Appendix). Students were given a random ID number. This number was their identifying ID to record student data.

All students with their regular teacher were taken to the computer labs. The students were then randomly divided into two groups. Each group of students went to a different computer lab. They accessed web pages on the Internet and evaluated material found in completion of the assignment. Students were apprised of the amount of time available (a normal class period of 45 minutes) to complete the assignment, with a five minute ending warning.

During the allotted time period, students used a computer connected to the Internet and a web browser to access material on the Internet. As each page of Civil War material was located, students used the scale to rate the material on the page for content relevant to American Civil War Battlefields. When a web page seemed appropriate to the student, they recorded the URL of that web page on a worksheet provided for the assignment and gave the page a score (see Appendix).

The experimental group was given special instructions for accessing their web pages once they were in the computer lab. This group had managed access to twenty-seven (27) selected American Civil War Battlefield resource pages from the Internet. The pages contained teacher selected Civil War resources rated from poor to excellent by the Civil War Specialist. Students in this group did not have access to any other Internet web pages. Content management software (I-Gear) was used to restrict this group to access to the local server only. The software allows for the scheduling of Internet access

throughout the day. During the experiment, this lab was scheduled for local server access only, restricting users to web pages stored on the local school server.

The control group had access to resources on the open Internet. Filtering software (I-Gear) was used to filter students access to web pages of a pornographic nature only. Students were not aware of the difference between the resources available to each group.

Students participated in the study via two networked computer labs located in adjacent rooms. One lab had 20 machines and the other had 25 machines. All of the computers were connected via ethernet to an Eclipse Internet server. The server was in turn connected to the Internet. The Eclipse server also served as a proxy cache server.

Data Analysis

The rating given to web pages by the students was compared to the master list as rated by the Civil War Specialist to validate the web pages accessed. It was expected that students in the control group would find some of the same web pages from the list that the experimental group was using. This was true, and the new and/or different pages found were also rated by the Civil War Specialist using the same 4 point scale.

Investigator

The investigator of this study took the role of classroom teacher for the students involved in the study. He instructed the students in using the scale to rate web pages and record the URL on a score sheet. He was also present as an observer while the students accessed web pages in the computer lab.

The researcher comes to this study from a K-12 teaching background, most recently working with school systems for Internet access. Over the last three years, the researcher worked closely with the developer of the filtering software used at Eastern

Elementary as well as with other school systems in implementing filtering software and content management of Internet resources.

Chapter 4

Results

This section addresses the research question with respect to what was revealed in the study and how it relates to the literature. It ends with a short section on the implications for the K-12 educational community.

Of the forty-one (41) students participating in this study, twenty-two (22) were male and nineteen (19) were female. The classroom teacher indicated that the population included students with learning disabilities. It is not known which group these students may have been in since the students were among those randomly assigned to either the control or experimental groups. The experimental group contained twenty-one (21) students (11 male and 10 female) while the control group contained twenty (20) students (11 male and 9 female).

The task for each group was to locate and evaluate web pages containing material on American Civil War Battlefields. While students in each group were able to get to a number of different web pages, some students reported not finding any web pages that fit the criteria. Both groups contained students who reported not finding any pages that they wanted to review for this process (2 from the experimental group and 9 from the control group). In reviewing the proxy cache log files for selected individuals, it became apparent that many of the students in the control group were accessing a number of web pages as they used search engines to locate relevant material. However this process (time spent searching) did not seem to provide the students with the necessary material to complete the assignment. As an example, one 7th grade female student who reported finding no

relevant pages spent a total of 38.47 minutes online. During that time she went to 28 web pages. Of those 28, three (3) were to the schools homepage, seven (7) were to different pages of search engines, eight (8) were to various civil war pages, one (1) was to a page that was blocked by the software, and one (1) was to an automobile page. One of the 6th grade males in the control group indicated that he found one (1) page as relevant to the assignment. The proxy cache log file for this individuals computer indicate that he spent a total of 31.57 minutes online going to five (5) search engine pages, to the schools home page once, and to six (6) Civil War pages.

Students in the experimental group were able to view and rate a total of one hundred eighty-eight (188) pages while the students in the control group were able to view two hundred seventy-nine (279) pages and rate thirty (30) of those pages. Of these pages, the experimental group rated thirty-three (33) pages as having excellent material. The control group rated four (4) pages as having excellent material.

The mean table for the number of pages rated as excellent by the experimental group compared with those rated excellent by the control group is found in Table 2.

Table 2. Mean Table for number of web pages identified

Experimental Group	Mean	1.5714
	N	21
	Standard Deviation	1.3628
Control Group	Mean	.2000
	N	20
	Standard Deviation	0.5231
Total	Mean	0.9024
	N	41
	Standard Deviation	1.2411

This table of means shows that the experimental group was able to rate a greater number of pages as excellent compared to the control group. An Analysis of variance on the number of pages rated by each group shows F measured at the .000 level, much less than .05, indicating a significant difference in the number of web pages rated excellent by the experimental group compared to the control group. (see Table 3).

Table 3. ANOVA – Number of Pages rated high by Group

Analysis of Variance for number of pages rated high by group

Source of Variation	DF	Mean Square	F	Sig of F
Main Effects	1	568.926	44.380	.000
Explained	1	568.926	44.380	.000
Residual	39	12.819		
Total	40	26.722		

Students are at the school for grades K-8, and have thus been in this school and have used the computer lab and Internet during their prior grade placements. One unexpected result from this study was that 6th grade students showed a significant difference in the number of web pages that they found over the 7th graders (see Table 4).

Table 4. ANOVA –Pages rated high by Grade Level

Analysis of Variance for grade by high score

Source of Variation	DF	Mean Square	F	Sig of F
Main Effects	1	6.509	4.607	.038
GRADE	1	6.509	4.607	.038
Explained	1	6.509	4.607	.038
Residual	39	1.413		
Total	40	1.540		

The experimental group had thirteen (13) 6th graders and the control group had nine (9), for a total of twenty-two (22). In exploring this result it was learned that a second computer lab had been installed at the school during the year that the 6th graders were in 5th grade. The school principal reported that this additional computer lab would have given the current 6th graders more time on computers compared to the current 7th graders.

While the difference in grade level results was a surprise, the analysis indicated there was no difference between males and females (see Table 5). The mean score for the male population was .72 with a standard deviation of 1.16. The female mean

Table 5. ANOVA – Number of pages by Gender

Analysis of Variance for number of pages by gender

Source of Variation	DF	Mean Square	F	Sig of F
Main Effects	1	28.266	1.059	.310
SEX	1	28.266	1.059	.310
Explained	1	28.266	1.059	.310
Residual	39	26.682		
Total	40	26.722		

was 1.10 with a standard deviation of 1.32. There was no significance of F at .310.

It was expected that students in the control group would find and review some of the same web pages that the experimental group reviewed. In fact, of the thirty pages rated by the control group, only two were different or not part of the pages also viewed by the experimental group. Students in the experimental group had a listing of web pages to review and were able to remain focused on their task for the entire period of time. Because the experimental group was only able to access web pages pertaining to the Civil War, it might be assumed that they were able to remain on task with little distractions. The control group started with various search engines. Some of the students were able to

locate related web pages in a timely fashion, but at least two students were observed going to a NASCAR page and to a news page after having followed add links from their search engine pages.

In addition to the researcher, three classroom teachers were present in the computer labs. All of the teachers and the researcher helped students with various questions. The assistance provided was basic instruction on use of the browser software and other such tips as were required by some of the students. Most of the students in the control group started using the “Net Search” button available on their browser. Others used search engines such as Yahoo or Excite. As the class time passed the students in the experimental group continued to work quietly and on task. The students in the control group were observed talking to their neighbor and going through different search engine pages in an effort to refine their search parameters.

In conclusion, the results of this study indicate that with the population used for this experiment, students using managed access to content on the Internet provides significantly higher number of resources in the K-12 environment then students using unmanaged access.

In addition to the statistical results of the study, there were other observations made by the researcher. The classroom teachers present for the experiment were not aware of the study’s hypotheses. The classroom teachers were able to watch the students in both groups complete their tasks. The contrast between the two computer labs was obvious, and may not have been observed had the opportunity to use two adjoining computer labs not been available. The noise level of the students in the control group continued to rise as the period went on, indicating a lack of concentration on the task. In

contrast, the experimental group was quiet, and the students were observed working and attempting to complete their task during the entire time period. Toward the end of the experiment, one teacher approached the researcher and quietly stated, “I know what you are trying to do.” She was able to see, by observation alone, that the one class was much more involved and concentrating on the task at hand.

Proxy Cache Results

Both of the computer labs were connected to the same Eclipse server. This server is also a proxy cache server that records each request made by a browser. The information is stored in one large file that covers the entire day’s activities. Information stored is by computer ID number and includes the time that the request was made and the location or URL address requested. A review of these files indicated that the students in the control group spent time visiting web pages containing material on the Starr Report, NASCAR, and an automobile company. The experimental group was not able to access any web pages outside of those stored on the server for this assignment. Thus, the 188 pages viewed by the experimental group indicated the total number of pages viewed by this group. The control group viewed a total of 279 pages, of which 30 were related to Civil War material. The proxy cache log file also indicated that of the 279 pages viewed by the control group, fifteen (15) had errors in typing of the URL address and four (4) of the pages were blocked by the filtering software. A majority of the pages (212) viewed by the control group were search engine web pages. A sample portion of the proxy cache log, during the time of the experiment, is available in the Appendix.

Implications for Education

The literature review indicates that most K-12 educational material has been managed, for various reasons, during the latter part of this century to enable learners to master the desired curriculum objectives (Gagne, Briggs & Wagner, 1974). The Internet, and particularly the World Wide Web, contains a wealth of material. Some of this material is relevant to the K-12 population and is a valuable resource for this population (Solomon, 1998). This study shows that teachers who take the time to prepare for Internet resource usage will have students who make the best use of their online time by locating a greater number of resources.

In addition to WebWhacker software, teachers have available a number of commercially available programs that offer the same features in retrieving web pages and storing the information on the hard drive of the user. These types of programs allow a single user to download and save a number of web pages. This software allows classroom teachers to review web pages prior to a lesson, and then download or “whack” the pages for storage on a local machine. Internet material can be stored on one stand-alone machine or can be loaded onto a server attached to a network for access by a number of client machines. Another method available requires server software (I-Gear for example) that has the capability to allow access to WWW pages by login account, or by individual computer workstation during a given time period. These procedures do involve prior planning on the part of the classroom teacher, but as this research demonstrated, it provides for a higher degree of performance by students in the completion of an assigned Internet task. Using the steps that were employed to conduct this research will allow a

classroom teacher, a computer lab instructor, or other individual, to appropriately manage content available on the Internet.

Final Thoughts

With some estimates claiming that there are more then 200 pornographic web pages added to the Internet each day, it becomes important for the K-12 population, as indicated by Bryson and Detty (1982), to use the available technology for the management of resources appropriate to this age group in an effective manner in the classroom.

This study shows that the proper use of the Internet in the K-12 curriculum should be an educational decision, not encumbered with censorship issues that differ in communities and throughout generations (Solomon, 1998). The issue is not what the educational community should be keeping from its students, but how educators can manage resources available through the Internet.

Future research in the use of student access to search engine techniques may be warranted as this is a new skill needed by the K-12 population to effectively access the resources available on the Internet. Repeating this study with a number of different population samples may also indicate if this technique should be employed across the board in the K-12 school setting. With K-12 access to resources, additional research on how students determine if material found can be considered a qualified source should also be undertaken.

Managing the learning environment gives the classroom teacher control over the content that students receive to advance their education.

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Appendix

Pilot Study Summary

IRB Informed Consent form

Parent Permission Form

Student Permission Form

Civil War Web Page Hunt Student Worksheet

Experimental Group Web Page

Instruction to Subjects Script

Web Page URL's with Ratings

Proxy Cache Sampling

Vita

Appendix I
Pilot Study Summary

Four students (2 boys and 2 girls) from grades 6 & 7 were used for a pilot study. The students completed the study just as the final research would be completed. From the experience gained in the pilot study, the researcher made minor changes to the way the task was to be presented to the students.

In obtaining the web pages to be used for this research, more then 25 Internet search engines were queried on American Civil War Battlefields. Twenty-seven web pages were selected. This list included web pages with excellent Civil War material to pages with no material related to battlefields. WebWhacker software was used to retrieve additional web pages three levels deep from each of the twenty-seven top pages. From these twenty-seven pages, a total of 400 pages were collected with 599 image files. The total amount of material saved to a local disk was 11.5 mega bytes of information. All of this material was then transferred to an Eclipse server for the pilot study.

The choice of three levels down translates into one main page with links two levels deep. Some of the pages have no additional links while some of the pages have links to 15 or more additional pages, thus the large amount of material. However, it is important to realize that from a main page, the user can only follow two more links before having to turn back.

The pilot study tested the procedures and methods on a small population similar to the group being used for the research project. Students in the pilot study followed the criteria set down for the experimental group. A proxy cache server was used to verify the pages viewed by the students.

Application for Approval of Research Involving Human Subjects

John R. Wenrich, doctoral student
Dr. John Burton, faculty advisor

Justification of the Project

The Internet presents a new phenomenon to educators and students in the K-12 environment. It's ease of use and ready access to material provide an overwhelming resource for use in the K-12 classroom. Some literature suggests that the content available on the Internet should be managed by educators in the same way that all content used in the K-12 curriculum is managed. This study will use an experimental design to determine if K-12 access to Internet resources provides a higher degree of results when students are presented with managed resources, or with open access to all Internet resources.

Procedures

Students will be eighty sixth and seventh graders from Eastern Elementary School in Giles County, Virginia. They will be in one of three class groups selected by the school principal. This study will not disqualify people on the basis of gender or ethnicity.

The researcher will go to each class prior to the experiment session and explain the method that the student will use to rate web sites. The same instruction will be given to all classes. During this time, students will be given an ID number generated by a computer. This number will be their identifying ID to complete the assignment.

The student, with their class and regular teacher, will then proceed to the computer lab. They will begin to access sites on the Internet and evaluate material found in completion of the assignment. They will be apprised of the amount of time left (a normal class period of 50 min.) to complete the assignment, with a five minute ending warning.

During the allotted time period, the student will use a computer connected to the Internet and a web browser to access material on the Internet. As each page of Civil War material is located, the student will use a rubric to rate the material on the page for content relevant to the Civil War. When a web page receives a high rating, the student will record the URL of that web page on a sheet of paper. The student will indicate the seven best sites found by circling the URL on the sheet of paper.

At the end of the class period, students will turn in their sheet of identified URL's containing their work and ID number, and return to their classroom for the remainder of the days school activities.

Students will be divided into two groups of equal size. One group will have managed access to thirty (30) selected resource sites from the Internet. The selected sites will contain teacher selected Civil War resources rated from poor to excellent. They will use the selected resource sites with the rubric to select the seven best sites. The second group will have access to resources on the open Internet. Blocking software will be used to filter students access to sites of a pornographic nature only. They will use the rubric to select the seven best sites found on the open Internet. Students will not be aware of the difference between the resources available.

Risks and Benefits

There are minimal risks to the student. No personal information will be used against them, the procedure of searching for material on the Internet does not create any undue burden on the student, and the student's answers will not be used in any other class or academic situation outside this study.

There are no personal benefits to the student beyond the knowledge of participating in a study that could help improve instruction for others. No promise or guarantee of benefits will be made to encourage participation in the project. After the student has completed the study, the student will be told the purpose of the experiment on content management of Internet resources in learning and will be given a place to fill out his or her name and address if the student would like to receive a copy of the results.

Confidentiality/Anonymity

Students will remain anonymous throughout the study. Students will be randomly assigned an ID number by a computer. The only information received from the student will be his or her gender, ethnicity, and grade level. Neither the student's name nor social security number will be used as an identifier, therefore once the student has completed the task, no method of matching a particular student to the information given by the student is possible. At no time will the researchers release the student's results of the study to anyone other than individuals working on the project. Students will not be compensated for participation in the study. Students will be free to withdraw from the study at any time without penalty. Students will be free not to answer any questions or respond to experimental situations that they choose without penalty.

Informed Consent

The informed consent form is attached.

Biographical Sketches

John R. Wenrich

Mr. Wenrich received a B.S. in Special Education for the Mentally Retarded and Elementary Education from Kutztown State College, then taught public school for three years. He next received an M.Ed. in Special Education for the Visually Handicapped from the University of Pittsburgh, after which he was an Education Specialist for the Virginia Department for the Visually Handicapped. Mr. Wenrich has been a teacher for the Pulaski County School System, and most recently Network Director for the Southwest Virginia Governor's School. He has also taught for six years at Radford University as adjunct faculty and is pursuing a doctorate at Virginia Polytechnic Institute and State University where he expects to complete his degree in 1998.

Dr. John Burton

After receiving a B.A. in Psychology from the University of North Carolina, Chapel Hill, and an M.A. in Experimental Psychology from Illinois State University, Dr. Burton spent two years as an instructor at Southwest Missouri State University and one year as a Research Associate at the University of Mid-America. He went on to complete his doctorate in Educational Psychology from the University of Nebraska, and has been an instructor at Virginia Polytechnic Institute and State University. He was most recently chairman of the Curriculum and Instruction department at VPI & SU.

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for Participants of Investigative Projects

Parent Permission Form

Title of Project: Content Management on the Internet
Investigator(s): John Wenrich, Dr. John Burton

The Purpose of this Research/Project

The purpose of the experiment is to study how certain factors influence learning. Factors that can influence learning, when used effectively, can help enhance the acquisition and retention of information.

Procedures

You student will come to the computer lab with their class. After a brief explanation, they will be given time to locate material on the Internet. As the student reviews the material, they will determine if the web pages meet certain criteria. They will keep track of the web page URL's for sites they feel contain good material for the assignment. At the end of the period, the student will turn in the list of URL's (URL= Unified Resource Locator or web page address).

Risks

There are minimal risks to the student. No personal information will be used against your child, and answers will not be used in any other class or academic situation outside this study.

Benefits of this Project

There are no direct benefits to students (other than the extra-credit points discussed in the compensation section), but participation in this research might help us improve instruction.

Extent of Anonymity and Confidentiality

Students will remain anonymous throughout the study. They will be randomly assigned an ID number by a computer and the only information we will receive from your child will be their gender, ethnicity, and grade level. Neither name nor social security number will be used as an identifier, therefore once your child leaves the session, no method of matching them to the information given is possible.

Compensation

Students participating in the study will receive a small percentage of extra credit, as agreed upon by their immediate teacher. Students can receive extra credit through other means, also as agreed upon by their immediate teacher.

Freedom to Withdraw

Students are free to withdraw from participation in this study at any time. Just inform the researcher or call one of the others listed at the bottom of this page.

By signing below, you indicate that you have read and understood the informed consent and conditions of this project, that you have had all of your questions answered, and that you give your voluntary consent for your child to participate in this project.

_____

Parent or Guardian Signature and Date

Should I have any questions about this research or its conduct, I may contact:

John R. Wenrich, (540)231-3668
Dr. John Burton, (540)231-5587

H.T. Hurd, Chair IRB (540)231-8327

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for Participants of Investigative Projects

Student Permission Form

Title of Project: Content Management on the Internet
Investigator(s): John Wenrich, Dr. John Burton

The Purpose of this Research/Project

The purpose of the experiment is to study how certain factors influence learning. Factors that can influence learning, when used effectively, can help enhance the acquisition and retention of information.

Procedures

You will come to the computer lab with your class. After a brief explanation, you will be given time to locate material via the Internet. As you review material, you will determine if the web pages meet certain criteria. You will keep track of the web page URL's for sites you feel contain good material for the assignment. At the end of the period, you will turn in your list of URL's (URL= Unified Resource Locator or web page address).

Risks

There are minimal risks to the student. No personal information will be used against you, and your answers will not be used in any other class or academic situation outside this study.

Benefits of this Project

There are no direct benefits to you (other than the extra-credit points discussed in the compensation section), but your participation in this research might help us improve instruction.

Extent of Anonymity and Confidentiality

You will remain anonymous throughout the study. You will be randomly assigned an ID number by a computer and the only information we will receive from you will be your gender, ethnicity, and grade level. Neither your name nor social security number will be used as an identifier, therefore once you leave the session, no method of matching you to the information given is possible.

Compensation

Students participating in the study will receive a small percentage of extra credit, as agreed upon by your immediate teacher. Students can receive extra credit through other means, also as agreed upon by your immediate teacher.

Freedom to Withdraw

You are free to withdraw from participation in this study at any time. Just inform the researcher or call one of the others listed at the bottom of this page.

By signing below, you indicate that you have read and understood the informed consent and conditions of this project, that you have had all of your questions answered, and that you give your voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

_____

Signature and Date

Should I have any questions about this research or its conduct, I may contact:

John R. Wenrich, (540)231-3668
Dr. John Burton, (540)231-5587

H.T. Hurd, Chair IRB (540)231-8327

American Civil War Battlefield Web Page Hunt

Enter your study ID number here: _____ M or F
Enter your computer number here: _____

Find the BEST web pages dealing with American Civil War Battlefields. Use the scale below to rate the pages you find.

RATE each page using this scale:

1 point = poor material
2 points = adequate material
3 points = good material
4 points = excellent material

Material is defined as material related to American Civil War Battlefields.

A better page will be determined by a verifiable source of that material, the degree to which the page can be credited with the material, credentials of the web master, the page sponsor, etc.

Web page URL address **Score**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Experimental Group Web Page

If you would like to view the experimental group web page, please access:

http://www.wenrich.net/civilwar.html

The above link is the exact page that the students used to access the material for this experiment. The online version allows you to follow the links to the online sites. All pages three levels deep were stored on the school server during the experiment so the students in the experimental group were able to access this material from the server instead of live on the Internet.

Script for Content Management FINAL Study:

Thank you for agreeing to be a part of this study on how the Internet is used for research. In case you wondered, in order to be able to use something, it should first be proven as possible in some kind of study. I'm sure you have heard the Crest toothpaste commercial where the person says that they used crest and had 33% fewer cavities. Crest can say that because a long time ago, they did a study of children and different toothpaste's to see which one worked best, and Crest was proven to give 33% fewer cavities.
Today, you are helping do a study on how the Internet is used for research.

I would like you to take a look at your worksheet. You will be looking at a number of Internet web pages. You are looking for material on American Civil War Battlefields. Pretend that you have to write a report on Civil War Battlefields and you are using the Internet to gather your material. When you find material that you would use for your report on battlefields, write down the URL address for that site and then using the scale on the top of your worksheet, rate the page and place a number beside the URL address.

Let's look at the rating scale:

On your worksheet you will see a scale from 1 to 4. As you look at a web page, decide if it has material that you would use for a research paper. Check for the author, the web page sponsor, the web page creator and see if the material comes from a reputable source.

Write the web page URL address on your paper and then rate the page and write your score next to the URL address on your worksheet.

So, if I found a site (say "site C") that had material on American Civil War Battlefields, and I decided that the material was good, I would write down the URL address and using the scale, rate the site as a 3. I would write the number 3 beside the URL address on my worksheet. If I found a site that had excellent material on American Civil War Battlefields, I may decide that it should be rated a 4. And so on.

You should pretend that you are going to write a real report. Take this seriously and look at the material on the web pages as if you really plan to use it for your report. Write down the page URL address and rate each page based on the scale. You should try to view and rate at least 5 pages.

<u>EXPEREMENTAL GROUP (only):</u>
Everyone will use the same starting web page. It has 27 sites for you to review. You do not need to look at all 27 sites. As you look at one site, you may link to another site from that one. When you have a web page with material you think is good, just record it's URL address and rate the material, then move on to another page. The URL addresses are long, so just write the last part. The WW45.html part.
If you get a screen that says, "forbidden", just press the back button and follow a different link. If you are asked to "login", just press the back button and make another selection.

If you finish looking at all 27 web pages before the end of the period, go back over the ones you rated highly and make sure you still wish to rate them as you did.

CONTROL GROUP (only):
Use the Search button on your browser, or use any other search engine that you know of such as Yahoo and Webcrawler. After you find a site, read through the material and then rate the page, then press the back button and search for some more pages. For each page you find, read through the material write the URL address on your paper, rate the page and write down your score.
If you are asked to log onto the system, use the guest account you would normally use in class.

Spend as much time looking at a page as you need. Not all of the links may work, so if you get a message stating you can not access a page, just move back and look for another web page.

You will have 45 minutes to review and rate the web pages. I will give you 5 minutes warning before the end of the period.

Any questions??

Web Page URL's with Rating

The following main web pages were rated by a Social Studies Teacher and Civil War Instructional Specialist. The pages that appeared under each main page should be considered a portion of the main page.

Web Page	Code	Rating
A Visit from a Civil War Soldier http://www.civilwarsoldier.com/	(WW5)	1
Spotsylvania Battlefield http://www.nps.gov/frsp/spotsy.htm	(WW16)	4
Battle of Gettysburg http://www.rockingham.k12.va.us/EMS/Gettysburg/Gettysburg.html	(WW29)	4
Battlefield Tours http://battlefields.home.mindspring.com/	(WW38)	2
Chancellorsville Battlefield http://www.nps.gov/frsp/cville.htm	(WW43)	4
Civil War Battlefields near Washington http://www.his.com/~matson/history.htm	(WW47)	4
Civil War Battlefield Photography http://www.civilwarmall.com/kreman.htm	(WW52)	1
Britton Lane Battlefield Association http://www.brittonlane1862.madison.tn.us/	(WW55)	4
Pickett's Mill http://ngeorgia.com/history/pmshs.shtml	(WW63)	2
Civil War Photographs http://rs6.loc.gov/cwphome.html	(WW67)	3
Staunton River Battlefield State Park http://www2.halifax.com/county/battle/	(WW76)	2
Rich Mountain Battlefield http://www.wvcivilwar.com/richmtn.htm	(WW81)	3
Images of Battle http://ils.unc.edu/civilwar/civilwar.html	(WW83)	3

Droop Mountain Battlefield State Park (WW102) 1
http://wvweb.com/www/droop_mountain.html

Battle of Kennesaw Mountain (WW104) 4
http://ngeorgia.com/history/kennesawmtn.shtml

Civil War Prints (WW113) 2
http://www.historic-images.com/

Fredericksburg Battlefield (WW122) 4
http://www.nps.gov/frsp/fburg.htm

Civil War Battlefields - Washington Post (WW126) 2
http://www.washingtonpost.com/wp-srv/local/longterm/tours/civilwar/bandbs.htm#TOP

Crosswords of the Civil War (WW131) 1
http://www.civilwarsites.com/

Antietam National Battlefield (WW140) 2
http://www.nps.gov/anti/

More Trouble than Victory (WW146) 3
http://www.bethelregiment.com/

Battles by State (WW150) 4
http://www.confederates.com/state.htm

Monocacy National Battlefield (WW151) 4
http://www.nps.gov/mono/mo_visit.htm

Civil War Studies (WW167) 3
http://www.si.edu/tsa/cw/cw.htm

Antietam Battlefield (WW170) 4
http://www.elohi.com/photo/antietam/

Petersburg National Battlefield (WW186) 3
http://www.nps.gov/pete/pe_info.htm

Virginia's Civil War (WW195) 4
http://www.civilwar-va.com/

Proxy Cache Server Sample Log File

This data represents a sample of the log file produced during the study. The file is generated and displayed in a web browser. This portion has been modified to fit the printed page. Web pages that end in WW78.htm, or similar numbering, indicate material pulled from the server by the experimental group, other listings represents pages accessed by the control group. The entire file for the time of the study (45 minutes) is 1.5MB of all text material.

Computer ID Date/Time Webs Page Accesses Proxy Info

c162.eems.giles - - [14/Sep/1998:12:32:06 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW111.gif HTTP/1.0" 200 15427 [16001 local] 1 0 18
c175.eems.giles - - [14/Sep/1998:12:32:06 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW46.jpg HTTP/1.0" 200 11011 [16027 local] 1 0 19
c175.eems.giles - - [14/Sep/1998:12:32:07 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW24.gif HTTP/1.0" 200 425 [16001 local] 1 0 18
c154.eems.giles - [14/Sep/1998:12:32:10 -0400] "GET http://www.yahoo.com/r/
au HTTP/1.0" 302 57 [16014 new (uncached)] 12 11 18
c167.eems.giles - [14/Sep/1998:12:32:10 -0400] "GET http://search.yahoo.com/bin/
search?p=civil+war+battle+fields HTTP/1.0" 200 16413 [16012 uncacheable] 10
c162.eems.giles - - [14/Sep/1998:12:32:10 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW109.jpg HTTP/1.0" 200 12997 [16033 local] 1 0 18
c167.eems.giles - [14/Sep/1998:12:32:11 -0400] "GET http://us.yimg.com/a/am/amazon/
8425/redbutton.gif HTTP/1.0" 200 1862 [16031 graced] 0 0 16
c182.eems.giles - - [14/Sep/1998:12:32:14 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW135.gif HTTP/1.0" 200 43623 [16012 local] 1 0 16
c177.eems.giles - - [14/Sep/1998:12:32:33 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW106.asp HTTP/1.0" 404 156 [16049 local] 1 0 22
c137.eems.giles - [14/Sep/1998:12:32:33 -0400] "GET http://www.civilwardata.com/
HTTP/1.0" 200 4207 [16027 new] 23 23 19
c190.eems.giles - [14/Sep/1998:12:32:34 -0400] "GET http://ad.doubleclick.net/ad/
cbs.sportsline.com/racing;ord=4152959904243 HTTP/1.0" 302 182 [16014 new]
c177.eems.giles - - [14/Sep/1998:12:32:34 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW569.gif HTTP/1.0" 200 2717 [16050 local] 0 0 23
c177.eems.giles - - [14/Sep/1998:12:32:35 -0400] "GET http://localhost:8002/login?http:/
www.listbot.com/subscribe_button.gif HTTP/1.0" 401 - [16027}
c185.eems.giles - - [14/Sep/1998:12:32:35 -0400] "GET http://eagles.eems.giles
k12.va.us/public/study/WW62.cgi HTTP/1.0" 403 149 [16048 local] 0 0 21
c190.eems.giles - [14/Sep/1998:12:32:36 -0400] "GET http://cbs.sportsline.com/
images/racing/auto/a_header.gif HTTP/1.0" 200 7881 [16035 new] 17 17 14
c190.eems.giles - [14/Sep/1998:12:32:37 -0400] "GET http://cbs.sportsline.com/
autoracing/index.html HTTP/1.0" 200 21448 [16025 new] 30 30 17
c055.eems.giles - [14/Sep/1998:12:32:38 -0400] "GET http://www.execpc.com/~kap/
civilwar.html HTTP/1.0" 403 - [16035 forbidden HomeDir] 0 0 14

Vita

Biographical Data Sheet: **JOHN R. WENRICH**

Born: Reading, Pennsylvania, July 26, 1953 Married: two children

Education:

Ph.D. Virginia Tech, October, 1998
Instructional Technology

M.Ed. University of Pittsburgh, 1979
Major - Education of the Visually Handicapped
Major - Orientation & Mobility Instruction

B.S. Kutztown State College, 1975
Major - Education of the Mentally Retarded
Major - Elementary Education

Professional Experience:

Present: 1. Associate Director, Institute for Connecting Science Research to the Classroom, Virginia Tech. 1998 - present

2. Adjunct Professor, University of Virginia 1997- present
Instructor for Technology Certificate Program courses

3. Apple Distinguished Educator, 1996, 1997, 1998

Past: 1. Network Director, Southwest Virginia Governor's School for Science, Mathematics and Technology, Dublin, VA. 1995 - 1998
This position was a Graduate Assistantship through Virginia Tech & SWVGS. Responsible for Internet access for four school systems and Wireless internetworking capabilities.

2. Coordinator, Demonstration School for Science, Math & Technology, Dublin Elementary School, Pulaski County Schools, Pulaski, VA. 1993 - 1995
Helped in planning of new concept school program, coordinated programs K-5 and team taught in school once opened.

3. Educable Mentally Retarded Classroom Teacher, Middle School level, Pulaski County Schools, Pulaski, VA. 1989 - 1994

4. Educable Mentally Retarded Classroom Teacher, High School and Middle School level, Pulaski County Schools, Pulaski, VA. 1988 - 1989

5. Adjunct Professor, Radford University 1994 - 1997
Instructor for graduate level courses in Telecommunications, Instructional Technology, Multimedia in Education

6. Education Specialist/Orientation and Mobility Specialist, Programs for Infants, Children, and Youth; Virginia Department for the Visually Handicapped; Bristol, VA 1979 -

7. Teacher of Deaf/Blind Adolescent Children; Western Pennsylvania School for the Blind; Pittsburgh, PA 1977-78 Responsible for 24 hour program with adolescent students and work duties for 6 staff members.

8. Teacher of primary Trainable Mentally Retarded Children; Russell County Public Schools; Lebanon, VA 1975-77 Classroom Teacher of students in grades 3,4,5,6.

Active Memberships in Professional Organizations:

1. Virginia Society for Technology in Education
   - Board of Directors, 1993-present, Vice President, 1998-99
     - Conference Chairman, 1994, Conference Committee 1996
   - Telecomputing Special Interest Group, Chairperson, 1992-present
     - Conference Chair, 1993, 1994, 1995, 1996, 1997
2. International Society for Technology in Education
   - Telecomputing in Education Special Interest Group
   - Technology Coordinator's Special Interest Group
3. Association for Educational Communications and Technology
   - Division of Telecommunications
4. International Visual Literacy Association
5. Eastern Educational Research Association
6. Southwest Virginia Technology Consortium, Board - 1994-1998
7. New River Valley Apple Core, President - 1989 - present

Other Professional Activities:

System Administrator Training - Unified Research Laboratories (1996)

NASA HPCC Intern, Langley Research Center, Hampton, VA. Summer 1995
- High Performance Computing and Communication Program (HPCC)
- Intern working on Internetworking Strategies for Educational access

Train-the-Trainers Design Team - VSTE
- Part of the development team that designed a complete training program for Teacher Internet training in the State of Virginia

Southwest Virginia Technology Consortium Summer Technology Boot Camp
- 1992-97 - Camp Instructor, 1994-97 - camp planning committee

Virginia State Department of Education Administrative Review Team of
1. Washington County Public Schools, 1980
2. Roanoke City Public Schools, 1980
3. Pittsylvania County Public Schools, 1980
4. Floyd County Public Schools, 1981
5. Roanoke County/Salem City Schools, 1981

Endorsements Held:

State of Virginia;

Certified Teacher of Elementary Education, NK - 4
Certified Teacher of Middle Education, 4 - 8
Certified Teacher of Special Education Mentally Retarded, birth - 22
Certified Teacher of the Visually Handicapped, birth - 22
Certified Supervisor of Special Education Programs

Other: Orientation and Mobility Professional Certification (AER)
Electronic Travel Aid Endorsement for Sonic Guide (AER)

Other Professional Duties:

- Pulaski County Schools Technology Committee, 1993-1995
- Chairman, Dublin Middle School Technology Committee, 1991-1994
- Coach for Knowledge Master Open Team at Dublin Middle School, 1990 - 1994
- Coach for Odyssey of the Mind Team at Dublin Middle School, 1990-91
- Coordinator of Programs for the Gifted at Dublin Middle School, 1990-91

SPECIFIC EXPERIENCES WITH COMPUTER TECHNOLOGY

Instructor for:

Telecommunication Integration Training for teachers in Bland County Schools - 1998.

Adjunct Professor for the University of Virginia, teaching graduate level courses in the Instructional Technology Certificate Program. 1997- present.

Adjunct Professor for Radford University, teaching graduate level courses in the uses of Instructional Technology, Multimedia, and the Internet. Numerous classes from 1993 - 1997. Teaching 4 courses per semester.

Using the Macintosh in the Middle School
Presented to teachers in Pulaski County, 1992.

Introduction to Virginia's Public Education Network
Presented to teachers in Pulaski, Carroll, Giles, and Wythe Counties, 1992

AppleWorks in the Middle School
1 credit course for teachers at Dublin Middle School, 1990.

Adaptive Computer Technology for the Visually Impaired
Presented to Regional office personnel of Virginia Department for the Visually Handicapped in Bristol, VA and in Roanoke, VA, 1987.

Consulting:

1. Telecommunications Specialist for Southwest Virginia Governor's School, 1990 -present
2. Associate with The workSmart Group, Inc., a technology consulting company working with educational institutions and businesses throughout Virginia. 1995 - present
3. Mental Health Residential Center Teacher Training Sessions - Marion, VA - 1996
4. Systems Facilitator for Virginia’s Public Education Network, 1990 - 1995
5. Adaptive computer Technology Transfer Specialist with the Virginia Department for the Visually Handicapped. Acted as a consultant to staff and local school systems in designing appropriate technological configurations for student and/or teacher use - 1986-1988
6. Region VII Education Services Center Staff Development Training Workshop Kilgore, Texas - Topic - "Revitalizing, Materializing, and Methodizing Your Vision Program" - August 1990
7. Software reviewer for Software Reviews on File, a division of Facts on File, Inc. 1987-1990
8. Beta software tester for DAR Systems International, Inc. 1989

Recent Conference Presentations:

National Consortium for Specialized Secondary Schools for Science, Mathematics and Technology (NCSSSMST), Reston, VA, March 1998 - Topic - "Connceting Your LAN to the WAN Wirelessly"

Florida Educational Technology Conference, FETC, Orlando, FL, March 1998 - Topic - "Connect Your LAN to the WAN via Wireless Internetworking"

International Society for Technology in Education, TEL•ED '97 Conference Austin, Texas, November 1997 - Topic - "Wireless Internetworking: An Inexpensive Connection for Rural and Urban Sites" Topic - "Content Control of the Internet: A Look at New Filtering Software"

Virginia Society for Technology in Education Annual Conference Virginia Beach, VA, April 1997 - Topic - "Wireless Internetworking"

Association for Educational Communications and Technology National Convention, Albuquerque, NM, Feb. 1997, - Topic - "Isolating Hardware and Software Standards for Instructional Technology"

International Society for Technology in Education, TEL•ED '96 Conference Tampa, FL, Dec.1996, - Topic - "Creating Web Pages OFFline: Working on an IntRAnet"

Virginia Society for Technology in Education Annual Conference Roanoke, VA, May 1996 - Topic - "Using an Intranet for Student Access"

Virginia Society for Technology in Education Annual Conference Wintergreen, VA, April 1995 - Topic - "Hypertext in the Classroom"

Special Interest Group for Telecommunications (VSTE) Conference Charlottesville, VA, June 1994 - Topic -"Internet Access Options"

Virginia Society for Technology in Education Annual Conference Wintergreen, VA, April 1994 - Topic - "Internet Graphics...get the Picture"

NOTE: For other conference presentations, please see end of VITA.

Conference Attendance:

I have attended many National, State, and Regional conferences dealing with Educational Technology. Most recent Conferences attended:

FETC - Florida Educational Technology Conference, March 1998

ISTE's TEL•ED '97, December 1997

Virginia Society for Technology in Education annual conference, April, 1997

Asociation for Educational Communications and Technology, February, 1997

ISTE's TEL•ED '96, December 1996

Virginia Society for Technology in Education annual conference, May 1996

Virginia Department of Education Technology Conference, November 1995 "Educational Technology Leadership Conference"

Southwest Virginia Technology Consortium Conference, October 1995 "Teachers and Technology"

National Educational Computing Conference (NECC), June 1995

Apple Distinguished Educator:

In 1995, I was selected as one of 50 Apple Distinguished Educator's in the United States. I was re-appointed to this position in 1998. The goals of the ADE program are:

1. To recognize outstanding educators for their contribution to educational technology.
2. To provide a direct network of support and communication between Apple Computer and outstanding educators with expertise in educational technology.
3. To collaborate with educators to bring education and technology information and skills to the broader educational community.

Apple Distinguished Educator Training:

- Apple Cooperate Headquarters Initial ADE Training - January 1996
- Apple Cooperate Headquarters Summer ADE Training - August 1996
- Apple Cooperate Headquarters Summer ADE Training - July 1997
- Apple Education Leading the Way Internet Seminar Trainer at:
  - James Madison University - March 1996
  - Southwest Virginia Higher Education Center - March 1996
  - Lynchburg College - April 1996
  - Fauquier County Web Page workshop - June 1997

Publications:

Wenrich, John. (1998). Wireless Internetworking: An Inexpensive Connection for Rural and Urban Sites [CD-ROM]. Proceedings of Tel•Ed '97. Austin, University of North Texas.

Wenrich, John (1998). Content Control of the Internet: A Look at New Filtering Software [CD-ROM]. Proceedings of Tel•Ed '97. Austin, University of North Texas.

Wenrich, John (1997). Making the Connection: A High Speed Internet Link for Rural Schools. Leading & Learning with Technology, Vol.25, No. 3.

Holmes, Glen & Wenrich, John (1997). Revisiting Cable TV in the Classroom. In R.C.Branch (Editor) Educational Media and Technology Yearbook 1997, Colorado, Libraries Unlimited.

Apple Computer, Inc. (1997). eMate 300 Teacher's Guide (034-0030-A). Cupertino, CA: Curriculum contributor.

Wenrich, John R. (1996). Creating WEB Homepages Offline: Working on an IntRAnet. In R. Forbes (Ed.), Proceedings of Tel•Ed '96. Tallahassee: SERVE.

Editor of *The Connection*, an online newsletter on integration of the Internet into the K-12 curriculum. 1997-98.
(Available at http://www.swvgs.k12.va.us/public/news)

Editor of statewide newsletter on Virginia's Public Education Network, published by the Virginia Department of Education, 1992 - 1994.

Editor and co-founder of THE COMMUNICATOR, a bimonthly national newsletter on curriculum and adaptive technology use for teachers of the visually handicapped 1985 -1991.

Grants:

Appalachian Regional Commission Training Grant - "Internet Training" ($12,500.00)
1997, Helped with collegial writing of proposal
Served on planning committee, Instructor for training sessions.

Center for Innovative Technology, Telecomputing Economic Development Project, "Pulaski County: A Connected Community" ($15,000.00)
1997, Helped with collegial writing of proposal
Served on planning committee

Virginia Tech K-12 Teacher Training in Technology Integration Grant ($150,000.00)
1996, Helped with collegial writing of proposal, Instructor for training sessions. Developed training curriculum and materials

Appalachian Educational Laboratory Grant - Teacher Training - "Using Telecommunications in the Classroom" ($3,000.00) 1993, Helped with collegial writing of proposal
Developed training curriculum and materials
Instructor for training sessions

Other:

- Telecommunications Module - Part of a design team that developed a training module for Internet access for college students and university faculty. Also part of the training team for the module.
- Experience (both use and construction) with single and multiple computer switches for handicapped access.
- Developed complete program for Department for the Visually Handicapped computer camp. Including curriculum objectives, facility location, and staff duties.
- President of The Communicator Apple Users Group (TCAUG), an international organization of computer using educators of the visually impaired, 1985-1990
- President of the New River Valley Apple Core, a local users group, 1987-present
- Attended Apple Computer Executive Briefing seminar in education, July 1990.
- Systems Administrator for Virginia's PEN (Virginia's Public Education Network), located at The Southwest Virginia Governor's School site, 1990-1995.

Internet Access:

I can be contacted at: wenrich@vt.edu
Additional information may also be viewed on the Web at
http://wenrich.net/john
My Virginia Tech Academic Portfolio can be viewed at:
http://wenrich.net/john/port
Additional projects and descriptions of work may be reviewed at:
http://wenrich.net/john/projects

Other Conference Presentations:

Virginia Society for Technology in Education Annual Conference
Fredericksburg, VA, March 1993 - Topic - "Using VA.Pen in your Classroom"
Topic - "Traveling the Internet Anonymously"

Southwest Virginia Technology Consortium Conference
Roanoke, VA, May 1992 - Topic - "VA.Pen, Access to the World" Topic - "Introduction to VA.Pen"

Virginia Educational Computer Association Annual Conference
Williamsburg, VA, March 1992 - Topic - "Accessing the World through VA.Pen"

Southwest Virginia Technology Consortium Conference
Roanoke, VA, May 1991 - Topic - "Making Your Life Easier with Technology"

Virginia State Media & Instructional Technology Annual Conference
Charlottesville, April 1991 - Topic - "Encouraging Teachers to use Technology"

Virginia Middle School Association Annual Conference
Richmond, VA, March 1991 - Topic - "Getting Teachers to use Technology"

Virginia State Itinerant Vision Teachers Conference
Charlottesville, VA, December 1990 - Topic - "Revitalizing, Materializing, and Methodizing Your Vision Program"

Virginia Middle School Association, Region 7 Conference
Roanoke, VA, October 1990 - Topic - "3M Comes to Special Education (Mainstreaming, Modification, and Management)"

Association for the Education and Rehabilitation of the Blind and Visually Impaired,
International Biennial Conference, July 1990, Washington, DC, Topic - "Revitalize, Materialize and Methodize Your Vision Program

Virginia Educational Computing Association, Annual Conference,
Fairfax, VA, April 1988 - Topic - "Access Technology for the Visually Handicapped"

Virginia State Itinerant Vision Teachers Conference,
Charlottesville, VA, November 1986 - Topic - "Adapting Public Domain Software for the Visually Impaired"

Association for the Education and Rehabilitation of the Blind and Visually
Handicapped, Virginia State Chapter Annual Conference, Roanoke, VA, May 1986, Topic - "Computer Equity for the Visually Impaired"