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ABSTRACT

The World Wide Web (WWW) has become a major presence on the Internet, and teachers are just beginning to discover many valuable applications the Web can have in their classrooms. This study explored use of WWW as a research and publication tool in a fifth grade class project on the formation of the United States. Students were given instruction in navigating the Web through Netscape, and they each searched for sites having to do with individual topics. Each student wrote a report under one of three categories: political leaders, three branches of government, or battles of the Revolutionary War. The Web, it was found, has not yet developed into an effective research tool. Only three of seventeen students found sites relating to their topic. These students did not use the information found on the Web, as the information had already been found in other resources from the library. Various problems with the use of the Web are discussed. Both teachers and students had positive attitudes toward the Web, even though no information was used directly in the reports. Once the reports were complete, the students drew out links among the three groups. Students put in their own hypertext mark-up language (HTML) code, and their reports were posted on the Web. Publication was very successful. Teachers noticed a great deal of improvement in the students' writing. With a few changes to the methods used in this study, the Web could be used as an important part of the classroom, both as a research and a publication tool. Appendices include: Netscape scavenger hunts and keys; a figure illustrating an example of a small group Web; photographs demonstrating the creation of Web links in small groups; and a sample document with HTML. (Contains 18 references.) (Author/MAS)

Research and Publication on the World Wide Web:

A Fifth Grade Class' Experience

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Running Title: Using the World Wide Web in a Fifth Grade Classroom

Abstract

In less than two years, the World Wide Web has become a major presence on the Internet. Teachers are just beginning to discover many valuable applications the Web can have in their classrooms. This study explored use of the Web as a research and publication tool in a fifth grade class project on the formation of the United States. Students were given instruction in navigating the Web through Netscape and they each searched for sites having to do with their individual topics. Each student wrote a report under one of three categories: Political Leaders, Three Branches of Government, and Battles of the Revolutionary War. The Web, it was found, has not yet developed into an effective research tool. Once the reports were complete, the students drew out links among the three groups. Students put in their own HTML code, and their reports were posted on the Web. Publication was very successful. Their teacher noticed a great deal of improvement in the students' writing. With a few changes to the methods used in this study, the Web could be used as an important part of the classroom, both as a research and a publication tool.

Introduction

A current hot topic in K-12 educational technology is the World Wide Web. The "Web," as it is also known, is the new multi-media dimension of the Internet. The Internet is a continually growing collection of information and resources. It has the potential to make valuable connections for classrooms. Some schools and individual classrooms are already changing classroom structure and teaching methods to incorporate this new technology.

Because these changes are so new, teachers have not had a chance to explore and test new methods of incorporating the Internet into their classrooms. Teachers need to develop ways to use the information to the fullest capacity. With the addition of multi-media capabilities of the World Wide Web, the Internet is even more valuable as a means to interest students in learning.

The purpose of this study was to explore use of the WWW as a research and publication tool in a fifth grade class. Students were assigned to write research papers on topics concerning the formation of the United States. The WWW was used as one resource among several provided through the school library. Reports were then published on the WWW. The class was observed throughout the project, and focus questions were based partially on the previous research done in this area. General patterns appeared that can be linked back to research that was done in the past.

Literature Review

The Internet and the World Wide Web

The WWW has advanced rapidly and is now making information available to universities, businesses and homes in a dynamic form which incorporates text, graphics, sound, video and hypertext from all over the world. With the click of a mouse, images from Alaska appear, voices speak from across the Pacific and documents written by Thomas Jefferson scroll up the screen. Educators needs to take advantage of this wealth of information and resources.

All these neatly laid out pages are linked through the Internet, which is simply a vast network of personal computers and servers. Networks were first created within individual buildings, and then companies and universities joined these smaller networks together to form a bigger network. Eventually, many universities, businesses and homes linked together over phone lines, satellites, micro wave links, packet radios or fiber optic cables to create the Internet (Noguchi, 1993, 3). As a part of this network, the WWW adds multi-media capabilities to the range of telecommunications technologies.

The basic technology underlying the Web was created in 1991 by Tim Berners-Lee of the Geneva-based European Particle Physics Laboratory. Berners-Lee wanted physicists to "talk to each other in an easier way" (Swisher 1995). Instead, with this new advancement, a user no longer types in the complicated commands that were needed for accessing text and graphics on the Internet. Information now can be searched out through a "browser" which is a Web software program. Browsers, such as Netscape and Mosaic, display information from the Web in a multi-media

format. A Web document consists of text with Hypertext Markup Language (HTML) tags which provide the developer the ability to format and embed links into the document. The document resides on a local server. Anyone in the world can access that document through the Uniform Resource Locator (URL), which is the document's address.

The WWW creates links between documents that allow instantaneous motion from one to the other. Before, getting to a specific document meant going through a series of predetermined menus. In order to get to other documents, a user would need to first back out of the menus to the original document and then go through all the menus to get to the next document. The Web cuts down on this time and allows students to follow their own paths. Because the Web is not linked linearly, but literally as a "web," a user can follow whatever path he chooses.

The Web is becoming easier to use and some experts predict that computer manufacturers will soon make browsers a standard on computers. Currently, there are an estimated 16,000 Web sites, and this number is increasing by ten percent a month (Swisher 1995). It is estimated that already more that 60 million people worldwide have access to global electronic mail (Harris, 1994, 60). If predictions are correct, this group of 60 million may soon be users of the WWW, also. Teachers and students who have access to the Web have found it to be useful. It is well worth their time for teachers to learn about the Internet and incorporate it into the classroom. This is a growing part of our students' future world that we need to prepare them for.

The World Wide Web in the Classroom

Many states are now offering free access to the Internet to all teachers, and if

they want to learn how to use it, they can now access it through their schools. Gleason Sackman has created pages on the Web that link together school sites from all over the United States. His collection presently lists 74 elementary schools' Web pages (Sackman, 1994). The number is increasing as schools install the hardware and software needed to access the Web.

A 1993 U.S. survey reported that the Internet is not widely used in the K-12 community. This survey picked out a group of teachers who were "technologically sophisticated," and found that only half of them had access to the Internet (Honey, 1993, 2). This survey was conducted, however, before the Web was widely used. Now, more teachers are likely to become interested in the Web because it offers multi-media capabilities that the Internet could not offer before on such a wide basis. In addition, Honey's survey did not take into account the teachers who were interested in using the Internet and might soon be users of it.

Because it is so new, the Information Highway, as the Internet is often called, can be overwhelming. One researcher believes it is more like an ocean to many in the schools. The Web lies before them as something murky, mysterious, dangerous, uncharted and in need of exploration (Honey, 1993, 3). Though the Web looks promising and exciting, widespread use has not become a reality for the vast majority of K-12 educators (Honey, 1993, 3). Keranen, a teacher in Northern Virginia, notes, "It only takes an hour to train a computer-literate teacher on the Internet...the hard part is integrating it into your curriculum" (Novitski, 1995, 14). Teachers need time to learn, not only how to use specific application, but they also need to learn how to incorporate them into their classroom.

Teachers should not be discouraged. Internet expert Tracy Parker believes that the K-12 community is one of the fastest growing groups involved in the

Internet (Novitski, 1995, 14). Classes were given computers as part of a project sponsored by Apple Computers. Even though it took these teachers several years before they could fully incorporate the new technology into their classrooms, they reported great successes. They even reflected on and challenged their old ways of teaching and the philosophy behind these methods (Dwyer 1991). Once teachers are exposed to the possible benefits, and learn how to incorporate technology, they find that the advantages to using technology directly in the classroom is well worth the time it takes to learn.

Even though it may take years to incorporate new technology into the classroom, advancements are making this incorporation easier. As stated above, the new structure that the Web provides to the Internet allows for direct links from document to document. The time it takes to move from one address to another is now negligible. These advancements make use of the Internet in the classroom valuable and more worth teachers time to hunt out specific applications that will improve their classrooms.

Research on the Web

Most teachers start out using electronic mail (e-mail) and then discover other resources and expand from there (Novitski, 1995, 17). E-mail is a part of the Internet that has allowed teachers to exchange information, ideas and lesson plans. It also was one of the precursors to the WWW. There are many examples of teachers who pull in resources from the Internet for use in their classrooms. Kathryn Keranen is very excited about the Internet as a research tool. She has been able to bring material into her geoscience class that she "couldn't get anywhere else" (Novitski, 1995, 16).

Because the Internet connects networks from all over the world, the amount of information available is extensive.

One popular form of research that is fairly informal is "key-pal" exchange. Students are linked up as pen-pals with other students from across the country and the world. Through contacts like these, students learn information that they could never get out of a book. In a project named "Houses and Homes" that was started by two schools from London and Tasmania, students exchanged information about how others lived. Children were involved from Maryland, Hawaii, Peru and Iceland and learned, for example, that houses are built a certain way in Iceland to withstand earthquakes and severe weather conditions (Becker & Hochella, 1994, 6). Another example of this type of student-to-student exchange is the "History Mystery Classroom Exchange." Students shared autobiographical information about their families, favorite movies and more. They were able to learn historical and geographic information through this exchange (Becker & Hochella, 1994, 6). Keranen believes that it is important for students to do this research themselves. She says, "they like having learning in their own hands" (Novitski, 1995, 14). Even though these kinds of resources do not match the typical resource from a library, students researched real and valid information.

The Internet has also been used for research through contacts with content area experts. A project called "The Electronic Emissary," based at the University of Texas at Austin, connects students with experts from all over the world. The organizers of the project send out a call for experts over the Internet. The experts respond with an information form, and then classrooms and subject area experts are matched up. One fourth grade student in Texas and middle school students in Wisconsin communicated with an astronomer and planetarium coordinator from

Kentucky about the origin of the universe, the birth, life and death of stars, constellations, the solar system, black holes, and much more. As part of a project studying the Middle Ages, sixth grade students in Houston, Texas wrote to their "Learned Sage," a professor of medieval history from the University of Illinois. She responded back to them, the "Seekers of Knowledge" (Harris, 1994, 61). Direct contact with experts is something that would rarely happen without the networking capabilities of the Internet because it would take much more time and coordination without the direct connections.

The World Wide Web adds additional possibilities to the Internet. Not only can teachers set up researching activities like those above, but they can bring in multi-media resources through the Web that were not as easily accessible before. The Internet has provided a medium for research through direct exchanges such as e-mail and news groups, but now information can be gathered from many forms of media. It is logical to assume that these applications that have been successful on the Internet will be even more successful with the addition of sound, video and graphics. The multi-media format of the Web makes information much more dynamic for students and will increase their desire to learn.

Publication

The Web also gives students incentive to learn by providing a wide audience for their work. Writing teachers and researchers have found that students' writing improves when their audience consists of more than the teacher (Wetzel 1992; Wright 1981). The teacher is an important audience for the student, but must not be the only one. If students know that all they can expect from their writing is a set of

comments in the margin, they will not put forth their best effort. The "red-marking" method does not work. Students do not usually take advantage of these comments to help them on their next papers (Wetzel 1992).

Instead, students should have a sense of purpose behind writing and revising. Motivation comes "through those who are important--peers, parents and teachers" (Wetzel, 1992, 40). This audience can be expanded through sharing with other classrooms, through the library, through literary magazines and through the Internet all over the world (1992). Sharing emphasizes the importance of the writer (Wright 1981). When a student finds something important to say and has interested others to read and respond, then saying it becomes important (Wetzel 1992). A teachers' handbook for writing from a school in Phoenix states, "it is the role of the teacher to provide many ways of sharing finished work" (Wright, 1981, 16).

Ken Blystone, who created Virtual School Bulletin Board System (VS-BBS), observed the benefits of publishing over the Internet. When he entered the library one day, he saw students waiting to get on the computer. He pulled his principal to the side and said, "Nick, here are 14 students standing in line waiting for an opportunity to read and write" (Noden, 1993, 166-67). They were excited to be a part of information interchanges over the Internet. Students are motivated by the technology itself and by the cultural exchange that takes place through such contacts. Having a wider audience increased the students desire to read and write.

The World Wide Web is also useful for publication because it is a hypertext medium. As stated above, hypertext allows students to organize information in a number of ways. This adds to the potential benefit of publishing over the Internet. The Web succeeds several programs that have been used in classrooms to integrate student work into a hypertext format. HyperCard is an example of a hypertext

program that has been used for the last few decades. This program creates stacks of linked cards or pages that can be organized in a number of ways. Links can be created in any order, not just linearly. A document with four pages might be linked so that you can view 1, then 3, then 2, then 1 again. It can be linked so that the user picks in what order to view the documents. One teacher has used it in teaching preschool children. He used the Learner Experience Approach (LEA) to reading that encourages children to dictate stories and then try to read their own words (Sponder 1993). He wrote down the stories of his students and them published them in a HyperCard stack with their own drawings. The students then attempted to read their own stories (Sponder 1993).

The WWW for the first time provides a combination of hypertext and a wide area networking scheme. The links go beyond local documents to include documents from all over the world. This is a golden opportunity for teachers to excite students about finding and sharing information. Giving children the opportunity to learn and share what they learn should be an important goal of education. By researching on the Web, students gain awareness of the world and they develop their own communication skills through publication. The Web's multi-media format also increases its worth for education. Educators need to consider how valuable a resource the Web can be. Novitski writes, "for educators, understanding the Web means appreciating its vast and possibly immeasurable potential for education" (1995, 3). Some who have used the Internet as a resource in the classroom have found that students are willing to give up time at recess or lunch to work on projects (Becker & Hochella, 1994; Willett-Smith, 1993). Any teacher would love to say that his students spend extra time on work because they love doing it. The Web has the potential to impact many students in these positive

ways. As stated above, the WWW is becoming a part of many classrooms and teachers need to learn how to use it to its potential.

Setting

This study was conducted in Albemarle County, Virginia at Virginia L. Murray Elementary School (K-5). Murray Elementary School was one of the first schools in Virginia to invest in a direct connection to the Internet. Most schools' connections to the Internet are much slower, but because of this direct connection a asscessing information could be done more quickly and several connections could be made at once. Students were taught how to use the Web and their work was published on the Web. Their principal, Tim Frazier, has set technology as one of the school's main focuses. There are computers in most classrooms and four Macintosh LCs and Mac Pluses in the library that teachers can sign up to use.

The students in this fifth grade class were from a mid socioeconomic background. There are 17 students in the class, 5 are girls and 12 are boys. Most of them had computers at home and had experience working with various types of technologies at Murray before this year. Dr. Prudhomme is a new teacher. He is very committed to learning about technology and incorporating it into his classroom. An intern from the University of Virginia Sociology department also worked with the class to introduce them to the Internet. The librarians were also very helpful in troubleshooting computer errors.

Because the students had some experience using technology before, it was possible to begin with introducing the Web, it was not necessary to start at the basics of computer usage. Incorporating the activities into the class schedule was not difficult because technology is already an everyday part of the school's environment.

Design

Throughout the school year, Dr. Prudhomme's class studied American History. At the time of this research project, the class was studying the formation of the United States. Each student was assigned a particular individual, institution or event under one of three topics (the three branches of government, political thinkers, and the Revolutionary War). The students then researched and wrote about their individual topics. The Web was introduced as an additional resources and as a publication tool.

The first step in the classroom was to introduce the students to Netscape. Most had never used the WWW before. In order to teach them how to navigate through the Web, they were taken through a WWW scavenger hunt (see Appendix A). The first part of the scavenger hunt asked for information from their school's home page. The second asked for information that could be found through the Netscape search buttons.

Three or four students at a time were taken to the library in order to introduce them to using Netscape. Each student worked at a computer by him/herself while observed from behind and were given help as needed. The computers were set up in a semicircle with their backs facing each other. All screens could easily be seen at a glance from behind their chairs. Each group had about 1/2 to 1 hour to look for resources having to do specifically with their individual topics. They used search engines such as WebCrawler and Lycos Search to find sites by keyword search. All students were rotated through the scavenger hunt. Any potential site addresses were saved in a ClarisWorks document.

During this time, all of the students had been researching through the regular library resources. Dr. Prudhomme had brought in books to the classroom and the students also looked on their own in the school library. They began writing their reports and continued researching. During the library time, some students would ask to spend time searching on the Web for information. The students edited their reports in pairs and were given help editing by the teachers. The students spent several weeks writing and editing. They then began word processing their reports.

Once most of the students had near final drafts, Dr. Prudhomme brought the students together to draw out links between their individual reports. Each of the three groups (Three Branches of Government, Political Leaders and Battles of the Revolutionary War) met to draw concept Webs. Each student briefly looked through their report to see if any of the other topics came up in the writing. The others added in links also as the person she/he talked through the report. One student recorded the links and wrote beside the lines what information was common to both reports (see Appendix B).

After all the groups had links draw out for the three subtopics, Dr. Prudhomme explained the next step. He had written the main title on a sentence strip and placed it at the top center of the chalkboard with a magnet. He also had the three subtopics on the board. Each student was to write his/her individual topic on a sentence strip and place it under the correct subtopic title (see Appendix C). Once all of the report topics were on the board, the students sat back down.

In order to get the students thinking in the right direction, he asked one student, "Are there any links with Yorktown?" (this was her topic)

Silence.

"Who helped out in the Revolutionary War?"

Several responded, "France."

Dr. Prudhomme said, "Okay, then who can link this information?"

Then several who had written about political leaders said they could link the battles with Benjamin Franklin or Thomas Jefferson. The class then swarmed up to the board to draw up the links with colored chalk. Dr. Prudhomme asked them to write down which links had been made on the board to their report and keep this in their writing folders.

The next step was to teach the students about HTML. Adding HTML was demonstrated by using one of the student's papers as an example. The students were shown how to take a word processed document, copy it into a text editor and add HTML tags. Several commands were explained to show that most need to be turned on and off: <html>, </html>,<title>,</title> (see Appendix D). We then looked through some of what Dr. Prudhomme had already posted on the Web under their class home page.

The students spent the next week adding HTML tags to their documents and saving them in SimpleText. They worked with an adult to post their reports on the Web. Dr. Prudhomme scanned in illustrations that the students had drawn and these were also added to the reports. Parents were shown the students' work at an Open House.

Throughout the study, students were observed and details from these observations were recorded in a journal. Dr. Prudhomme observed and reflected on specific questions. Some video was taken of students as they worked and several students were interviewed on audio-tape. Five questions were the main area of focus:

1) Is relevant information fairly easy for students to find on the Web?

2) Are these resources reliable?

3) What information is added to reports that would not have been available without the Web?

4) Do students and teachers have a positive attitude about using the Web as a research and publication tool?

5) What responses did the class receive from their Web pages?

These partially came out of previous research.

In order to interpret the information gathered through journaling, Dr. Prudhomme was questioned over e-mail and through an interview. The journal was reviewed and highlighted according to patterns that ran throughout. Students were also interviewed and the video was reviewed. Patterns appeared through the study that related to the five focus questions. There were also findings that showed up unexpectedly.

Results

Teaching students how to navigate the Web through Netscape was successful. From the beginning, they were fairly comfortable using the technologies that were part of the study. Most did not need encouragement to begin exploring. They picked up how to find sites through navigation buttons, search engines and entering URL's quickly. A few of the students who did not have a lot of prior experience needed more hints than others, but overall, the entire class became competent users of Netscape.

They did, however, need instruction on how best to use their time when searching. Students wasted time looking into sites that were irrelevant. Some wasted time was impossible to avoid because the search engines are not very precise, yet. For each keyword search that was entered, a list of at least 20 irrelevant sites was produced. Usually the engine created a list of several hundred sites, some relevant, but most of them were not. In order to find an address of one useful site, the students had to read through all the other addresses. In some cases, students skipped over what may have been a useful source of information. They did not always have the skills needed to search through such an exhaustive list of addresses.

For about a week no students found any useful information. Even when we found addresses that looked promising, the students were still not finding information because the connection could not be made. This may have happened for several reasons. The number of users is increasing, so the search engines cannot search for all at once. The lines are in a sense "bottled up" with too many users. We were also denied access to some once we got addresses because the original creators

may have made changes and resaved, thus changing the address. If the address is not accurate to the letter, the connection cannot be made. When addresses are changed, all the links in source documents to that address must be changed also.

As found in earlier research, the Web can be something like an ocean (Honey, 1993, 3). These students also found that the Web as currently structured, prevents its use as an efficient research tool. Finding information through the Web was not easy. Only 3 of 17 students found sites relating to their individual reports. These students did not use the information that they found on the Web in their papers. They had already found this information in other resources from the library. Students who were not finding useful resources on the Web decided to go back to using books. They did not have enough time to continue their searches because they needed to begin writing.

None of the students added information from the Web. All their information came from resources in the library. Teachers have had success bringing in resources that could not be found anywhere else, but for our study, no such resources were found within the time frame of the study. Hunting for specific resources on the Web required a time commitment that could not be made, especially considering a first year teacher's busy schedule.

Sources that were found to be relevant, were apparently reliable. Even though there is still some speculation about the authenticity of information on the Web, these resources seemed reliable. At the present time, there is no definitive way to determine which resources are reliable. Several strategies were used to approximately determine validity. The information matched up with what students found in books from the library. Also, university addresses were often included in the addresses. This added credibility to the information that we found.

There was only one site that we could not figure out where it came from. It contained the journal of a soldier who had fought in the Revolutionary War, but we had no reason to doubt its validity. Clifford Lynch conducted a study of the Integrity of the Internet (1993). He found that because just about anyone can post information on the Internet, a lot of junk is posted. Documents are not screened for the Internet as they are for a printed journal. For our project, however, we were able to pick out which sites were valid and which were not.

Both the teachers and the students in this project had positive attitudes, even though no information was directly used in reports. All examples of success on the Internet described the great enthusiasm of students. We also found that working with these technologies is motivational. Even though a few students became frustrated when denied access, these same students continued to use the Web and continued to ask to use it.

All students seemed especially enthusiastic about publishing on the Web. Here again this study lined up with previous research. Having a purpose for writing helped encourage students and showed them that their work is important. Half of the students who were interviewed said that they tried harder because they knew that many people could look at their work. Those who did not say they worked harder are probably working hard even without publishing on the Web. Dr. Prudhomme noticed an obvious improvement in their writing when they found out that their work would be put on the Web. With an earlier project, Dr. Prudhomme had only posted what he had picked as the best writing. The class was told that for this project, all work would be published. Despite being told this, students were still concerned about whether or not their reports were good enough to be published.

This corresponds with findings in the literature review. The wide audience motivates students to push themselves to do better work. They see more of a purpose behind their writing and are therefore more motivated to write. Publishing on the Web was very successful and research was successful in increasing students' interest in researching even if specific sites were not always found. The class has not received response back from others, yet. The Web is still new and once parents come to the Open House to see their work, I am sure they will hear more feedback from outside the classroom.

In addition to these findings that relate to the proposed research questions, it was also found that students gained more from creating working links than they would have from simply drawing out a graphic organizer of the information. Creating Web links gave students a chance to use problem solving and organizational skills. The structure of the information was left in their hands and they chose how to set up title pages and how to add links into their documents. It was important to let them have a hand in this organization because they were able to see how their information fit together. Dr. Prudhomme noted that this was much more dynamic than a drawing alone.

Students also took the initiative in helping each other. When first introduced to the Web, several groups paid close attention to the other students and asked how they got to a certain site. One boy called out, "I found something on Saratoga (another student's topic)." He came across several things in his own search that the others could possibly use. The students were especially cooperative in learning how to add HTML tags. They started off a "chain-reaction" as Dr. Prudhomme called it. Several students were finished earlier than the others and could add many commands after the brief lesson that we gave the whole class. Then

as others finished word processing their documents, they received help from those who had worked with HTML already on their own documents.

In summary, the major findings in this study were that even though it was found that publication can be a great benefit, the Web is not yet an effective research tool for individual classrooms. Students can learn how to use the Web, but because the search engines are not accurate, too much time is needed. The school day does not contain enough time to let students search for hours. The research done in this study did not contribute to these specific reports, but these students now know how to access information on the Web. They have the skills to do keyword searches and to open addresses once they are found. Many of the students know how to add HTML tags to create Web pages. The most important finding of the study was discovering the sense of pride that students felt in seeing their work published on the Web. They were excited to explore their pages knowing that all the world could access their work. They not only were more motivated to work harder on their writing, but they also wanted to show it off to others.

Conclusions

As the literature documents, the Internet has been used successfully in the classroom. Teachers are able to pull in resources that they would not have been able to access without the Internet (Novitski, 1995, 16). Even though additional information was not found on the Web through this study, it was valuable in showing the potential that lies in the Web.

The Web was not particularly useful as a research tool because as it is currently organized, too much time is required for searching out new sites. In order to use the Web as a resource now, teachers need to spend preparation time hunting for resources before beginning a unit in the classroom. Students' time in the school day can be better spent than by looking through a long list of irrelevant sites. Their research time could be used more efficiently if a number of addresses for relevant sites are available from the beginning.

It is also important that students are taught how to navigate the Web. They should be given the chance to explore for a short amount of time, but it does not seem appropriate for them to spend hours looking for information that is readily available in other forms. If the library provides the information needed in print, this time should not be wasted on the Web. However, if the students have time to look for information on the Web, they should be given instruction on how to carry out a search. In this study students could have used time more efficiently if they had followed some guidelines to help focus their searches. They needed practice looking through site descriptions for general information that related to their topics. With this instruction they probably would not have skipped over potentially useful resources as often.

Teaching students these skills as a large group would cut down on the wasted time. Students, however, need to be supervised. Not only can they access sites that are irrelevant, and waste time; but, they can also access information that is not appropriate. Teachers, therefore, need to not only try to use their time efficiently, but need to also watch students fairly closely. It would be advisable for a teacher to position him/herself so that all students' screens can be viewed with a quick glance. Anyone can post information on the Web and currently there is no way for a teacher to deny access to inappropriate material (such as Madonna's home page). Teachers can avoid potential problems with a little advanced planning.

The results of this study suggest that using the Web for an historical research project is not effective. It can be inferred from reports of successful use of the Internet that there are resources which are more readily useful for a classroom. Information that is posted or changed daily would best be accessed through the Web. Kathryn Keranen, a geoscience teacher in Northern Virginia, assigns her students to find seismic information from earthquakes that have happened that same day (Novitski, 1995). This kind of project is completed easily over the Web, but because historical events are documented well in print, our searches may have been superfluous.

It was also found in this study that as documented in many reports, publication of student work increased student motivation. Posting students' reports on the Web seems to be an effective and positive means to boost student effort in writing. From the success achieved in this fifth grade class, teachers can be encouraged to continue to involve students in postings on the Web.

Not only is the novelty motivational, but the hypertext medium helps to facilitate learning. Students learned from writing their individual reports, and they

also learned how the information was part of a whole through creating the links. Because students gained a great deal from creating working links, it would be appropriate to continue to give students a major role in organizing their information. Future research could explore how this combination of hypertext and publishing for a wide audience affects student learning. This study focused on publication in general, but a specific study on the effects of a hypertext published for a large audience would be helpful.

As the first time using the Web in this classroom, this study was successful. This study was valuable for all the students and teachers. Now the students have an understanding of the structure of the Internet that will benefit them in working with it in the future. Even though converting documents into HTML is already becoming easier with translators, these students know some of the commands behind the finished and polished version. Exposure to the Web has sparked a lot of ideas for all of the teachers. Hopefuily, in the future researching on the Web will not require such a commitment of time and effort. The Web obviously has a lot to offer in researching because so much has already been added to the WWW and more information is added daily. Teachers can take advantage of the motivational aspect of the Web by continuing to post student work. As Dr. Prudhomme stated the most important aspect of the study was the sense of pride that the students felt in displaying their own work on the Web. Students were not able to find specific additional information during this study, but all benefited from publication. The Web has provided success in publication, and hopefully will provide many other opportunities for learning in the future.

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Appendix A1

Netscape Scavenger Hunt
Virginia L. Murray Home Page

1 pt. What is the address for the Virginia L. Murray home page?

1 pt. What pictures are on the home page?

2 pt.What happens when you click on Mr. Frazier's picture?

2 pt. Who's class is listed first under class home pages?

2 pt. What is your class address (e-mail)?

3 pt. From what page can you find pictures of important Afro-Americans?

4 pt. What are current weather conditions?

3 pt. What offices did Thomas Jefferson hold in the government?

3 pt. When did Thomas Jefferson begin planning Monticello?

3 pt. What are Kelly Belardo's future plans?

4 pt. What color is the gall bladder in a frog?

Appendix A2

Netscape Scavenger Hunt
General Tool Buttons

3pt. Name three of Dr. Prudhomme's bookmarks.

4 pt. What are 2 ways to get to "What's New?"

4 pt. What are 2 ways to open a URL?

4 pt. What is the 5th community college listed?

5 pt. What is the name of the engine that allows you to search for keywords?

4 pt. Finish this title International _____ ____ Kenkyukai Society.

4 pt. When using the search command/button, you can find matches in Title, URL and what else?

Now return HOME.

Appendix A3

Netscape Scavenger Hunt (KEY)

What is the address for the Virginia L. Murray home page?

http://pen1.pen.k12.va.us:80/Anthology/Div/Albemarle/Schools/Murray Elem/

What pictures are on the home page?

Mr. Frazier and Amy Roy's drawing

What happens when you click on Mr. Frazier's picture?

He introduces himself.

Who's class is listed first under class home pages?

Dr. Prudhomme's

What is your class address (e-mail)?

vlme5cls@pen.k12.va.us

From what page can you find pictures of important Afro-Americans?

What are current weather conditions?

What offices did Thomas Jefferson hold in the government?

minister to France, secretary of state, vice-president, president(1801-1809)

When did Thomas Jefferson begin planning Monticello?

1768

Appendix A4

What are Kelly Belardo's future plans?

get a master's of teaching

What color is the gall bladder in a frog?

greenish

Appendix A5

Netscape Scavenger Hunt

General Tool Buttons (KEY)

3pt. Name three of Dr. Prudhomme's bookmarks.

4 pt. What are 2 ways to get to "What's New?"

directory and tool button

4 pt. What are 2 ways to open a URL?

tool button and under file

4 pt. What is the 5th community college listed?

Coast Comm. College District

5 pt. What is the name of the engine that allows you to search for keywords?

WebCrawler searching

4 pt. Finish this title International _____ Kenkyukai Society.

Netsuke

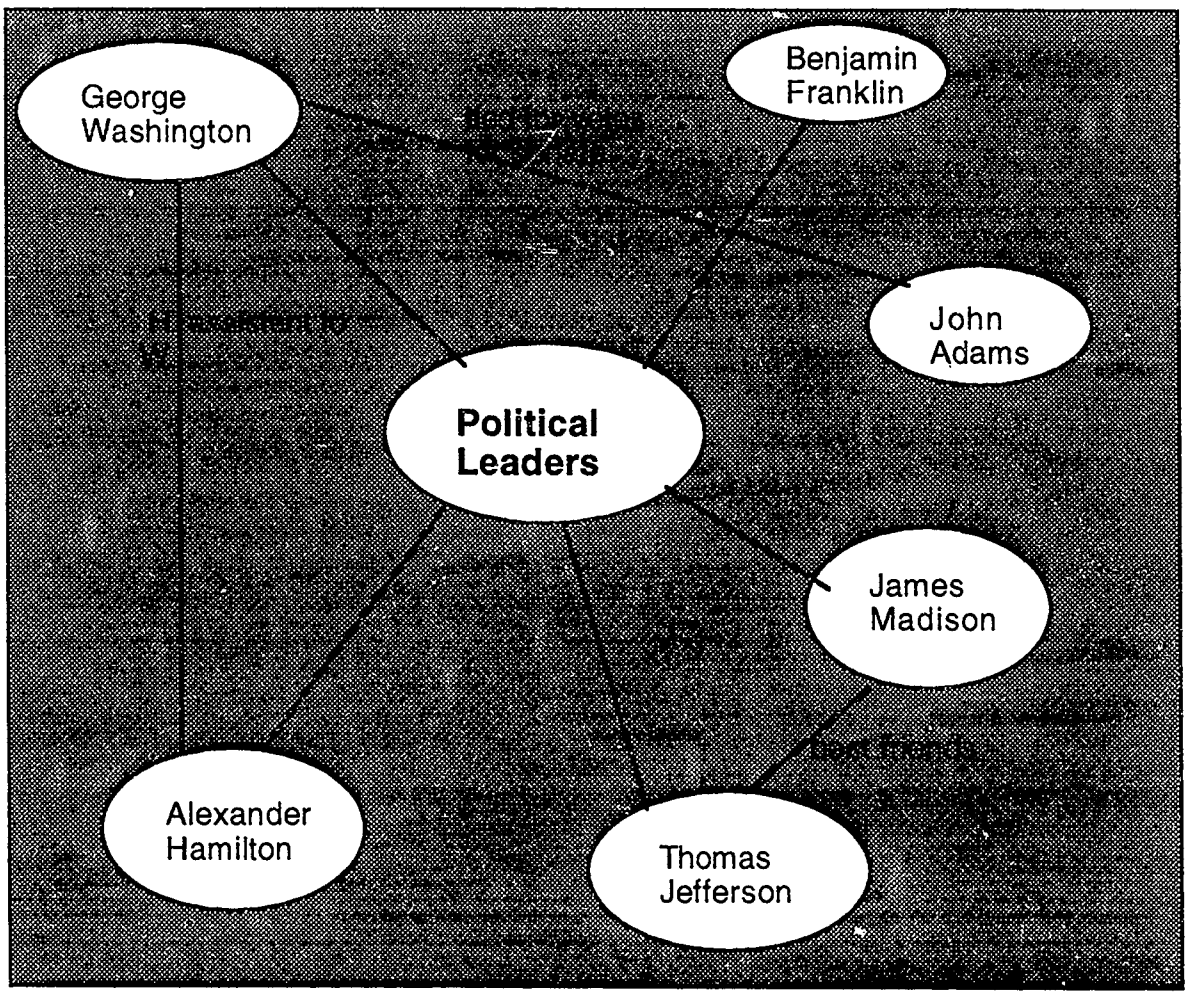
4 pt. When using the search command/button, you can find matches in Title, URL and what else?

comments

Now return HOME.

Appendix B

Example of a Small Group Web



note: Students drew out originals by hand. This is a recreation.

Appendix C1

Creating Web Links in Small Groups

Appendix C2

Creating Web Links Among the Three Groups

Appendix D1

Sample document with HTML:

```
<html>
<title>Washington</title>
<center><IMG SRC="washington.GIF"><h1>George Washington</h1></center>
<center><H3>By  Craig</h3></center>
<HR size=5>

George Washington was born February 22, 1732 in Westmoreland County, Virginia. When he was young he liked to go fishing, boating and what he loved the most was horseback riding. He was very good in school. At the age of 17 he was invited to join a party to survey lands owned by the Fairfax family west of the Blue Ridge mountains. After that he had interest in the development of the western lands. In the summer of 1749 Washington was appointed official surveyor for Culpeper County. During two years Washington made surveys for land owners on the Virginia Frontier.<P>
He resigned in 1754 but in May 1755 he joined a camp as an unpaid volunteer to serve as an aide for the British General Edward Braddock who came to Virginia with a group of British regulars. Washington played a big part in the French and Indian war. Washington was chosen by Lieutenant Governor Robert Dinwiddie to send a message to the French to leave the land in the western part of Pennsylvania. But the French refused his offer. A few kilometers from Fort Duquesne (one of the French forts) they were ambushed by a group of French soldiers and Indians. Braddock was mortally wounded and Washington nearly escaped death. A successful French assault caused Washington to almost surrender. Still the British won the French and Indian war and France had to give up most of their land.<P>
In August 1775 Washington was appointed to command Virginia defense along the western frontier of the colony. Washington succeeded in keeping the western frontier relatively safe.<P>
After Washington's half brother Lawrence died, Washington inherited Mt. Vernon. In 1759 Washington married Martha Custis. Washington was the wealthiest man in Virginia, after having those two things happen.<P>
Washington was elected to the House of Burgesses in 1758. Washington stayed for more than a decade. With Washington's service in
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Appendix D2

House of Burgesses he won himself an election as a Virginia delegate to the first and second Continental Congress.<P>

When fighting broke out between the British and Massachusetts in 1775, the Second Continental Congress named Washington commander of its newly created Continental army. Washington took command of the army in Boston in mid-July, and when the enemy evacuated the city in 1776, Washington moved his army to New York. Washington was defeated there in August by a superior force led by Sir William Howe. He withdrew from Manhattan to establish a new defense line above New York City. Then he made it to safety (from the British) in Pennsylvania by crossing through New Jersey and Delaware. In December 1776, although demoralized by Howe's easy captures of New York and New Jersey, Washington spotted a few places where the British were unguarded. On December 26 , 1776, Washington captured Trenton and on January 3, 1777, he defeated British troops at Princeton. These two things that Washington did restored Patriot beliefs that the Americans could win and by spring Washington had 8,000 new recruits. In August the American commander tried unsuccessfully to block Howe's advance to Philadelphia. At the battle of Brandywine Creek in September, Washington fought a minor battle with Howe at Germantown but Howe's superior numbers forced him to retreat again. Washington and his men spent the following winter at Valley Forge west of Philadelphia. It was horrible there, they had no supplies and most had no boots to walk in. In June 1778, Washington attacked Clinton's British army at Monmouth, New Jersey but he was again forced to leave. Then the French army joined the American army after the battle of Saratoga. Washington and Rochambeau (one of the French leaders) moved 7,000 troops (half of them French) from New York to Yorktown, Virginia to attack a British army. In less than five weeks everyone was tired and sleepy (so they might not fight as good). Washington sent word to Lafayette who was commanding forces in Virginia to keep the British commander Lord Cornwallis from leaving his base. At the end of September the French and American Army joined Lafayette. Out numbered two to one the British surrendered. Although peace and British recognition of United States of America did not come till two years later, the battle of Yorktown proved

Appendix D3

to be the last battle of the American Revolution.<P>

In one of his last acts as commander, Washington sent a letter to the states imploring them to have a national government. Washington was chosen to go to a convention by the Virginia Government Assembly, there Washington was chosen president (which means ruler) of the states. Elected President in 1788 and again in 1792 Washington presided over the formation and initial operation of the new government (which means he did more than they expected him to do). By appointing Alexander Hamilton secretary of the treasury and Thomas Jefferson secretary of state, Washington brought the two most capable figures of the Revolutionary generation into two central positions of responsibility of running the states with him. After leaving office in 1797 Washington retired to Mt. Vernon, where he died on December 14 , 1799 at the age of 63.<P>

I think Washington was very important during the Revolutionary War because Washington was one of the main reasons the Americans won. Washington was calm and didn't get upset if the Americans won or lost a battle. When Washington was invited to that party to survey lands when he was 17, he got interested in the development of the Western lands. That was the main reason that started Washington to become a general for the Americans. I think Washington was an excellent president because most of the people in the states liked him. I liked him because he was a great general , and was very brave to fight in the battles that he fought in. <p><hr> <h3>Bibliography</h3>
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<P>
<hr size=5>
Turn to the chapter on:<p>

Political Thinkers

Appendix D4

```
<li><a href="revolution.html">The Revolutionary War</a>
<li><a href="govt.html">The Structure of our Government</a>
<li>Go back to the<a href="birthtitle.html"> title page</a></ul>
<hr>
Jump back to our <a href="../jeffhome.html">Class Home Page</a><P>
</HTml>
```