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A study of the effects of the use of computerized sources on elementary student research projects

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A STUDY OF THE EFFECTS OF THE USE OF COMPUTERIZED SOURCES ON ELEMENTARY STUDENT RESEARCH PROJECTS

By
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ABSTRACT

Betty Jane W. Oliva. A Study of the Effects of the Use of Computerized Sources In Elementary Student Research Projects. 1998. (Under the direction of Dr. Holly G. Willett, Program in School and Public Librarianship).

The purpose of this study was to determine elementary students' abilities in the information gathering process and the impact of the use of computerized resources on these abilities. Did the use of computerized research technology improve students' results? How well did students make use of this technology to find information? Would students effectively combine the use of computerized and print sources for information? What effect did the inclusion of computers have on the students' attitude towards the research assignment? Four classes of fourth grade students were combined into two groups. Students were assigned to research answers to 50 questions. Each group was assigned to answer 25 using print sources and 25 using computerized sources. Students answered Pre-Activity and Post-Activity surveys. Classes were observed while conducting research. Survey answers and answers to research questions were tabulated, scored, and percentaged. Numbers were compared to allow conclusions to be drawn. The type of information source used had little effect on the number of correct answers given. Students were able to locate information efficiently using computerized sources of information. It was clear that inclusion of computers into the assignment raised levels of enthusiasm and interest among students.

MINI-ABSTRACT

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The purpose of this study was to determine elementary school students' abilities to gather information and the impact of the use of computerized resources on these abilities. The type of information source used had little effect on the number of correct responses. Students were able to locate information efficiently and had a high level of enthusiasm for the project including the use of computers.

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Chapter 1

Statement of Purpose

As computerized information technology advances into elementary school media centers, it is important to determine how it may best be implemented with these students. Teachers and librarians must decide which skills students need to acquire in order to make use of the newer technologies. Teachers and media specialists must develop methods to teach students the skills needed to access electronic information. Students need the ability to find information from electronic sources, while still making use of existing print resources. Research is necessary to accurately define student capabilities and deficiencies in these areas.

Purpose

The purpose of this study was to determine elementary students' abilities in the information gathering process, and the impact of the use of computerized resources on these abilities. Did the use of computerized research technology improve students' results? How well did students make use of this technology to find information? Would students effectively combine the use of print sources and computerized sources to gather and assimilate information? Did the inclusion of the computer make the student apprehensive about completing the assignment or did it generate excitement and interest?

Methodology

To this end, a study was designed and implemented that incorporated both print and computerized methods of research. This study included four classes of fourth grade students. These students ranged in age from 9 to 11. The students were required to complete a research assignment finding information to answer 50 questions. The two classes that comprised Group 1 were asked to begin their research using only computerized sources to answer questions 1-25. These sources included CD-ROM versions of the encyclopedia, on-line periodicals, and Internet sources. To answer questions 26-50, these students would change over to print versions of the encyclopedia, magazine articles, and reference books. The two classes that comprised Group 2, started

with the print sources of information to answer questions 1-25 and then switched to computerized sources of information to answer questions 26-50. The librarian worked with classroom teachers to formulate instructions for the students, and produced an outline of expectations that aided the students in fulfilling the research requirements.

Students were surveyed prior to beginning the project to determine their experience and expertise in the use of print and electronic research sources. The survey determined if students had access to a computer at home. It further determined if students had Internet access at home, and the extent of their experience using electronic sources. The Mercer County Library System provided Internet access as well as other types of electronic research capabilities for students who did not have these available to them at home.

Since the fourth grade students in Sharon Elementary School study the Iditarod, the students' research assignment focused on the race and related topics. Students were required to find background information on Alaska, the history of the race, information about the individual mushers, the rules of the race, the required treatment of the dogs, information about supplies needed by the racers, the course of the race, and past winners. Students were introduced to Boolean and Keyword searching techniques prior to beginning the assignment. Students were observed while they completed some of the research required. Student projects were collected and analyzed for the content and accuracy of information.

Students then completed another survey regarding the research they did and the effect of the sources used on the information they presented. The survey at this point focused on the sources that students used in doing their research, and the extent and type of information gathered from those sources. It also determined the amount of time needed to complete the research in each half of the assignment. Survey questions included questions to determine students' attitudes toward the work they completed. Did the use of electronic sources aid their research? Did the use of electronic sources in the assignment increase the difficulty level of the assignment? What impact did the inclusion of technology have on students' perception of the assignment? Did the prospect of using the computer to aid in completing an assignment generate interest and enthusiasm on the

part of the student? Did the prospect of using the computer make the assignment look intimidating and difficult to the student?

Discussion

By requiring students to complete a research assignment using computerized and print sources, the librarian would be able to compare and contrast the searching methods the students used and the results they produced. The librarian would discover which research method yielded the most information and which was the easiest for students to utilize to access information. The surveys gave background information on the individual students and offered insight into the research process. Observation enabled the librarian to uncover the students' perception of the tasks, and their enthusiasm for the project. It also allowed insight into the students' strengths and weaknesses in their completion of this project and enabled the librarian to focus on remediating the deficiencies through classroom instruction. Completion of this study allowed the librarian to determine which specific skills students need to learn in order to be able to effectively make use of computer technology for research purposes. All the data was placed into a numerical format that aided in the analysis and conclusions.

Chapter 2

Review of the Literature

The need for students to be able to access information through computerized sources is beyond dispute. As more information is put into electronic format, students will continue to need the skills to access this data.

> Students need to be able to use computers flexibly, creatively, and purposefully. All learners should be able to recognize what they need to accomplish, determine whether a computer will help them to do so, and then be able to use the computer as part of the process of accomplishing their task (Eisenberg and Johnson, 1996).

Experts agree about the importance of the computer for students. "Use of the computer promotes research skills by providing a quick and convenient way to track down relevant source materials. Use of the computer for research also improves computer skills through training in electronic information management" (Holzberg, 1989). Critical thinking skills are also improved as students must analyze the information presented on the computer, and select what best fits their needs.

"The students had little difficulty in navigation and information seeking. It also appears that students need to learn a new set of skills if they are to be able to successfully extract and apply the full range of information made available through a multimedia source" (Perzylo, 1992, p. 238). As popular with students as the new media is, a new range of skills must be taught if students are to go beyond the beginning stages of locating topics to finding and extracting specific information. "This disconnection between students' preferences for multimedia formats and their inabilities to mine them for in-depth information suggests that students and teachers alike must develop new conceptions of the best ways to access, evaluate, and use multimedia information for learning" (Neuman, 1997, p. 692). Studies have been done that further confirm this need. "Research on children's search behavior on electronic information retrieval tools has found that children generally like to search online catalogs and electronic encyclopedias

often better that their print counterparts. While children tend to be enthusiastic in their use of electronic retrieval tasks, they often have difficulty locating specific information when they use them" (Hirsch, 1997, p. 728).

Student Search Methods

Studies have been done to discover the searching methods that are the easiest and most productive for students to utilize. There has been considerable discussion over the use of Boolean search strategies versus a simpler keyword browsing search method. The analytic Boolean strategy demands of its users the ability to break down a topic into one or more important concepts. Users must then recall synonyms and combine these terms with the appropriate connectors to begin searching. This strategy then requires of its users the ability to substitute new terms for terms that do not yield results. Studies show (Liebscher, 1988) that the Boolean search method requires considerable time and incentive to learn. It may be unreasonable to expect younger students to be able to effectively use this method in their research. "Many children find it difficult to select search terms and then generate alternate search terms" (Hirsch, 1997).

The keyword browsing method of searching may well be more suited to younger students. "Using this method the searchers need to formulate a search query that is simple and broad. The only requirement is that the query place the user in the ballpark" (Liebscher, 1988, p.224). This strategy is preferred by many searchers as it relies on identifying one or two main concepts, and then the searcher would employ only recognition skills to select information that is appropriate. Liebscher (1988) states that this process is less complex than applying the analytical strategy, and it uses a cognitive function (recognition) that is significantly faster than the recall functions required by the analytical strategy. Yet Liebscher (1988) acknowledges that a simple query is likely to yield a larger quantity of entries to review than other techniques.

In another study the investigation found that students encountered other difficulties in their searches.

> Students were not able to generate search terms or words that connected the information needed to the information source. Intensive vocabulary preparation did not seem to help. They seemed to lack a conceptual network that would

> help them to recognize information and relate it to what they already knew. The students expected to find information by looking up the topic verbatim rather than pulling from a repertoire of words and terms that formed a network of relationships (Gordon, 1996, p. 29-30).

The studies that have been done do support the philosophy that students can be taught to conduct searches within a variety of databases. They will however, need specialized instruction in the methods of searching for information on electronic databases. Some studies also concluded that the students involved were more successful when retrieving specific factual information in response to simple tasks.

> The task of information seeking comprises a number of steps. The information problem must be analysed in order to identify its conceptual structure. The identified concepts must then be expressed in search terms. The terms must be assembled into a search strategy which is then implemented. The retrieved information must be evaluated, and if it is not considered satisfactory the search terms or search strategy may be reformulated. Information seeking involves cognitive activity. It may be affected by the personal characteristics of the searcher, such as age, knowledge, and experience. (Large, 1994, p. 499).

It would seem that with younger students particularly, preparation for completing a research assignment should include classroom instruction in developing questions and isolating the appropriate keywords. "Success in information retrieval transactions was largely accounted for by the children's tendency to express their information needs in simple, concrete search terms" (Large, 1994, p. 502). Spurrell, (1996) recommended that students begin with a brainstorming session to come up with the questions they need to ask. This would be followed by classifying the questions under headings that might be utilized as keywords. Students would also need to be taught note taking skills as well as basic bibliographic formats.

It is further suggested that assignments be connected to the real world, on topics of interest to students (Loertscher, 1996). Yet there must be a focus to any assignment that will enable students to formulate questions and will give direction to their inquiries.

Assignment Design

Attention must be paid to the organization of the assignment to ensure that it matches the abilities and cognitive development of the students. From the ages of 8 through 10 children can perform what Piaget calls concrete operations. Their thinking is based on concrete experience, and they are able to categorize and classify information (Kuhlthau, 1987). Students are curious about many things and are able to undertake research tasks involving obtaining information from a variety of sources. "Properly designed, these assignments can build the ability to recall, summarize, and paraphrase information" (Kuhlthau, 1987 p. 46). They will also give the children confidence in their abilities and encourage them to use non-fiction and reference materials in seeking information.

Chapter 3

Methods

Background

This study was conducted with four classes of fourth grade students. The students were between 9 and 11 years of age. The school is in a formerly rural area that is rapidly transforming into a suburban area. Of the fourth grade student population, 2% receive free lunches. The minorities represented in the class comprised .06% African American students and .08% other minority populations. The students are heterogeneously grouped into four classes of 22 to 25 students per class. While not all of the students were permitted to participate (see Appendix A for permission letter), overall participation in the study was 75% of the student population; totaling 72 of the 95 students in the grade level.

Organization

A cooperatively planned research report was developed by the classroom teachers and the librarian and integrated into the Social Studies curriculum. The guidelines and expectations for completion of the report were explained to students by the classroom teachers and librarian. Students would have the opportunity to complete portions of the assignment during three of their library class periods, during which time the librarian would be present to assist and observe the students. The teachers were not present during library class periods because it is their preparation period.

Classroom Instruction

Prior to beginning this report research, students were instructed in library class in the use of keyword searching, Boolean searching, and the use of subject headings. Students had received prior instruction in the use of print encylopedias, including the use of guide words and locating a variety of topics. They were also instructed in the format of a bibliography

Methodology

Immediately prior to beginning their research, participating students were administered a Pre-Activity Survey (see Appendix B). The purpose of this survey was to ascertain student's prior experience with computers, computerized sources of information, and the Internet and its information services.

The students were then given a list of 50 questions concerning the state of Alaska and the Iditarod (see Appendix C). Twenty-five of these questions were to be answered using print sources of information. These sources included print versions of assorted encyclopedias, almanacs, books, and magazines. The remaining 25 questions were to be answered using computerized sources of information. These sources included CD-ROM encyclopedias, magazine databases, and Internet sources (see Appendix D for a list of student reference materials). Students were required to use at least two print sources and two computerized sources in completing their assignment. Two of the classes participating designated as Group 1 were assigned to answer questions 1-25 using computerized sources first, and the other two classes designated as Group 2 were assigned to answer questions 1-25 using print sources first. Group 1 classes were then directed to answer questions 26-50 using print sources, while Group 2 classes were instructed to use computerized sources to answer these questions. Having all students answer all the questions removed any bias that might have been present in terms of both the varying difficulty of grouped questions and the varying educational abilities of grouped students.

The focus of the library observations was to discover if, while doing their research, students were able to choose correct sources for information, if they were able to formulate keywords, which would then lead to information that would aid them in answering their questions. At fifteen minute intervals the librarian would circulate through the library observing students as they worked, tallying observations made on a checklist (see Appendix E).

Implementation

The students spent three library class sessions over the next three weeks collecting information with which to answer their questions. In the school library, students used

books, encyclopedias, almanacs, atlases, and CD-ROM encyclopedias (see Appendix D). Additionally students were directed to the local county library for Internet access and further sources of information. While the students conducted their research, the librarian was a participant observer, who provided assistance and direction as needed, and observed the students at work. At the end of four weeks, students were directed to turn in their reports, whether or not they had answered all of the questions.

Upon completion of the assignment, students were administered a Post Activity Survey (see Appendix B). The purpose of the Post-Activity Survey was to discover students' impressions of the work they had just completed. Which method did the student feel was easiest, which was fastest, which was most helpful, and which method did they enjoy most?

Analysis

The student reports were scored and tabulated, and percentages were calculated to discover the number of correct answers students were able to find using print sources as opposed to the number of correct answers students were able to find using computerized sources. Observations were compiled and tallied. Survey answers were tabulated and compiled into tables. All findings will be reported in the next chapter.

Chapter 4

Findings

Pre-Activity Survey

The information gathered from the students in the Pre-Activity Survey revealed that a large number of students had computers at home and computer experience. Findings for the Pre-Activity survey are reported in Table 1. When participants were asked if they had a computer in their home, 92% of the students in Group 1 answered yes. Of the students in Group 2, 94% stated that they had a computer at home. In total 93% of all students in the classes said they had a computer in their homes.

When asked if they used this computer, 89% of the students in Group 1 answered yes. In Group 2, 94% of the students stated that they used this computer. In total, 92% of all students in the classes said they used the computer.

When asked how much time the students spent using the computer per week there was greater variation. In the four classes combined, 15% of the students stated that they used the computer less than 1 hour per week. Twenty-eight percent of the students stated that they used the computer 1-2 hours per week, 28% of the students stated that they used the computer 2-5 hours per week, while 11% stated that they used the computer 5-10 hours per week, 10% stated they used the computer more than 10 hours per week, and 8% did not answer the question (this number comprised of students who did not have a computer at home).

Students were asked if they had used CD-ROM encyclopedias. Combining the four classes, 31% said they never used CD-ROM encyclopedias, 51% stated they used CD-ROM encyclopedias occasionally, while 10% stated that they used CD-ROM encyclopedias frequently, and 8% did not answer.

The survey then asked if students had Internet access at home. Of the students in the four classes, 67% stated that they had Internet access at home, with 25% of the students stating that they did not have Internet access, and 8% not answering this question (consisting of the students without computers in their homes). When asked if they used

the Internet for research purposes, 31% of the students in the combined classes stated that they never used the Internet for research, 31% stated they occasionally used it, with 11% stating that they frequently used the Internet for research, and 28% did not answer (again consisting of students without computers and/or Internet access).

When asked if they enjoyed using the computer at home or in school, all of the students in every class answered yes. This point was further illustrated by the pictures the students drew on the reverse of the Post-Activity Survey. A total of 53 of the pictures the students drew featured computers, while 13 of the pictures depicted students using books.

Table 1

Pre-Activity Survey

Question	Group 1		Group 2		Combined	
	N	%	N	%	N	%
Computer at home						
Yes	34	92%	33	94%	67	93%
No	3	8%	2	6%	5	7%
Other	0	0%	0	0%	0	0%
Total	37	100%	35	100%	72	100%
Use home computer						
Yes	33	89%	33	94%	66	92%
No	1	3%	0	0%	1	1%
Other	3	8%	2	6%	5	7%
Total	37	100%	35	100%	72	100%
Frequency of computer use						
< 1 hr p/wk.	3	8%	8	23%	11	15%
1-2 hrs. p/wk.	13	35%	7	20%	20	28%
2-5 hrs. p/wk.	10	27%	10	29%	20	28%
5-10 hrs. p/wk.	5	14%	3	9%	8	11%
>10 hrs. p/wk.	2	5%	5	14%	7	10%
N/A	4	11%	2	6%	6	8%
Total	37	100%	35	100%	72	100%

Table 1 (Continued)

Question	Group 1		Group 2		Combined	
	N	%	N	%	N	%
Use a CD-ROM encyclopedia						
Never	10	27%	12	34%	22	31%
Occas	21	57%	16	46%	37	51%
Freq	2	5%	5	14%	7	10%
N/A	4	11%	2	6%	6	8%
Total	37	100%	35	100%	72	100%
Internet access at home						
Yes	24	65%	24	69%	48	67%
No	9	24%	9	26%	18	
N/A	4	11%	2	6%	6	8%
Total	37	100%	35	100%	72	100%
Use Internet for research						
Never	11	30%	11	31%	22	31%
Occas.	12	32%	10	29%	22	31%
Freq.	2	5%	6	17%	8	11%
N/A	12	32%	8	23%	20	28%
Total	37	100%	35	100%	72	100%
Enjoy computer use						
Yes	37	100%	35	100%	72	100%
No	0	0%	0	0%	0	0%
N/A	0	0%	0	0%	0	0%
Total	37	100%	35	100%	72	100%

Observation Notes

During the first week of the project, the librarian observed the students while working on their research. During the 40 minute class period, the librarian would observe the students at 15 minute intervals, making tally marks on the observation checklist (see Appendix D). The numbers listed in the classroom observations below do not reflect a total count of the students per class due to the fact that not all students were permitted by their parents to participate in the study. The librarian excluded those students from

observation. Individual students would be observed at more than one task during the library class time. The focus of the observation was to find out if students were able to go through the process of formulating keywords and use these keywords to search for information. Observation further revealed if students were able to locate articles using keywords and take the next step of revising keywords as needed to continue searching for information.

Reference books and materials were made available to the students to choose from at their own discretion. Four computers were available to the students, these were equipped CD-ROM's with Grolier's Multi-Media Encyclopedia, Compton's Interactive Encyclopedia (a 1994 version, and a 1995 version), and Microsoft Electronic Bookshelf (containing a dictionary, thesaurus, atlas, book of quotations, and an encyclopedia).

Students worked in 15 minute rotations, 15 minutes on the computer, then 15 minutes using print sources. During their 15 minutes on the computer, students worked on the set of questions for computers, and then switched to the alternate set of questions during their time using print sources. In all classes, the few students who did not have access to a computer at home were stationed at the computers first, then other students were added.

Observation of Class 1

There were a total of 19 students in this class who participated in the study and were observed. In the first rotation, eight students were able to choose correct sources while working on the computer, and were able to formulate keywords which then led to articles. Once these students found articles, some found it difficult to extract information from them. Two students went on to try other keywords, which led to other articles. Another group of 8 students were brought up to work with the computers, and these students were able to locate correct sources, identify keywords, which led them to articles. Three of these students needed assistance changing keywords when trying to change topics.

Of students working with print sources, the librarian observed 11 of the students actively seeking information using print sources. These students had chosen keywords that were appropriate and led to articles. One person needed assistance revising a

keyword. The major difficulty again seemed to be in extracting the required information, rather than locating information.

There was a great deal of enthusiasm among the students evidenced by their time on task and their excitement when permitted to use the computer.

Observation of Class 2

There were 13 students in this class who were permitted to participate in the study. Of students working with computerized sources in 2 rotations, all 13 were able to locate correct sources, identify keywords, and locate articles. Two students needed help revising keywords during their library time. All of the students were able to extract information from the articles, though they needed to be reminded to read the headings and scroll down to where the needed information was located.

Of the students working with print sources, 10 were able to choose correct sources for information, and 3 needed assistance in choosing sources. Eleven of these students were able to identify keywords that led to articles, and 2 students were not able to identify a keyword and required assistance. After assistance, all students were then able to locate articles from which to gain information.

Again, there was a great deal of enthusiasm for the research process that included the use of the computer. Students were excited, involved in the search for information, and for the most part stayed on task throughout the library period.

Observation of Class 3

There were 18 students in this class permitted to participate in the study. During the class session, all 18 of the students were rotated up to the computers at various points, and all were able to choose correct sources, identify keywords, and locate articles. While using print sources, 16 of the students were able to choose correct sources, 2 needed assistance, 16 were able to identify keywords, and locate articles, while again, 2 needed further assistance in identifying keywords.

This particular class was very successful throughout in staying on task and completing the various research questions. They were highly motivated in their working with both print and computerized sources.

Observation of Class 4

There were 21 students in this class permitted to participate in the study. Overall, during this class session, 13 students chose correct computerized sources with which to work, while 8 others required assistance. Eleven students could identify keywords that led to articles, with 10 other students needing assistance. Two students needed assistance revising keywords, and 2 others were able to revise keywords independently.

Of students using print sources, 16 were able to choose correct sources, 5 students needed assistance matching the question to the correct source from which to locate an answer. Fifteen students were able to identify keywords which led to articles, 1 student required assistance with formulating appropriate keywords.

Observation Overview

As the observations continued for three weeks, it became apparent that the major difficulties for the students were in extraction of information rather than location of information. Students were able to choose from print versions of atlases, almanacs, encyclopedias, and books. They made correct choices for the most part in selecting which book was needed to answer any particular question. When working on the computer selecting sources was even less of a difficulty; even when working with the Microsoft Bookshelf, students had no difficulty moving from the Atlas to the Encyclopedia, to the Dictionary included in this CD-ROM.

Formulation of keywords to search under also did not present a difficulty for the students perhaps because the answers were available searching under three major headings, (Alaska, Iditarod, and Sled Dog Racing). Even students working independently at home reported to the librarian various addresses they used and their apparent success in locating information on the Internet. When working with keywords, most keywords led to articles that students were able to use to find information, and with a small amount of practice students were able to formulate new keywords to find other information. The students were comfortable using a trial and error method for formulating keywords when they wanted to move on to a different topic.

The major difficulty experienced by students in the course of their research project, which became obvious during observation, was the extraction of information

from articles. Students expected the answers to be readily apparent. They had difficulty scrolling down through CD-ROM encyclopedia articles, locating appropriate headings in which to find answers to their questions. Likewise they had difficulty skimming through print encyclopedia articles looking for relevant information.

Post-Activity Survey

After the students had turned in their reports, they were asked to complete a Post-Activity Survey. The purpose of this survey was to discover the students' thoughts, emotions, and attitudes regarding the two methods of research. The results given below are combined class totals. Table 2 reports these findings for Groups 1 and 2 as well as the combined totals.

When asked which method of research was the fastest, 19% of the students chose the print encyclopedia, 25% chose the CD-ROM encyclopedia, 3% selected magazines, 42% listed Internet web sites, and 7% listed other (and indicated books as their choice) with 4% not answering.

When asked which method of research was the easiest for them, 24% chose the print encyclopedia, 29% of the students selected CD-ROM encyclopedias, 39% chose Internet web sites, 7% listed other (again indicating books), 1% did not answer, and none of the students listed magazines as the easiest source.

Which method was most helpful was the next question, with 31% of the students listing the print encyclopedias as most helpful. CD-ROM encyclopedias were chosen as most helpful by 19% of the students, while 1% chose magazines, 33% chose Internet web sites, 11% chose other (books) and 4% did not answer.

The last question on the Post-Activity Survey asked students which method of doing research was their favorite. The print encyclopedia was chosen by 11% of the students, while 38% chose the CD-ROM encyclopedia as their favorite, and 35% chose the Internet web sites. In the "other" category, books were chosen by 11% of the students, 6% did not answer this question, and none of the students chose magazines as their favorite method of doing research.

Table 2

Post-Activity Survey

Question	Group 1		Group 2		Combined	
	N	%	N	%	N	%
Fastest method						
Print Enc.	8	22%	6	17%	14	19%
CD-ROM Enc.	7	19%	11	31%	18	25%
Magazine	0	0%	2	6%	2	3%
Internet	17	46%	13	37%	30	42%
Other	4	11%	1	3%	5	7%
N/A	1	3%	2	6%	3	4%
Total	37	100%	35	100%	72	100%
Easiest method						
Print Enc.	10	27%	7	20%	17	24%
CD-ROM Enc.	11	30%	10	29%	21	29%
Magazine	0	0%	0	0%	0	0%
Internet	13	35%	15	43%	28	39%
Other	3	8%	2	6%	5	7%
N/A	0	0%	1	3%	1	1%
Total	37	100%	35	100%	72	100%
Most helpful						
Print Enc.	13	35%	9	26%	22	31%
CD-ROM Enc.	5	14%	9	26%	14	19%
Magazine	0	0%	1	3%	1	1%
Internet	11	30%	13	37%	24	33%
Other	6	16%	2	6%	8	11%
N/A	2	5%	1	3%	3	4%
Total	37	100%	35	100%	72	100%
Favorite method						
Print Enc.	7	19%	1	3%	8	11%
CD-ROM Enc.	13	35%	14	40%	27	38%
Magazine	0	0%	0	0%	0	0%
Internet	11	30%	14	40%	25	35%
Other	4	11%	4	11%	8	11%
N/A	2	5%	2	6%	4	6%
Total	37	100%	35	100%	72	100%

Research Questions

Actual raw scores and group percentages are located in Appendix F. The summary table below demonstrates that Questions 1-25 were easier to answer than Questions 26-50, regardless of the type of information source used. Overall for Questions 1-25 there were 1,376 correct answers out of a possible 1800, for a total of 76% correct answers. While for Questions 26-50, there were overall 1,171 correct answers out of a possible 1800, a total of 65% correct answers.

Table 3

Correct Answers by Groups

Questions 1 – 25	n	# Correct	% Correct
Group 1	37	786	85%
Group 2	35	590	67%
Combined	72	1376	76%
Questions 26-50	n	# Correct	% Correct
Group 1	37	663	72%
Group 2	35	508	58%
Combined	72	1171	65%

The study design prepared for such a discrepancy in difficulty. In analyzing print sources versus computerized sources, the questions were evenly divided between those two question groups. This effectively negates the skewing effect of the more difficult questions.

The average number of correct answers found using print sources was 25.06, and the average number of correct answers found using computerized sources was 25.88.

Table 4

Computer vs. Print Sources

Source	Total # Correct	Avg. # Correct	Avg. % Correct
Computer	1294	25.9	72%
Print	1253	25.1	70%

Conclusions and recommendations based on all of the above findings will be discussed in the next chapter.

Chapter 5

Summary, Conclusions, and Recommendations

Summary

The purpose of this study was to determine elementary students' abilities in the information gathering process, and the impact of the use of computerized resources on these abilities. Were the students' results improved by the use of computerized research technology? How well did students make use of this technology to find information? Did the students effectively combine the use of print sources and computerized sources to gather and assimilate information? Did the inclusion of the computer make the student apprehensive about completing the assignment or did it generate excitement and interest? By completing research on fifty questions alternating the use of computerized and print sources, and completing surveys before and after their research, data was generated from which tentative conclusions may be drawn.

Conclusions

The evidence presented in Table 4 in the previous chapter indicated that the type of information source used (print or computer) had little impact on the number of correct answers generated. With an average of 25.9 questions answered correctly using computerized sources, and an average of 25.1 questions answered correctly using print sources it seems that the type of information source used had little impact on the number of correct answers. Thus the use of computerized research technology improved students' results only slightly.

It was observed that students were able to locate information more efficiently using computerized sources of information than with print sources. Observations of the classes listed the success demonstrated by the students as they formulated appropriate keywords and searched using these keywords, and then as they revised keywords as necessary. Internet web sites were chosen by 42% of the students as the fastest method of research, and web sites were listed as the easiest method of doing research by 39% of the students. These statistics further support the conclusion that students were able to use

computerized sources of information efficiently and effectively in their search for data. These findings agree with the study done by L. Perzylo in his investigation of children's use of Multimedia CD-ROM encyclopedias (Perzylo, 1992, p. 238) Observation noted that isolating and extracting information presented more of a challenge to students using both print and computerized information sources. This was also noted by Neuman, who noted the disconnection between students' preferences for computerized formats, and their difficulties in extracting needed information (Neuman, 1997, p. 692).

As mentioned earlier there is less of a disparity between correct answers found using print and computerized sources than might have been expected. With a total number of 1294 questions answered correctly using computerized sources of information, and a total number of 1253 questions answered correctly using print sources of information (see Table 4), the data reveals that there is little difference in the correct answers found between the two types of sources. So it could not be stated, based on this limited study, that the use of computerized technology improved students' results significantly.

The design of the student report necessitated that each student use both print and computerized sources. Observation noted that students had little difficulty using print sources of information; however, the students did not consider it the fastest or easiest method. The print encyclopedia was listed by 19% of the students as the fastest method of doing research versus 39% for the Internet. The print encyclopedia was chosen by 24% of the students as the easiest method of research, versus 29% for the Internet. It was however, considered equally as helpful as the Internet (31%, Internet and 33%, print encyclopedia). Most telling however, was that the print encyclopedia was outshadowed by the two computerized sources as the favorite method of research (CD-ROM encyclopedia 38%, Internet 35%, and Print Encyclopedia 11%). In explaining the popularity of computerized formats there is always the attraction of something new to be considered, yet since the majority of these students own this technology themselves, and have access to them at home, it is difficult to state categorically that novelty is the major attraction for the students.

In terms of combined student results, students were able to answer 71% of the 50 questions correctly, so it would seem that students were able to combine the use of print and computerized information sources.

Both the surveys make it clear that the students were highly enthusiastic about the inclusion of computer technology in the assignment. In the Pre-Activity Survey, 100% of the students reported that they enjoyed using the computer either at home or in school. In the Post-Activity Survey 38% of the students chose the CD-ROM encyclopedia as their favorite method of doing research, while 35% chose the Internet web site as their favorite research method. Observation of the classes also noted a high level of enthusiasm for the entire project, but particularly for the use of the computer, as students waited anxiously for their turns to use the computer, and reported back to the librarian their experiences at home using Internet sources.

Recommendations

Based on the difficulties students encountered with extraction of information regardless of the source, it would seem that further or continued instruction in skimming and scanning skills would be appropriate, as would further instruction in the process of scrolling down through an article, reading subheadings. It would be interesting to repeat this study after student instruction in skimming and scanning of articles, and location of information in a variety of other print sources. It would be interesting to see how the scores would be influenced by further instruction in these skills.

As computer technology is included in more areas across the school curriculum, the novelty of working on the computer will diminish naturally for students. With the wide range of information available and the variety of formats offered, it is to be hoped that the use of computers will not lose its appeal for students.

It is obvious that there is and will continue to be a need for students to be able to access and utilize computerized sources of information. The instruction of the skills necessary for making efficient and effective use of these information sources will and should continue to play an important role in library information instruction.

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Appendix A

Student Permission Letter

January 9, 1998

Dear Parents of Fourth Grade Students:

Your child will be assigned a report by his/her teachers this marking period. That report will include students using both print and computerized sources for their research.

As part of my graduate studies, I am interested in learning what skills students need and how they feel about using the computer. In order to find this out, students will complete a survey and may participate in personal interviews. If a child participates in an interview his/her name will not be used in my study. In class observations will also take place.

Since this study is in addition to your child's regular school assignment we need your permission for your child to participate. If you have any questions or concerns please contact me at 259-7606. Thank you for your consideration.

Sincerely,

Betty Jane Oliva

Librarian

Please indicate whether or not you wish your child to participate in this study by checking the appropriate statement below and returning this letter to your child's teacher.

_____Yes, my child _____may participate in this study.

_____No, my child _____may not participate in this study.

_____ _____

(Parent/Guardian signature) (Date)

Appendix B

Surveys

Pre - Activity Survey

1. Do you have a computer at home?
   - A. Yes - If your answer is YES go to question #2.
   - B. No - If your answer is NO go to question #7.

2. Do you use this computer?
   - A. Yes - If your answer is YES go to question #3
   - B. No - If your answer is NO go to question #7.

3. How often do you use this computer? (Use your best guess)

   A. Less than 1 hour per week

   B. 1-2 hours per week

   C. Between 2-5 hours per week

   D. Between 5 -10 hours per week

   E. More than 10 hours per week

4. How often do you use a CD-ROM Encyclopedia?

   A. Never B. Occasionally C. Frequently

5. Do you have Internet access at home?
   - A. Yes - If your answer is YES go to question #6.
   - B. No - If your answer is NO go to question #7.

6. How often do you use the Internet for research purposes?

   A. Never B. Occasionally C. Frequently

7. Do you enjoy using the computer (either at home or at school)?

A. Yes B. No

Name _____

Post - Activity Survey

1. Think about how much time it took you to answer the questions using the computer and using the print encyclopedia and magazines.
Which was fastest to use? (Choose only one.)

A. Print Encyclopedia
B. CD-ROM Encyclopedia
C. Magazine article
D. Internet Web Site
E. Other _____

2. Overall which source of information was easiest for you to use? (Choose only one.)

A. Print encyclopedia
B. CD-ROM encyclopedia
C. Magazine article
D. Internet Web Site
E. Other _____

3. Overall which source of information was most helpful to you in doing your research? (Choose only one.)

A. Print encyclopedia
B. CD-ROM encyclopedia
C. Magazine article
D. Internet Web Site
E. Other _____

4. What was your favorite method of doing research? (Choose only one.)

A. Print encyclopedia
B. CD-ROM encyclopedia
C. Magazine article
D. Internet Web Site
E. Other _____

5. Use the back to draw a picture of any part of this assignment that you choose.

Name _____

Appendix C

Alaska/Iditarod Report - Instructions and Questions

Alaska/Iditarod Report (Group 1)

Name_____ Due Date : March 2, 1998

In order to prepare you for the upcoming study of Alaska and the Iditarod, please follow these directions.

1. Answer questions 1 - 25 using at least 2 different computerized sources. These include CD-ROM encyclopedias, magazine databases, and any Internet sources.

2. Answer questions 26 - 50 using at least 2 different print sources. These include print encyclopedias, magazines, and books.

3. All sources that you use must be included in your bibliography. The format for the bibliography will be explained by the librarian.

4. Answers are to be written in complete sentences on lined paper. Skip one line between answers. You have the option to complete this assignment on your home computer.

*Note: Students will have the opportunity to work on this assignment during their library classes in February.

Alaska/Iditarod Report (Group 2)

Name_____ Due Date : March 2, 1998

In order to prepare you for the upcoming study of Alaska and the Iditarod, please follow these directions.

1. Answer questions 1 - 25 using at least 2 different print sources. These include print encyclopedias, magazines, and books.

2. Answer questions 26 - 50 using at least 2 different computerized sources. These include CD-ROM encyclopedias, magazine databases, and any Internet sources.

3. All sources that you use must be included in your bibliography. The format for the bibliography will be explained by the librarian.

4. Answers are to be written in complete sentences on lined paper. Skip one line between answers. You have the option to complete this assignment on your home computer.

*Note: Students will have the opportunity to work on this assignment during their library classes in February.

Alaska/The Iditarod - Questions

1. When was the first Iditarod race run?
2. Who is the "Father of the Iditarod?"
3. What does the word "Iditarod" mean?
4. What is the Red Lantern award, and to whom is it awarded?
5. What is a checkpoint?
6. Who was Balto?
7. How long is the race in miles?
8. Why were people coming to Alaska at the turn of the century?
9. What is the highest elevation in Alaska?
10. What are the principal products of Alaska?
11. What is the largest city in Alaska?
12. What is the name of the chain of Alaskan islands that stretch into the Pacific Ocean?
13. One of the longest rivers in North American runs through Alaska. What is its name?
14. What is Alaska's State Flower?
15. What is Alaska's State Bird?
16. What is Alaska's State Sport?
17. What is Alaska's State Tree?

18. What is Alaska's State Fish?

19. What is Alaska's State Motto?

20. How much did William Seward pay for Alaska?

21. What was the big discovery in Alaska that sparked a surge of interest and swarms of new settlers in the last decade of the 19th century?

22. Alaska is divided into five geographical regions. What are they called?

23. What is the most northern city in Alaska?

24. Who is the Bering Sea named after?

25. How many national parks are located in Alaska?

26. What signaled the end of the use of the dog team as a mode of transportation in the late 1920's?

27. What event does the Iditarod commemorate?

28. The Iditarod takes two routes depending on the years. Which route will be taken in 1998?

29. Why didn't the serum needed for the diphtheria outbreak just get flown to Nome?

30. Where does the word "musher" come from?

31. What are the only two reasons a musher can be disqualified from the race?

32. Why are dog booties required equipment?

33. How does the food and supplies for the dogs and mushers get shipped to the race checkpoints?

34. What is the Golden Harness award?

35. What is the capital of Alaska?

36. What bodies of water border the state of Alaska?

37. What two provinces of Canada border Alaska?

38. What is the name of the body of water between Alaska and Russia?

39. What country claimed Alaska as its property before the United States bought it in 1867?

40. What year did Alaska become a state?

41. What is the largest city in Alaska?

42. What is the yearly range of temperatures in Alaska?

43. What is the approximate yearly snowfall in Alaska?

44. The largest carnivore in the world lives in Alaska. What is it?

45. Many fur bearing animals live in Alaska. Name at least 4 of them.

46. Alaska's shoreline is home to more marine mammals than are found anywhere else. Name 3 of them.

47. What does the name Alaska mean?

48. Alaska has the longest coastline in the United States. How long is it?

49. There are dancing colorful veils of light seen in northern skies at night. They are frequently seen in Alaska, what are they called?

50. How does Alaska rank in population in comparison to other states?

Appendix D

Student Reference Materials

Print Sources:

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Appendix E

Observation Format

Observation of
Students using Print Sources:

Choosing Correct Sources	Unable to choose correct sources (need assistance)
Can identify keywords	Unable to identify keywords
Keyword leads to article	Keyword doesn't lead to article
Able to revise keyword	Needs assistance to revise keyword
Able to isolate information	Unable to isolate information

Observation of
Students Using Computerized Sources

Chooses correct sources	Unable to choose correct sources (need assistance)
Can identify keywords	Unable to identify keywords (need assistance)
Keyword leads to article	Keyword doesn't lead to article
Able to revise keyword as needed	Needs assistance to revise keyword
Able to isolate information	Unable to isolate information

Appendix F

Student Report Results – Raw Data

Questions 1 – 25

	Group 1 - Computer		Group 2 - Print	
Question #	# Correct	% Correct	# Correct	% Correct
1	20	54%	19	54%
2	33	89%	23	66%
3	21	57%	12	34%
4	30	81%	20	57%
5	28	76%	22	63%
6	25	68%	22	63%
7	33	89%	27	77%
8	33	89%	24	69%
9	31	84%	28	80%
10	33	89%	25	71%
11	33	89%	25	71%
12	32	86%	27	77%
13	34	92%	27	77%
14	36	97%	28	80%
15	36	97%	27	77%
16	36	97%	25	71%
17	36	97%	28	80%
18	34	92%	20	57%
19	34	92%	27	77%
20	36	97%	27	77%
21	33	89%	26	74%
22	32	86%	23	66%
23	36	97%	24	69%
24	33	89%	26	74%
25	18	49%	8	23%
TOTAL	786	85%	590	67%

Questions 26-50

	Group 1 - Print		Group 2 - Computer	
Question #	# Correct	% Correct	# Correct	% Correct
26	12	32%	18	51%
27	24	65%	16	46%
28	35	95%	22	63%
29	10	27%	11	31%
30	20	54%	14	40%
31	24	65%	11	31%
32	29	78%	23	66%
33	30	81%	20	57%
34	22	59%	19	54%
35	35	95%	28	80%
36	31	84%	25	71%
37	29	78%	24	69%
38	30	81%	22	63%
39	32	86%	28	80%
40	31	84%	24	69%
41	31	84%	27	77%
42	16	43%	16	46%
43	29	78%	20	57%
44	27	73%	12	34%
45	29	78%	24	69%
46	33	89%	26	74%
47	30	81%	25	71%
48	20	54%	15	43%
49	33	89%	25	71%
50	21	57%	13	37%
TOTAL	663	72%	508	58%