Advisor: Joanne Jasmine, Ed. D.

Using WebQuests, Interactive Websites, Software Programs, and Computer Centered Projects to Enhance Knowledge of Ecosystems and Lessen Incidents of Calling Out and Student Disengagement Among 4th Grade Students

Elaine Hetherington
Program of Curriculum and Instruction

Submitted in partial fulfillment
Of the requirements for the degree of
Master of Arts in the
Graduate Program
Caldwell College
2011

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

Abstract

The intention of this study was to determine if the use of technology during science instruction increased on-task behavior and motivation. Computer technology in the form of WebQuests, interactive websites, software programs, and computer centered projects were implemented to provide virtual learning opportunities in science. Various qualitative methodologies were used to triangulate the data. These methods consisted of field notes, tally charts, a post-test, and a student questionnaire. The field notes and questionnaires indicated that the two student participants enjoyed using technology during the "Ecosystems" science unit. At the conclusion of this study, each student responded positively to the questions regarding the use of technology. Data revealed that students were more motivated when technology was integrated into classroom instruction as calling out and disengagement decreased. Furthermore, field notes indicated that there were no incidents of complaining from either student during computer-based instruction.

Table of Contents

Chapter 1

Introduction

In the last decade computer technology has been recognized as an important learning tool in education (Jeffs, Morrison, Messenhaimer, Rizza, & Banister, 2003). Access to computer software programs and Internet information has revolutionized instruction by providing an interactive and hands-on approach to learning (Lipscomb, 2003). Applications such as WebQuests and interactive whiteboards can increase positive attitudes and levels of motivation among students (Halat, 2008) by presenting content through multiple representations, such as graphics, videos, and hands-on activities. These applications allow the entire class to see, participate, and be actively engaged in the lessons (Jeffs, et al., 2003), therefore, giving meaning and purpose to learning (Song & Keller, 1999). When goals and outcomes are valued by the learner, an increase in motivation is likely to occur, thus, resulting in more time on-task and fewer discipline problems (Schmacker, Young, & Bembry, 1995).

Background

This study was conducted in a PreK-8 school in a suburban Northeastern section of the country. The district consisted of 2 schools and serviced approximately 900 students. The district was administrated by 2 principals and 1 superintendent. The school in which the study occurred had a total of 535 students with 47 teachers and 20 staff members. Students in kindergarten through fourth grade were taught primarily by 1 teacher, who was responsible for all major subjects. Middle school classes were taught by content area teachers and subjects were departmentalized. Every classroom in the district was equipped with a Smartboard. The students participating in this study were 2 fourth graders classified as emotionally disturbed. The school where the study occurred spoke primarily English, 91.4%, as a first language (New Jersey Department of Education [NJDOE], 2008-2009). The student to computer ratio was 2.9 (191

computers total), compared with the state average of 3.3 (NJDOE, 2008-2009). The school in which the study occurred had 139 computers located in classrooms, 7 computers located in the library, and 45 within 2 computer labs (NJDOE, 2008-2009).

Statement of Problem

Educators use technology as a tool to enhance learning and improve student attitudes towards school (Daniels, 2004). Computers can be a great resource to increase motivation and make learning more enticing (Keller, 2008). This teacher researcher had noticed a low level of motivation from her students in regards to classroom work. Students often called out, refused to work, or distracted one another, thus, completing poor quality work. Moreover, these students had an overall negative attitude toward school. This teacher researcher believed one way to increase motivation and on-task behavior was to infuse technology into her science lessons. The participants in this study attended a computer technology class weekly and were familiar with basic skills such as word processing and research through the Internet. The students appeared to enjoy technology class, seldom behaved poorly, and expressed excitement about using a computer.

Therefore, the purpose of this study was to determine if the use of technology during science instruction increased on-task behavior and motivation. Computer technology in the form of WebQuests, interactive websites, software programs, and computer centered projects were implemented to provide virtual learning opportunities in science. By using these forms of computer technology, students may be more motivated in the learning process and, therefore, lessen incidents of calling out and student disengagement (Schmaker, et al., 1995).

Research Question

To what extent did using WebQuests, interactive websites, software programs, and computer centered projects enhance knowledge of ecosystems and lessen incidents of calling out and student disengagement among 4th grade students?

Definition of Terms

Computer assisted instruction (CAI): instruction or remediation presented on a computer

Interactive Whiteboard (IWB): a large, touch screen board, which allow users to control a computer connected to a digital projector for the use of whole-class instruction

Motivation: the desire or need to accomplish goals or tasks

Off-task behavior: behavior that interferes with learning and disrupts instructional delivery including daydreaming, calling out, talking, taunting, and wandering around the room

Conclusion

Computer technology can be used to supplement traditional instruction, such as lectures and discussions resulting in an increase of student learning (Lipscomb, 2003). When student engagement and learning is valued by a student, he or she may gain the ability to stay on-task (Palmer, Smith, &Wehmeyer, 2004) and, possibly, fewer discipline problems will occur (Schmacker, et al., 1995). Therefore, the use of WebQuests, interactive websites, software programs, and computer centered projects may increase student motivation and on-task behavior.

Chapter 2

Literature Review

School children today have been born into a world of digital technology (Kolikant, 2009). Increased popularity and availability of this technology has allowed teachers to supplement traditional, lecture-based teaching with a more interactive form of instruction (Lipscomb, 2003). This active participation may make learning more meaningful, thus, student motivation is likely to occur (Keller, 2008), and this motivation may lead to more time on-task and fewer discipline problems (Schmacker, et al., 1995). Computers can also yield learning opportunities by enhancing creativity, increasing research skills, and improving understandings of material being taught (U.S. Department of Education, 1995).

History of Computer Technology

According to The Computational Science Education Project (1996), computer technology has evolved through seven stages. The first stage, The Mechanical Era (1623-1945), was a time where machines were used to solve mathematical problems. Schickhard, Pascal, and Leibnitz designed calculators that were capable of basic addition, subtraction, multiplication, and division. In 1823, Babbage created the first multi-purpose and programmable computing device, the Analytical Engine. This machine used a series of punched cards, designed to program mechanical looms for calculations (Singer, 1998). In 1853, Scheutz and his son constructed a calculator that could process 15 digits numbers and calculate fourth order differences (Moreau, 1984). In 1924, International Business Machine (IBM) was founded which, ultimately, would become one of the largest information technology companies to manufacture and sell computer hardware and software (The Computational Science Education Project, 1996).

The next stage of the computer evolution was the Generation of Electronic Computers (1937-1953). During this stage, Atanasoff and Berry constructed a machine that was capable of solving 29 simultaneous equations. In 1945, Eckert and Mauchly built the first general purpose programmable electronic computer (Moreau, 1984), and in 1952, they designed the first commercially successful computer (Rosenberg, 2004).

During the third stage (1954-1962), commercial machines were created and were the first mass produced computers with core memory. In addition, supercomputers were designed for numeric processing in scientific application (The Computational Science Education Project, 1996).

The fourth stage (1963-1972) founded Combined Programming Language (CPL). CPL was developed to create a language capable of high level, machine programming. Other advancements included integrated circuits (a chip used to process computer information) and microprogramming (a method of operating a computer using small sets of directions). By 1972, the Fifth Stage (1972-1984) revolutionized single chips and semiconductor memories to speed up the process of computers. In the 1980's IBM and Microsoft created the Personal Computer (Computational Science Education Project, 1996).

The Sixth Stage (1984-1990) created local area network (LAN) which supplied network capabilities to computers close in proximity. Wide area network (WAN) was also created for the purpose of supplying network capabilities at a distance. By 1990, the Seventh Generation stage brought improvements in hardware, operating systems, and application software. Personal computers operated faster, the World Wide Web increased in popularity, and technology became prevalent in schools (Willis, 2003).

Technology in Schools

When computers were first introduced in school settings in the 1960's, they were slow and had very little memory (Willis, 2003). At this time, computers were mostly used for administrators or for the use of computer-assisted technology (Schiffer, 2008). Computer assisted technology allowed the computer to act as a basic skills instructor. During this time, teachers were skeptical of computers and had little training in them (Schiffer).

In the early 1980's educational software and computers were limited in availability. There were approximately 100,000 computers in schools, 1 for every 400 students (Willis, 2003). Education software was designed to quiz students on facts or perform simple math problems; however, they were not used for high-order thinking activities (Schiffer, 2008). By the mid 1980's, computer-based tutorials, learning games, word processing, spreadsheets, databases, and drawing applications were developed (Hermes, 2009). Computers slowly increased in popularity within schools, as they aided in a variety of content areas to type, organize, and illustrate information (Hermes).

In the early1990's, video discs, simulations, educational databases, and other forms of computer assisted technology were used to supplement material from textbooks (Hermes, 2009). The Internet was introduced in 1995 and this provided a way for teachers to research lesson plans and access instructional websites for student resources (Hermes). By 1998, there were nearly 9 million computers in schools (Willis, 2003), and teachers were using computers to communicate with colleagues and parents via email. Multimedia videos and graphics were used to deliver instruction, provide educational games, create internet-based research projects, and apply word processing (Hermes, 2009).

Computers in Learning

Computer-assisted technology supplements traditional instruction by encouraging higher level thinking and increasing student interactions (Jerome & Barbetta, 2005). Student exploration can be facilitated through the use of the Internet. Students can search for information, build websites or design computer-based projects, and share their knowledge with peers through computers (Jonassen, Peck, & Wilson, 1999). Computer technology also provides an opportunity for students to create, evaluate, and analyze information (Atherton, 2002). For example, students can research an endangered species and ways to protect them from extinction. Students can also devise a plan to help this species return to a healthy population size. The results can be shared though a PowerPoint presentation, audio/video guide, or any computer-based project. Teachers can encourage students to respond to ideas or research, use online concept maps to promote thinking, or provide stimulating material such as animations and video segments (Jerome & Barbetta, 2005).

In addition, technology can increase learning by allowing children of various abilities levels to work at their own pace (Jeffs, et al., 2003). Teachers can customize learning for the struggling and the advanced learner as computers play the role of a tutor. Audio streaming and video streaming can be used in a virtual one-on-one tutoring experience as students post questions while educational professionals respond with immediate feedback (Jeffs, et al.).

The US Department of Education (1995) has shown that computers yield learning opportunities by enhancing creativity, increasing research skills, and improving understandings of material being taught. Researchers observed 17 classrooms and conducted interviews with students. Results of the interviews reported that technology empowered students with knowledge

and learning skills. Seventy percent of the students interviewed thought that computers made learning more fun, which in turn, kept students engaged in the learning process.

Types of Educational Technology

The Internet is one learning tool that students can use to find information and construct complex knowledge bases. For example, students can research information, distribute that information on a website, and communicate and share ideas (Jonassen, et al., 1999). E-mail, distance learning chat rooms, simulations, video streaming, and educational websites are ways the Internet can support learning by having students produce information rather than being passive recipients (Jonassen, et al.).

Another Internet application is WebQuests, an inquiry-oriented activity, which requires students to use the Internet to synthesize their knowledge about a specific topic (March, 2003). Students are given a task to complete, usually to solve a problem or fix a real-life issue (Lipscomb, 2003). For example, the "Crool Zone" WebQuest invites students to participate in an interactive look at school violence. Students take on the perspectives of students, teachers, parents, and counselors to propose a solution to end school violence. Such a WebQuest experience helps students develop an understanding for the seriousness of school violence (March, 2003). A study by Halat (2008) indicated that participants who used WebQuests had a more positive attitude towards work, as well as a higher level of motivation. All 202 participants provided positive responses to wanting to use WebQuests and indicated that WebQuests were a break from textbook and traditional ways of teaching.

Interactive whiteboards is another form of technology used in classrooms (Gage, 2005). Interactive whiteboards are large, touch screen boards, which allow users to control a computer connected to a digital projector (Smith, Higgins, Wall, & Miller, 2005). Teachers can use the

interactive boards to replace flipcharts, chalk boards, and media systems. The interactive whiteboard provides a hands-on experience for the visual, auditory, and tactile learner (Beeland, 2002) as students control the computer by touching the screen (Gage, 2005). Content is presented through multiple representations, such as graphics, videos, and interactive activities, allowing the entire class to see, to participate, and to be actively engaged in the lessons (Jeffs, et al., 2003). Teachers can also make notes using digital ink, view websites as a group, model the use of software, create digital lessons and templates, write notes over video clips, and showcase student presentations (Beeland, 2002).

Integration of Technology in Science

Ferretti, MacArthur, and Okolo (2002) suggested that technology is a critical aspect of instructing science. Technology enables science educators to teach students how to collect, store, and process data into a variety of formats such as tables, charts, and graphs (Scaife & Wellington, 1993). Students are not limited by their physical drawing and graphing skills, instead their work can be judged on content. Students can also use technology to model the research techniques of biologists, scientists, and engineers. Computers can simulate experiments completed by these people that are otherwise too expensive or dangerous in real life, and software programs can help measure, document, interpret, and manage data collected in the experiment (Wolf, 2003).

Motivation and Learning

Motivation is the desire or need to accomplish goals or tasks (Lerner, 2006). In addition, motivation to learn is enhanced when there is an arousal of learner curiosity or when the learner finds meaning in the information being taught (Keller, 2008). When goals and outcomes are valued by the learner, motivation to learn will most likely occur (Schweinle, Meyer, & Turner,

2006). Students who do not find learning to be enjoyable or rewarding have a low level of motivation, which can cause an increase in off-task behavior (Schweinle, et al.). Off-task behavior is behavior that interferes with learning and disrupts instructional delivery including daydreaming, calling out, talking, taunting, and wandering around the room (Shumate, Wills, & Howard, 2010).

Keller (2008) found that student motivation can be established in a classroom that integrates technology within its instruction. Computers can enhance learning activities by engaging the learner in the material through interactive tasks. Content presented on a computer can be captivating to student interests through pictures, colors, and animations (Song & Keller, 1999). When information is meaningful and has a purpose, motivation increases.

Related Studies

Waxman and Huang (1996) conducted a study to examine whether student on-task and off-task behaviors significantly differed according to the degree of technology utilized within a classroom. The study included 2,189 middle school students who were randomly chosen from a multi-ethnic school district in the south central region of the United States. Data collection methods included observations, anecdotal records, and checklists. Waxman and Huang reported that students who utilized technology during instruction spent 20% more time on-task compared with their peers who did not use technology. Students became increasingly engaged in meaningful tasks when the classroom was student-centered. The study also indicated that the group of students who utilized technology demonstrated fewer discipline problems and valued the experience of working with computer technology (Waxman & Huang, 1996).

Beeland (2002) conducted a study to determine the effects of using interactive whiteboards as an instructional tool to encourage student engagement. The participants included

10 teachers and 197 students separated randomly into 10 classes. In each class, the teacher presented a lesson using the interactive whiteboard. At the conclusion of the lesson, surveys and questionnaires were distributed. The results indicated a strong preference for the use of interactive whiteboards in the classroom. Additionally, the data collected from the surveys and questionnaires, as well as anecdotal records from the researcher, showed a significant statistical improvement in student engagement.

Daniels (2004) conducted research on the motivational effects of using computer technology during writing instruction. The participants included fifth grade teachers and students who were preparing for a state-wide standardized assessment by completing writing prompts. Daniels provided questionnaires to the teachers to investigate their attitudes towards computer usage. Data suggested that as motivation increased, enthusiasm for writing improved, which led to increased lengths of student writing samples. The research also suggested that students spent more on-task time working on the computers and complaining less (Daniels, 2004). Daniels attributes this to the idea that students liked playing any activity that was computer related.

Conclusion

Student motivation and engagement is essential in the learning process. One factor that influences student levels of motivation is technology (Keller, 2008). Technology can benefit educators and students by supplementing traditional instruction with a more meaningful way (Lipscomb, 2003). When students are exposed to innovative technology and stimulating visuals, engagement in learning can increase (Song and Keller, 1999). As learning is valued by students, off-task behaviors can decrease and attentive, on-task behavior can become more evident (Schmaker, et al., 1995).

Chapter 3

Methodology

This study investigated whether the utilization of computer technology during science instruction improved off-task behavior and student disengagement. WebQuests, interactive websites, software programs, and computer centered projects were incorporated into a science unit on ecosystems. This teacher researcher assessed student behavior and knowledge of ecosystems through the use of a post test, open-ended questionnaire, and a tally chart with field notes. This teacher researcher hypothesized that students would improve time on-task, increase motivation to learn, understand the content, and complain less about given assignments through using computer technology in the learning process.

Participants

The participants in this study were two fourth grade students in a suburban Pre-K to 8th grade school. This self-contained class consisted of 5 male students, with 1 second grade student, 2 fourth grade students, and 2 fifth grade students. However, for this study, only 2 fourth grade students participated. These students were classified as emotionally disturbed and were placed in a self-contained classroom all day with the exception of lunch, recess, and specials. This study occurred during the 40 minute science period, 5 days a week, for a total of 5 weeks. This teacher researcher taught in this self-contained class for 2 years and had taught previously in a private special education school for 2 years.

Materials

Through written consent, the superintendent and principal approved this action research project prior to implementation (see Appendix A). A parental consent letter (see Appendix A) was distributed to parents and/or guardians describing the nature of this study, as well as the

potential risks and benefits. This teacher researcher obtained parental written consent from both students who participated in this study.

The first method of data collection in this study was a post test (see Appendix B). Post tests are used to formatively assess the effectiveness of an intervention at the conclusion of the study (Hendricks, 2009) and provide an opportunity to see change in learning (Hendricks). The post-test was included in the fourth grade textbook series *Science: A Closer Look* (Hackett, et al., 2008). This assessment consisted of multiple choice questions, fill in the blanks, and open-ended questions. The students were assessed on the 6 biomes, abiotic/biotic factors, food chains, food webs, and ecosystems.

The second method of data collection was an open-ended questionnaire (see Appendix B). Open-ended questionnaires were distributed at the end of this study to allow students to express their thoughts on the use of computer technology. This qualitative method is quick and less time consuming than analyzing verbal inquiry data (Hendricks, 2009). The questions were designed in an open-ended manner allowing participants to elaborate on questions and provide specific examples to help determine the value of computer based instruction (Glanz, 2003). In addition, participants were labeled anonymously to allow more expressive opinions.

The third method of data collection was observational data that included a tally chart and field notes (see Appendix B). To facilitate these observations, this teacher researcher wrote field notes on the antecedents of student behavior and completed a tally chart on the occurrences of calling out and disengagement. Field notes were selected to provide written anecdotal documentation of information observed by this teacher researcher. This method is convenient and can help document unexpected events and detailed notes (Glanz, 2003). Tally marks were selected to record instances of the target behaviors in a systematic and easy way (Glanz).

Data triangulation was used to verify the various evaluation methods to assess the results of this research study. Triangulation clearly identifies strengths and weaknesses and helps add credibility and validity to make the findings stronger through analyzing multiple forms of data (Glanz, 2003). For all methods of data collection, complete anonymity and confidentiality were maintained. Students were identified as "student a" and "student b" on the post test, open-ended questionnaire, and the anecdotal notes.

Procedure

Throughout the school year, this teacher researcher instructed science lessons daily for 40 minutes. Prior to this study, the students typically read from the science book and engaged in classroom discussions and note-taking. After each lesson, the students were formally assessed on a quiz. At the conclusion of the chapter, the teacher distributed a cumulative test that was graded on a 100% scale. Students also completed experiments and projects. However, a majority of instruction and classroom activities did not infuse computer technology. Therefore, when this study was implemented computer activities occurred 5 times a week, Monday through Friday. Data was collected 3 times a week, including Mondays, Wednesdays, and Fridays with the exception of January 17, 2011.

During the first week of this study, January 3 - 7, 2011, students received traditional instruction based on reading, lecturing, and note-taking. This teacher introduced the ecosystems chapter to the participants and recorded baseline data Monday, Wednesday, and Friday. Incidents of calling out and disengagement were documented on tally charts and explained in field notes. Disengagement describes behavior that interferes with learning and disrupts instructional delivery. Additional field notes were recorded to identify the antecedents of the observed behavior.

During the second week, January 10 - 14, 2011, the students researched different ecosystems using the Internet (http://geographyworldonline.com/ecosystems.html). Students were given an assignment to choose one ecosystem and identify all the biotic and abiotic factors. Using Microsoft Word and clipart, students sorted these factors onto a T-chart. This teacher researcher collected data on Monday, Wednesday, and Friday.

During the third week, January 24 - 28, 2011, students learned about the Earth's six biomes. The objectives of this lesson were for students to explain how energy is cycled through an ecosystem and to describe food webs and the predator to prey relationship. Students built a virtual food web of animals in a Mexican ecosystem from a Scholastic Explorers website (http://teacher.scholastic.com/activities/explorer/ecosystems/be_an_explorer/map/form_wildcats.htm).A cumulative activity required students to create a travel brochure of a specific biome using Microsoft Works. Data was collected on Tuesday, Wednesday, and Friday. The district in which the students attend was closed on January 17, 2011.

During the fourth week, January 31 - February 4, 2011, students received traditional, lecture-based instruction on the relationships within ecosystems. Students were given 1 school week to complete a WebQuest titled "Exploring the Ecosystems" (http://www.beverlyschools.org/schools/exploringecosystems/introduction.html). In this WebQuest students pretended they were taking the role of different scientists, including a botanist, zoologist, and meteorologist. Students were assigned these roles as they embarked on a journey through the six biomes. At the conclusion of this lesson, the students completed a PowerPoint slideshow on an animal from one of the six biomes. Students completed Internet research (http://schools.dcsdk12.org/education/components/scrapbook/default.php?sectiondetailid=62736,

http://www.worldbiomes.com/, & http://ths.sps.lane.edu/biomes/index1.html) to present information on physical traits, location, climate, animal threats, and adaptations. In addition, students wrote an animal riddle and published it using word processing. The student participants worked on both activities Monday through Friday, for 40 minutes each day. This teacher researcher collected data on Monday, Wednesday, and Friday.

During the fifth week of this study, February 7 - 11, 2011, the two participants presented their PowerPoint presentations to the class. A final post-test assessment was distributed and a questionnaire was completed.

Conclusion

This research study was conducted to understand how technology may improve motivation and lessen incidents of calling out and disengagement. Triangulation, a process in which several forms of data are collected and analyzed, helped establish credibility (Hendricks, 2009). Quantitative data in the form of a post test was used to measure student knowledge of ecosystems. The qualitative data in the forms of questionnaires, tally charts, and field notes were used to measure perceived student motivation and amount of time off-task and disengaged.

Chapter 4

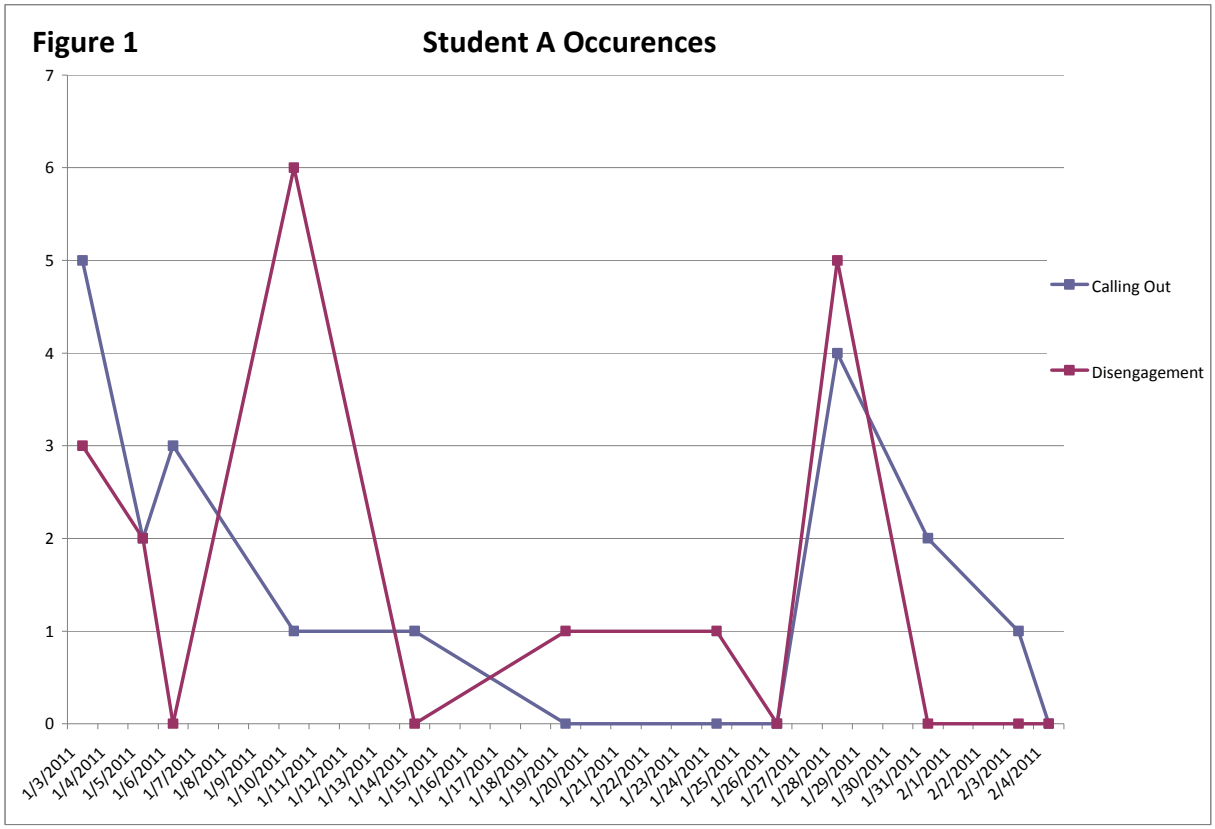
Analysis of Data

This study was conducted to determine if the use of technology during science instruction increased student on-task behavior and motivation. This teacher researcher integrated *WebQuests, interactive websites, software programs, and computer centered projects within a unit on ecosystems to examine whether incidents of calling out and student disengagement was lessened. Three different measures to collect data were implemented, a* tally chart and field notes, *a post-test, and* an open-ended questionnaire.

Results of Data

Student A

During the first week of this study, January 3 - 7, 2011, this teacher researcher collected baseline data on the occurrences of calling out and disengagement (see Figure 1).



During this collection period (3 times a week for 40 minutes), students received traditional instruction which incorporated reading, lecturing, discussing, and note-taking. On January 3, 5, and 6, Student A had 5, 2, and 3 incidents of calling out respectively. Field notes indicated that calling out included the student making sound effects, shouting answers, and telling the teacher, "I need an energy drink". On January 3, 5, and 6, Student A had 5, 5, and 0 occurrences of disengagement respectively. Field notes indicated that these occurrences included rolling eyes, playing with pencils, ignoring the teacher, looking at the clock, and crumpling paper.

During the second week of this study January 10-14, daily, the students researched different ecosystems using the Internet and were given an assignment to choose one ecosystem and identify all the biotic and abiotic factors. Each day, the first 20 minutes of the period was spent reading, taking notes, and having a classroom discussion. During the second half of the

period, students used Microsoft Word and clipart to sort these factors onto a T-chart. Data was collected on January 10 and 14, and due to unexpected school closings, data was also collected on January 19, and considered part of week 1 (see Figure 1). Student A had 1 incident of calling out on January 10 and 14 and no incidents of calling out on January 19. Field notes revealed that calling out included saying an answer aloud during note-taking and asking the teacher if air was an abiotic or biotic factor while on the computer. On January 10, 14, and 19, Student A had 6, 0, and 1 incidents of disengagement respectively. Field notes indicated that every incident of disengagement occurred during traditional teaching and included the following: wandering eyes, writing in the textbook, not following along with note-taking and placing hands over his eyes.

During the week of January 24 - 28, each day, students created a travel brochure of a specific biome using Microsoft Word. The first 20 minutes of the period was traditional instruction, which included reading books and completing a graphic organizer. The remaining 20 minutes of the period was spent researching their individual biome and typing the brochure on the computer. Students also built a virtual food web of animals in a Mexican ecosystem from a Scholastic Explorers website (http://teacher.scholastic.com/activities/explorer/ecosystems/be_an_explorer/map/form_wildcats.htm). At the conclusion of this week, January 28, the students completed a quiz and then began working on a PowerPoint slideshow about an animal from one of the six biomes. Data revealed that Student A had no incidents of calling out January 24 and 26. On January 28, he had 4 incidents which all included yelling at staff members when he was told to complete a quiz during traditional instruction time. Field notes revealed that prior to the science lesson on January 28, Student A was reprimanded during his physical education class and he entered this class upset (yelling, rolling eyes, pushing materials off the desk). Regarding disengagement, Student A had

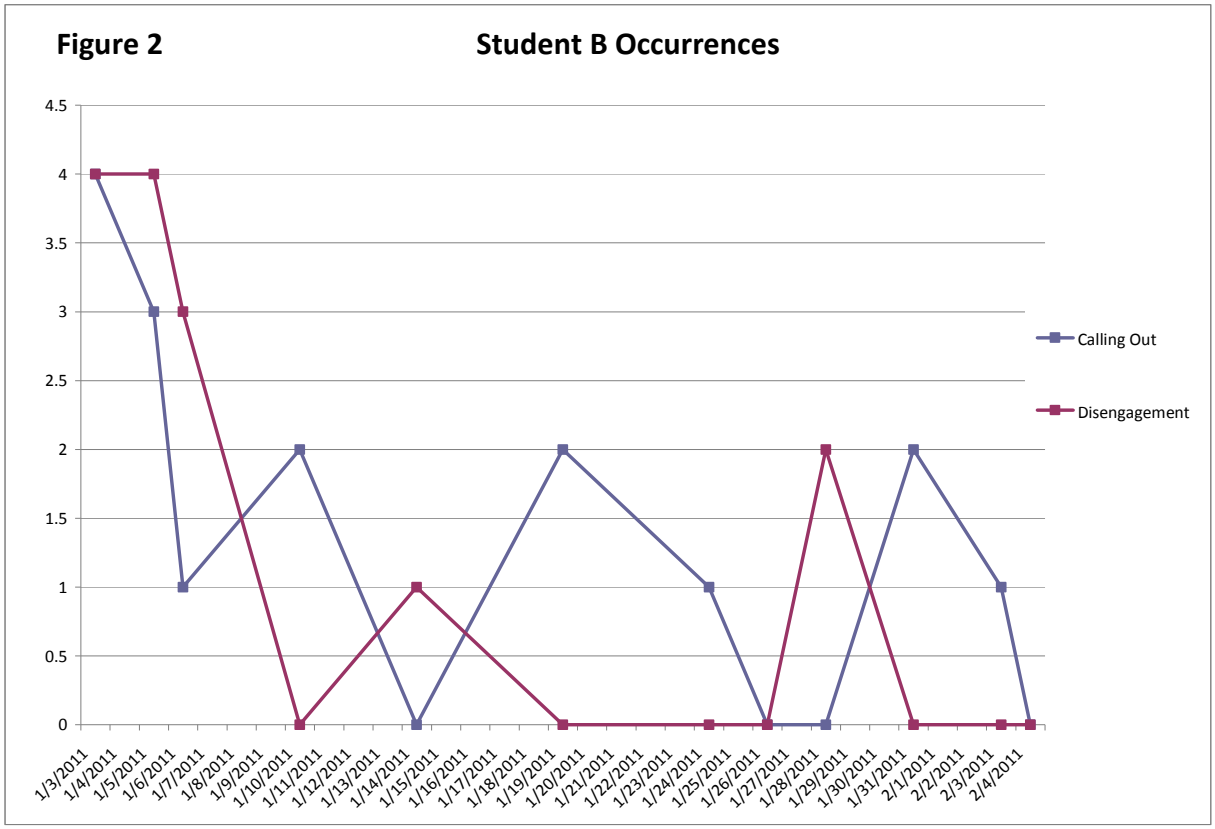
1 occurrence during traditional teaching on January 24, followed by 0 on January 26, and 5 on January 28. Field notes revealed that disengagement included the following: wandering eyes, throwing a pencil, refusing to work, and throwing the lesson quiz on the ground. These occurrences all happened during traditional instruction and were related to the incident that occurred the previous period during the physical education class.

During the week of January 31- February 4, students studied the Earth's six biomes. They were given 1 school week to complete a WebQuest titled "Exploring the Ecosystems". On January 31, February 3, and February 4, Student A had 2, 1, and 0 incidents of calling out respectively. Field notes indicated that during the traditional teaching time, Student A shouted that he wanted to take the role of the zoologist saying, "I'll be 30 by the time this works" (while the computer was loading), and shouting, "I'm done Ms. Hetherington" at the conclusion of the period while on the computer. The tally chart indicated no incidents of disengagement during the final week of this study during traditional teacher instruction or during computer integration.

Student A decreased the occurrences of calling out after technology was introduced into the science unit. The average incidents of calling out for Student A during baseline data collection were 3.33 per day. Over the course of this study, the average incidents of calling out decreased to 1.0. Furthermore, the average incidents per day of disengagement during the baseline data collection period were 1.66 and decreased throughout the study to 1.44 incidents per day. Finally, Student A scored an 81% on the science unit post-test indicating a proficiency of knowledge about ecosystems.

Student B

During the first week of this study, January 3 - 7, 2011, this teacher researcher collected baseline data on the occurrences of calling out and disengagement (see Figure 2).



During this collection period (3 times a week for 40 minutes), students received traditional instruction based on reading, lecturing, and note-taking. On January 3, 5, and 6, Student B had 4, 3, and 1 incidents of calling out respectively. Field notes indicated that calling out included the student shouting answers and asking the teacher, "What time does gym start?" On January 3, 5, and 6, Student B had 5, 2, and 0 incidents of disengagement. Field notes indicated that these occurrences included wandering eyes, looking at the clock, and staring at the walls.

On January 10, 14, and 19, Student B had 2, 0, and 2 incidents of calling out (see Figure 2). Field notes revealed that every incident of calling out was during traditional teaching and included saying answers aloud and asking the teacher for the date. On January 10, 14, and 19, Student B had 0, 1, and 0 occurrences disengagement. Field notes indicated that disengagement included wandering eyes, specifically looking at the clock while using the computer. On January

24, 26, and 28, Student B had 1, 0, and 0 incidents of calling out. The field notes indicated that while reading the textbook, the one incident of calling out occurred when Student B asked the page number without raising his hand. The tally chart indicated that Student B had no occurrences of disengagement on January 24 and January 26. There were 2 incidents of disengagement on January 28, which included refusing to work on the lesson quiz and losing focus while on the computer. Student B was modeling Student A's behavior during the quiz to avoid doing the assignment; however, when Student B was reminded that he would be using the computers upon completion of the quiz, he immediately started working. In addition, Student B mentioned he was hungry. This class is prior to the lunch period.

On January 31, February 3, and 4, Student B had 2, 1, and 0 incidents of calling out. Field notes indicated that calling out included the student shouting plans for summer vacation twice during traditional teaching, and the student telling the teacher that he accidentally ripped his paper while recording information for the WebQuest. The tally chart indicated no incidents of disengagement during the final week of the study during traditional teaching or computer-based instruction.

The results of the data collected for Student B revealed many positive changes. Student B decreased the occurrences of disengagement after technology was introduced in to the science unit. The average incidents of calling out for Student B during baseline data collection were 2.66 per day. Over the course of this study, the average incident of calling out decreased to 0.88. Furthermore, the average incidents of disengagement during the baseline data collection period were 3.66 and decreased throughout the study to 0.33 incidents per day. Finally, Student B scored an 83% on the science unit post-test indicating proficiency of the ecosystem unit.

The next data collection method was student questionnaires, which were distributed and completed on February 9, 2011. When Student A was asked if he liked learning about ecosystems on the computer, he answered yes because he thought it was more fun and faster to work on the computer. Next, Student A self-reported that the PowerPoint assignment was the most helpful form of computer technology because he learned about biotic and abiotic factors. The "Build a Food Chain" was the least liked assignment, however, he did not elaborate further as to why it was not desirable and it was not observed by the researcher. Student A also commented that computer technology helped him behave appropriately because it helped him maintain focus and prevented calling out because he knew how to use the computer and did not require assistance.

Furthermore, Student A responded that computer technology helped him pay attention and commented that he felt as though he was "in his own world" when completing computer-based activities. As a teacher observer, Student A was not easily distracted while using the computer and was more independent during assignments, thus, the feeling of being in his own world. Finally, when Student A was asked if he would like to use computers in other subjects he answered yes, specifically in social studies. He also commented that he would like to use computers and complete computer-based projects during other subjects so he did not have to read from a book. Consequently, avoiding reading will not help this student; therefore, this teacher researcher must choose computer-based activities that are literacy rich. While this is still reading, Student A will be more apt to comply.

When Student B was asked if he liked learning about ecosystems on the computer, he answered yes because he liked to search for pictures on Google images. Student B believed the most helpful form of computer technology was the WebQuest because he learned about weather,

animals, and climate in the Tundra, and that the "Build a Food Chain" website was the least helpful assignment. Unfortunately, he did not elaborate further. The teacher researcher believes that Student B did not likethe assignment because it was a quick activity that did not require researching. Next, Student B commented that computer technology helped him behave appropriately because he likes to research things, which he felt kept him quiet. He also felt that technology prevented him from calling out because the computers helped him pay attention. Finally, Student B commented that he would like to use computers in other subjects, specifically in math as he felt that he learned more on the computer, than in textbooks.

Analysis of Data

Using multiple methods of data collection and analysis provides credibility and validity to the findings of this study (Glanz, 2003). The qualitative analysis of the field notes, tally chart, post-test, and student questionnaire helped this researcher assess the results of this study.

The results of the data collected for Student A showed many positive gains. Student A called out less frequently, from an average of 3.33 incidents per day with only traditional instruction to 1.0 incident per day when computer-based assignments were integrated into lessons. Student A supported the use of computers as an instructional tool as he commented that he called out less while on the computer because he was familiar with how to use it. When he was taking part in traditional instruction, such as note-taking, reading, or discussion questions, Student A believed he paid attention less and was easily distracted, thus having more incidents of disengagement and calling out. Furthermore, Student A thought his behavior improved during computer-based assignments because he felt the tasks were more motivating and rewarding.

The number of disengagement occurrences also decreased. During baseline data collection, Student A was disengaged an average of 1.66 incidents per day when taking part in

only traditional instruction. At the conclusion of this study, Student A had an average of 1.44 disengagement occurrences per day when computers were integrated. While the change is quite small, the downward trend reveals that Student A found computer-based assignments to be more gratifying than traditional instruction, thus being more engaged in the lesson. In addition, he reported that he focused and behaved better while on the computer because it was faster, more fun, and he learned much. Student A self-reported that knowing that he was going to use the computer during the lesson helped improve his behavior during traditional instruction. Student A completed the unit post-test with a grade of 81%. This teacher researcher believes that his grade is a reflection of proficient comprehension and understanding of the material taught.

The results of the data collected for Student B also showed positive change. Student B called out less frequently, from an average of 2.66 incidents per day during traditional instruction to 0.88 incidents per day when computer-based assignments were integrated into lessons. Student B self-reported that the computer helped him call out less and he remained quiet because he enjoyed researching information. Student B also revealed that he called out less during traditional instruction when he knew he was using the computers during the lesson. Furthermore, during baseline data collection, Student B was disengaged an average of 3.66 incidents per day when taking part in traditional instruction. At the conclusion of this study, Student B had an average of 0.33 incidents of disengagement per day when computers were integrated. He commented that he paid attention and behaved better while on the computer because he felt he could learn many news things, such as weather, animals, and climate. The teacher researcher believes this helped Student B behave better during traditional instruction as he completed the unit post-test with a grade of 83%. This teacher researcher believes that his grade is a reflection of proficient comprehension and understanding of the material taught.

Limitations

There were a number of unexpected school closings and delayed openings as a result of the winter weather. This altered the original schedule causing this teacher researcher to extend the lessons. This study was also limited by the disabilities of the students. At times these students were removed from the room due to their disruptive behavior. The removal of either student impacted the study by causing disruption and distractions to the lessons. In addition, one of the two student computers was not working. Therefore, one student had to use the teacher's computer. At times the server was running slow which made using the computer difficult.

Discussion

The field notes and questionnaires indicated that these two students enjoyed using technology during the "Ecosystems" science unit. At the end of the end of this 4 week study, each student responded positively to the questions regarding the use of technology. Data revealed that students were more motivated when technology was integrated into classroom instruction as calling out and disengagement decreased. The unit post-test scores of 81% for Student A and 83% for Student B revealed that they comprehended the information. Furthermore, field notes indicated that there were no incidents of complaining from either student during computer-based instruction. Waxman & Huang (1996) found that students who utilized technology during instruction spent 20% more time on-task, compared with their peers who did not use technology. The data from this study suggested that students were more engaged while working on the computer.

When asked which form of computer technology helped the most, Student B self-reported the WebQuest as he learned about the weather, animals, and climate in the tundra. Halat (2008) indicated that participants who used WebQuests have a more positive attitude

towards work, as well as a higher level of motivation to learn. Student A also indicated that he liked using the computer and completing computer-based projects because it did not require reading from the book. Computer-based assignments should maintain the same literacy rich content that a textbook has in order to develop the strong reading skills that a book can provide. In addition, Student A said that using the computer was faster and more fun, and he could focus.

Implications for Teaching

The data collected from this study would suggest that these two students benefitted from the integration of computer technology into a science unit. The use of technology during the study decreased the amount of calling and disengagement and participants were motivated by the use of computer technology. They continued to request the use of computers, the Smart Board, and other computer-based programs upon completion of this study. This teacher researcher has used this opportunity to infuse technology into other content areas such as language arts and social studies by integrating computer-based projects using PowerPoint, WebQuests, Microsoft Word, and the Internet. She has used the results of this study to present more stimulating and hands-on lessons to her students through using the classroom personal computers, the Smart Board, as well as the school Mac lab on a weekly basis. For example, these students set-up a "Glogster" account to create interactive posters, completed an online experiment from National Geographic, and participated in a new WebQuest on animal adaptations. Furthermore, this teacher researcher has continued to collect behavior data using a tally chart and field notes to better identify triggers of student behaviors in hopes of further reducing incidents of calling out and disengagement.

Next September, this teacher researcher plans to incorporate computer-based assignments across content areas. Assignments will be literacy rich, hands-on, challenging, and stimulating.

Computer conduct, safety rules, and the credibility of websites will be taught prior to assignments to ensure the safety of the class.

Conclusion

The integration of computer technology is an effective strategy to help students improve off-task behaviors. Student participants in this study showed a decrease in the number of calling out and disengagement incidents when technology was infused during instruction. These students expressed a desire to use computer technology during science lessons and requested more computer-based projects. In addition, they reported that technology helped them focus which may lead to improved behavior and increased motivation.

References

Atherton, J. S. (2002). Learning and teaching: Deep and surface learning. Retrieved from http://www.dmu.ac.uk/~jamesa/learning/deepsurf.htm

Beeland, W. D. (2002) *Student engagement, visual learning and technology: can interactive whiteboards help?* Retrieved from the Valdosta State University website: http://chiron.valdosta.edu/are/Artmanscrpt/vol1no1/beeland_am.pdf

Computational Science Education Project. (1996). Retrieved from http://www.phy.ornl.gov/csep/ov/node8.html

Daniels, A. (2004). Composition instruction: using technology to motivate students to write. *Information Technology in Childhood Education*, 157-174.

Ferretti, R. P., MacArthur, C. D., & Okolo, C. M. (2002). Teaching effectively about historical things. *Teaching Exceptional Children*, *34*(6), 66-69.

Gage, J. (2005). *How to Use an Interactive Whiteboard Really Effectively in your Primary Classroom.* London: David Fulton Publishers.

Glanz, Jeffrey. (2003). Action Research. Norwood, MA: Christopher-Gordon Publishers, Inc.

Hackett, J.,Leroy, K., Moyer, R., Teferi, M., Terman, D., Vasques, J., Wheeler, G., Zike, D.(2008). *Science: A Closer Look*. New York, NY: MacMillan/ McGraw Hill.

Halat, E. (2008). The effects of designing Webquests on the motivation of pre-service elementary school teachers. *International Journal of Mathematical education in Science and Technology, 39(6), 793-802. Retrieved from* http://web.ebscohost.com.ezproxy.caldwell.edu:2048/ehost/pdfviewer/pdfviewer?vid=4&hid=17&sid=6e481b61-1b80-40c3-99ec-9f1156e7c10f%40sessionmgr14

Hendricks, C. (2009). *Improving Schools through Action research: A Comprehensive Guide for Educators.* Upper Saddle River, NJ: Pearson.

Hermes, A. (2009). The history of computers in schools. Retrieved from http://www.ehow.com/about_5491373_history-computers-school.html

Jeffs, T., Morrison, W.F., Messenheimer, T., Rizza, M.G., & Banister, S. (2003). A Retrospective Analysis of Technological Advancements in Special Education. In D.L. Johnson, & C.D. Maddux (Eds.), *Technology in Education: A Twenty Year Retrospective.* New York, NY: The Haworth Press.

Jerome A., and Barbetta, P. (2005). The effect of active student responding during computer-assisted instruction on social studies learning by students with learning disabilities. Journal *of Special Education Technology. 20* (3). Retrieved from http://jset.unlv.edu

Jonassen, D., Peck, K., & Wilson, B. (1999). *Learning with technology: A constructivist perspective.* (Ed.) Prentice Hall. Retrieved from http://www.mendeley.com/research/learning-with-technology-a-constructivisit-perspective/

Keller, J.M. (2008) First principles of motivation to learning and e-learning. *Distance Education*, *29*(2), 175-182.

Kolikant, Y. (2009). Digital students in a book-oriented school: students' perceptions of school and the usability of digital technology in schools. *Journal of Educational Technology & Society, 12(*2), 131-143. Retrieved from http://web.ebscohost.com.ezproxy.caldwell.edu:2048/ehost/pdfviewer/pdfviewer?vid=6&hid=9&sid=5f896998-a9d4-4630-b99f-80eb955f40e3%40sessionmgr13

Lerner, J. (2006). *Learning Disabilities and Related Disorders: Characteristics and Teaching Strategies.* New York, NY: Houghton Mifflin Company.

Lipscomb, T. (2003). I guess it was pretty fun- Using web quests in the middle school classroom. *The Clearing House*, *76*(3). Retrieved from http://web.ebscohost.com.ezproxy.caldwell.edu:2048/ehost/pdfviewer/pdfviewer?vid=22&hid=9&sid=b6d3cffd-b649-458b-ab57-eeac87c995a9%40sessionmgr11

March, T. (2003). The learning power of WebQuests. *Educational Leadership, 61*(4), 42-47. Retrieved from http://web.ebscohost.com.ezproxy.caldwell.edu:2048/ehost/pdfviewer/pdfviewer?vid=23&hid=9&sid=b6d3cffd-b649-458b-ab57-eeac87c995a9%40sessionmgr11

Moreau, R. (1984). The computer comes of age – The people, the hardware, and the software. *The British Journal for the History of Science.* London: The MIT Press.

National Center on Educational Statistics (2002). Computer and Internet Use by Children and Adolescents in 2001. Washington, DC: U.S. Department of Education. Retrieved from http://nces.ed.gov/pubs2004/2004014.pdf

New Jersey Department of Education (2008-2009). Retrieved from http://www.wanaque.k12.nj.us/files/NJDOE_Wanaque_School_Report_Card_2008-2009.pdf

Palmer, S., Smith, S. & Wehmeyer, M. (2004). Technology Use by Students with Intellectual Disabilities. *Journal of Special Education Technology*, *19*(4), 7-21.

Rosenberg, R.S. (2004). *The Social Impact of Computers*. San Diego, CA: Academic Press.

Scaife, J., and Wellington, J. (1993). *Information Technology in Science and Technology Education*. Buckingham: Open University Press. Retrieved from http://eric.ed.gov/PDFS/ED371955.pdf

Schiffer, C. (2008). Infusing technology into the classroom: Continuous practice improvement. Temple University.

Schumacker, R., Young, J. and Bembry, K. (1995). Math attitudes and achievement of algebra 1 students: A comparative study of computer-assisted and traditional lecture methods of instruction. *Computers in the Schools*, *11*(4), 27-33.

Shumate, E., & Wills, H. (2010) Classroom-based functional analysis and intervention for disruptive and ***off-task behaviors.*** *Education and Treatment of Children*, *33*(1), 26..Retrieved from http://web.ebscohost.com.ezproxy.caldwell.edu:2048/ehost/detail?vid=3&hid=15&sid=ff974b87-d40e-4f1b-a987fe927b5b629%40sessionmgr4&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=eric&AN=EJ871904

Schweinle, A., Meyer, D.K., & Turner, J.C. (2006). Striking the right balance: Students' motivation and affect in elementary mathematics. *The Journal of Educational Research*, *99*(5), 271-289. .

Smith, H., Higgins, S., Wall, K., & Miller, J. (2005). Interactive Whiteboards: Boon or Bandwagon? A Critical Review of the Literature. *Journal of Computer Assisted Learning*, *21*, 91-101. Retrieved from http://web.ebscohost.com.ezproxy.caldwell.edu:2048/ehost/pdfviewer/pdfviewer?vid=8&hid=7&sid=70fedece-5d3a-4efb-a1ee-ab0cc8d37b8f%40sessionmgr14

Song, S., & Keller, J. (1999). The ARCS model for developing motivationally-adaptive computer-assisted instruction. Retrieved from http://web.ebscohost.com.ezproxy.caldwell.edu:2048/ehost/detail?vid=3&hid=6&sid=5b

2eea6f-03c4-426a-bf17-3ebee0d0a2f1%40sessionmgr14&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=eric&AN=ED436181

U.S. Department of Education, National Center for Education Statistics (1995). DC: U.S. Government Printing Office.

Waxman, H. & Huang, S. (1996). Classroom instruction difference by level of technology use in middle school mathematics. *Journal of Educational Computing Research*, *14*(2), 157-169.

Willis, J. (2003). Instructional technologies in schools: are we there yet? In D.L. Johnson, & C.D. Maddux (Eds.), *Technology in Education: A Twenty- Year Retrospective, 20*(1-2), 11-33. New York, NY: The Haworth Press. Retrieved from http://dx.doi.org/10.1300/J025v20n01_02

Wolf, C. (2003). Technology in environmental education. Retrieved from http://www.newhorizons.org/strategies/environmental/wolf.htm

Appendix A

Parental Consent Form

I, _____, **(printed name of parent or guardian)**, agree to permit _____ **(printed name of child)** to participate in the Action Research Study, *The Effects of Using WebQuests, Interactive Websites, Software Programs, and Computer Centered Projects to Enhance Knowledge of Ecosystems and to Lessen Incidents of Calling Out and Student Disengagement among 4th Grade Students,* being carried out by Ms. Elaine Hetherington, your child's teacher at the _____ Elementary School. I have been informed by Ms. Hetherington of the general nature of the study, the possible benefits and risks, as well as the promise of complete anonymity for all involved. I understand the following:

1. My child may withdraw from this study at any time.
2. I may withdraw permission for my child to participate in the study at any time.
3. Even if my child completes the study, I have the right to withhold permission from the researcher to use any data based on my child's participation.
4. Upon my request, the researcher will provide me with a written summary of the study's findings.

_____
(Signature of parent or guardian)

_____
(Date)

_____
(Relationship to child)

September 22, 2010

Dear Mr. and Mrs. _____,

In addition to being your child's classroom teacher, I am a graduate student in the Masters of Arts in Curriculum and Instruction program at Caldwell College. As part of my degree requirement, I am conducting an Action Research Study on *The Effects of Using WebQuests, Interactive Websites, Software Programs, and Computer Centered Projects to Enhance Knowledge of Ecosystems and to Lessen Incidents of Calling Out and Student Disengagement among 4th Grade Students*. The results of the study will be used to improve classroom instruction by increasing on-task behavior.

Goals of the study:

- To determine if the use of technology during science instruction increases on-task behavior.
- To examine whether student motivation is influenced by the use of computer technology as an instructional methodology.

Benefits:

- Possible increased student motivation to learn science
- Increased exposure to various forms of computer technology
- Possible decrease is student off-task behavior

Risks:

- Possible short-term increase in student off-task behavior during baseline period of the study.
- Possible short-term decrease in motivation to learn science during the baseline period of the study.
- If the Internet is down an alternative plan needs to be established by the researcher/teacher.

I would greatly appreciate if you could take a moment to read the Parental Consent Form and determine if you would be interested in having your child participate in this study. Please return the consent form to me in an enclosed envelop with your child no later than September 24, 2010. Feel free to contact me at _____ School if you have any questions.

Thank you in advance for your assistance and cooperation.

Sincerely,

Elaine Hetherington

September 22, 2010

_____ Public Schools

Ms. Elaine Hetherington, a teacher in the _____ School District, will be conducting a research study. This project is a requirement for Caldwell College's Master of Arts in Curriculum and Instruction program. As an administrator of this district, I was informed by the researcher of the general nature of the project, *The Effects of Using WebQuests, Interactive Websites, Software Programs, and Computer Centered Projects to Enhance Knowledge of Ecosystems and to Lessen Incidents of Calling Out and Student Disengagement among 4th Grade Students*.

Goals of the study:

- To determine if the use of technology during science instruction increases on-task behavior.
- To examine whether student motivation is influenced by the use of computer technology as an instructional methodology.

Benefits:

- Possible increased student motivation to learn science
- Increased exposure to various forms of computer technology
- Possible decrease is student off-task behavior

Risks:

- Possible short-term increase in student off-task behavior during baseline period of the study.
- Possible short-term decrease in motivation to learn science during the baseline period of the study.
- If the Internet is down an alternative plan needs to be established by the researcher.

Given the above, Ms. Hetherington is granted permission to seek written parental approval to obtain subject for her study from the pool of students in her class.

Name: _____

Title: Superintendent of Schools, _____ Public Schools

Signature: _____

Appendix B

Date and Type of Technology Used	Student "A" or Student "B"	Time:	Behavior # 1 Calling Out (Occurrences)	Behavior # 2 Disengagement (Occurrences)	Field Notes
	Traditional Teaching				
	Computer Integration				

Open Ended Questionnaire

Do **not** write your name on this paper. Answer all questions on the attached blank paper.

Forms of Computer Technology:

1. **Ecosystem Journey WebQuest**
2. **PowerPoint Slideshow**
3. **Internet Research: Ecosystems / Biomes**
4. **"Build a Food Chain" - Interactive Website**

1. Did you like learning about ecosystems using the computer? Why or why not?

2. From the above list, which form of computer technology helped you learn the most?

3. From the above list, which form of computer technology helped you the least?

4. Did you think the computer technology helped you behave appropriately? If so, why?

5. Did it prevent you from calling out?

6. Did it help you pay attention?

7. Would you like to use computers in other subjects (Social Studies, Math, and / or Language Arts)? Explain.