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Final Research Report
IT 6720

Increasing Student Internet Searching Skills

Description of Problem

Due to the increased use of the Internet for student research, I discovered the need for an instructional tool that helps students learn how to evaluate Internet resources. Most students have not been taught how to develop strategies for critically thinking about and evaluating Internet content. I had several coworkers express to me the need for instruction in this area; yet, there was very little research on the topic because the content is relatively new. I also observed how frustrated students became when they were unable to find the specific information that they are looking for. The students would look to me for guidance, yet I could not help them as well as I wanted.

In the fall of 2003, I created an Internet site for my Advanced Web Authoring class that was designed to help students learn about how to evaluate Internet pages. This site can be found at <http://ouray.cudenver.edu/~cshaffer/web/search.htm>. The goal of the Internet site was to instruct students on how to develop critical thinking skills in regard to searching the Internet. By including Boolean search terms, keywords, sorting skills, as well as critically thinking about how to conduct searches that will bring back optimal results, students improved their Internet searching skills after completing an activity in conjunction with the Web site.

I had my second quarter classes complete the activity and then looked at the effectiveness of the instruction to see if there are ways that I could improve on it. I also used this same lesson, with a few refinements, in the third quarter sections of the class. I had the students in the second quarter class take a survey (Attachment 1) both before and after completing the web page I had developed, so that I could compare the surveys and analyze the answers they gave. Overall, the results of the survey indicated a definite usefulness of the site. However, I felt that I was not able to obtain truly useful results from this survey, and refined the survey in order to acquire information that would help me in my research. This information helped me to identify areas that could be improved, and determine if the web site I created was doing its job.

Another focus in this research was to discover ways that critical thinking skills could be evaluated. I have found that often students are not challenged to think deeply about what they were asked to complete, as well as think about their own thoughts. Students were often perplexed when I tell them to be creative and use their imagination. These students have not been instructed on how to think on their own, and this is a critical part of their knowledge. I wanted to find more resources that would enable me to help students discover the capabilities within their imaginations.

Lastly, I had begun to notice a difference in my teaching style. As I started including technology into my classroom, I have taken on the role of facilitator. I have found a great deal of enjoyment in seeing my transformation as an educator. I now encourage the students to try to think on their own, answer their own questions, and question more things that interest them. Of interest to me was the student's reaction to this style of teaching, and whether or not it was beneficial to them.

Description of Setting

The students who were asked to complete the survey and gain instruction in conducting Internet searches were part of my Computer Foundations I class at Falcon Creek Middle School in Centennial,

CO. This class is offered as an elective in conjunction with Health and PE at the 7th grade level. Next year the class will also be offered at the 6th grade level because it has been recognized that students need these important computer and keyboarding skills at an earlier age. The course is currently one quarter in duration. Prior to taking this course, the students had not been given any formal computing instruction at Falcon Creek Middle School. It is possible they have had instruction at a previous school.

During the course, the students are given time to improve keyboarding skills every day. They are also instructed in the parts, functioning, and important terms that involve computers. They are instructed in the use of the Microsoft Office Suite, and are expected to produce products in Word, Excel, and PowerPoint. The Excel and PowerPoint projects involve the use of research, which the students are to complete via the Internet. Therefore it is important that the students have the Internet searching skills they need to conduct efficient and accurate research.

Of the students in the Computer Foundations classes, I discovered that 90-100% of them are able to access a computer outside of school. Students also have access to school computer facilities at school on Tuesdays and Thursdays both before and after school. Utilizing the morning computer lab requires motivation on the part of the student.

Review of Literature

“When you plug something into a wall, someone is getting plugged into you. Which means you need new patterns of defense, perception, understanding, evaluation. You need a new kind of education”
-Neil Postman, 1969, *Teaching as a Subversive Activity*

With the introduction of technology into everyday life, people must have skills that will allow them to succeed. It is now becoming important for the educational system to prepare students with “21st Century Skills” (Ncrel, 2003) that allow the students to meet the needs of a technologically changing society. Basic literacy is changing from the traditional reading, writing, and listening to include being able to “listen and speak, and read and write fluently through text, images, motion video, charts and graphs, and hypertext across a range of media.” (Ncrel, 2003) In addition to such skills “browsing, searching, and navigating online have become essential skills for students, as have the limitations of using online resources.” (Ncrel, 2003)

Not only must workers in today’s society be technologically literate, they must be able to apply their skills to practical situations. With today’s emphasis on testing, students are rarely challenged to think critically and independently. Curiosity is often squelched at the cost of covering the required curriculum. “Technology makes gathering information so easy that we may create a perception that that’s all there is to figuring out life’s complex issues and problems.” (Barell, 2003) By teaching students to use technology, a critical point of instruction is that they should not be avoiding the process of analysis, understanding, and application.

Teaching critical thinking in isolation does little to help the student. However, when included within content, students can be instructed in ways of critical thinking. One of the most important factors in helping students become more critical thinkers is to “create a classroom atmosphere where students are encouraged to read deeply, question, engage in divergent thinking, look for relationships among ideas, and grapple with real life issues.” (Carr, 1990)

In middle schools, the student population is incredibly diverse, varying greatly in physical, conceptual, social, and emotional development. Adolescents are making the transition from being concrete thinkers to abstract thinkers. Students this age are naturally inquisitive, curious, and inventive.

Adolescence is the ideal time to encourage critical thinking, problem solving, and creativity skills in order for the adolescent to learn more about themselves. Crucial to this is “establishing a psychologically safe environment, promoting greater tolerance and appreciation for ideas among class members, and acting as facilitator rather than director.” (Sorenson, et al, 1996)

Throughout the course of the past school year, I have had the opportunity to “restart” the Computer Foundations class several times. I have found that I have changed it quite a bit each quarter. I have decided to take on more of the facilitator role, encouraging the students to think on their own, find ways to answer their questions independently, and become more creative. While the projects the students were asked to do had certain requirements, the students were free to interpret directions on their own, try new ideas, question, and use their imagination.

In order for students to examine the kind of questions that they were asking, they needed some strategies that would help them. John Barell’s Developing More Curious Minds describes the use of Bloom’s Taxonomy as a way to increase students’ critical thinking skills. Students will be asked to look at the higher level thinking skills that they were using. While they may start their questioning on the knowledge or comprehension levels, they were instructed on how to question on the analysis, synthesis, and evaluation levels through the final assignments, where they put together a list of Web sites considered resourceful in each of their subjects.

Research Questions

Does instruction in Internet evaluation techniques improve my students’ abilities to choose quality Internet sources?

How will changing the teacher role to a more facilitator role effect how students think and learn?

Will instructor modeling of good questioning techniques improve student’s questioning skills?

Will students ask questions if they are taught the concept of Bloom’s Taxonomy and are provided instruction in higher-order questioning?

Description of Innovation

A unit of instruction was implemented into the Computer Foundations curriculum that focused on improving critical thinking skills. Upon completion of the instructional unit, students should be able to:

- Conduct Boolean searches
- Incorporate keyword searches
- Analyze Internet addresses
- Determine author validity and objectivity
- Determine integrity of data
- Evaluate website purpose
- Apply basic sorting skills to Internet searches
- Review timeliness of website material
- Develop critical thinking skills related to Internet researching
- Analyze the quality of questions they are asking, and identify the level of Bloom’s Taxonomy that the questions are on.

Individual lessons will included the following:

- The class brainstormed Internet searching strategies they previously have used. The teacher led a questioning session into strategies that have been successful and unsuccessful.
- The teacher introduced a Web site to the class (www.dhmo.org) and the class discussed what they thought about the site. Students then wrote a 3-4 sentence opinion of the Web site and turned it in to the teacher.
- The class participated in a lesson that analyzed how to sort information. (Shoe sorting activity)
- Students completed the Internet tutorial created by the instructor and answered questions based on the Web site.
- Students revisited the opinion they wrote about the DHMO Web site, and reflected on their previous opinions, identifying if they still agreed with it. Students explained what they now look for when evaluating Web sites. This was used as an informal evaluation of students' ability to think critically about Internet sources.
- Students compiled a list of Internet resources that can be of use to them at home and at school. They were asked to list 4-6 sites that could be used as a resource in each subject area (science, math, language arts, social studies), and described how the sites are beneficial. Students were formally evaluated on their ability to compile this resource. Teacher assistance was noted as the students are working, and the finished product was evaluated based on its usefulness and also using the Holistic Scoring Rubric.

Of key importance in this project was the classroom culture that was created. I believed that if students felt secure and comfortable in their environment, they would be more likely to challenge themselves, question, and try new things. I wanted my students to view my classroom as such.

Instruction was also given regarding using higher order thinking skills and Bloom's Taxonomy. Students were introduced to the levels in Bloom's taxonomy, and as a class were asked to identify verbs that would fit into each level. They completed an activity where the class came up with questions about two pieces of fruit that could be applied into each of the different levels of Bloom's Taxonomy. By teaching the students how to evaluate the quality of their questions, the goal is to have them ask questions that are more meaningful and inspire curiosity.

Description of membership of action research

I worked with students enrolled in an elective Computer Foundations class at Falcon Creek Middle School. Students took part in instruction in identified critical thinking activities, used the instructor created Web site for further instruction, and compiled a group of resource Web sites. Students were surveyed on attitudes regarding their Internet searching abilities, informally evaluated on their Internet searching skills, and formally evaluated on their ability to compile Internet resources.

Environmental impact statement assessing

There were no negative effects that resulted upon implementation of this action research plan. There were no anticipated negative effects of the instruction on the students participating in the class.

Data Collection

Research Questions	Data Source			
	1	2	3	4
1. Does instruction in Internet evaluation techniques improve my students' abilities to choose quality Internet sources?	Student Assessment	Informal Evaluation of Reflection	Formal Evaluation of Final Project	Teacher Notes
2. How will changing the teacher role to a more facilitator role effect how students think and learn?	Student Survey	Teacher Notes		
3. Will instructor modeling of good questioning techniques improve student's questioning skills?	Student Survey	Teacher Notes	Formal Evaluation of Final Project	
4. Will students ask questions if they are taught the concept of Bloom's Taxonomy and are provided instruction in higher-order questioning?	Student Survey	Teacher Notes	Formal Evaluation of Final Project	

Explanation of Data Collection Items

Student Assessment

Students were asked to complete an assessment before and after instruction regarding critical thinking skills.

Informal Evaluation of Reflection

Students were informally evaluated on how they evaluate a Web site. They wrote a short opinion of a Web site prior to instruction in searching strategies, and then were asked to revisit this opinion and reflect on it after instruction. Reflections were evaluated using the Holistic Critical Thinking rubric by Facione and Facione.

Formal Evaluation of Final Project

Students were formally evaluated on their ability to search for and compile a list of resources that could be used in each subject. Students were asked to describe their questioning processes that enabled them to compile their resources. Resource lists were evaluated using the Holistic Critical Thinking rubric created by Facione and Facione.

Student Survey

Students were surveyed regarding their current questioning techniques. Students were asked to rate how they conducted Internet searches, the classroom environment, and identify any tips or suggestions they learned that have helped them conduct searches. They were also asked to identify the level of Bloom's Taxonomy they feel their questioning is on, and describe why they believed this.

Teacher Notes

The teacher kept a reflective log of how instruction went during the teaching unit.

Statement of resources

Resources required for this research project include the Instructor created Internet site and computer lab with Internet access.

Timeline

Phase 1

(January-February)

Final changes were made on the Internet site

Quarter 2 students were surveyed regarding their Internet Searching skills after instruction

Quarter 3 students were surveyed regarding their Internet Searching skills before instruction

Phase 2

(February-March)

Internet site was implemented to Quarter 3 classes

Critical Thinking skills were taught and reinforced

Quarter 3 students were surveyed regarding their Internet Searching skills after instruction

Informal evaluations were conducted

Formal evaluations were conducted

Phase 3

(March-May)

Analysis of data collection

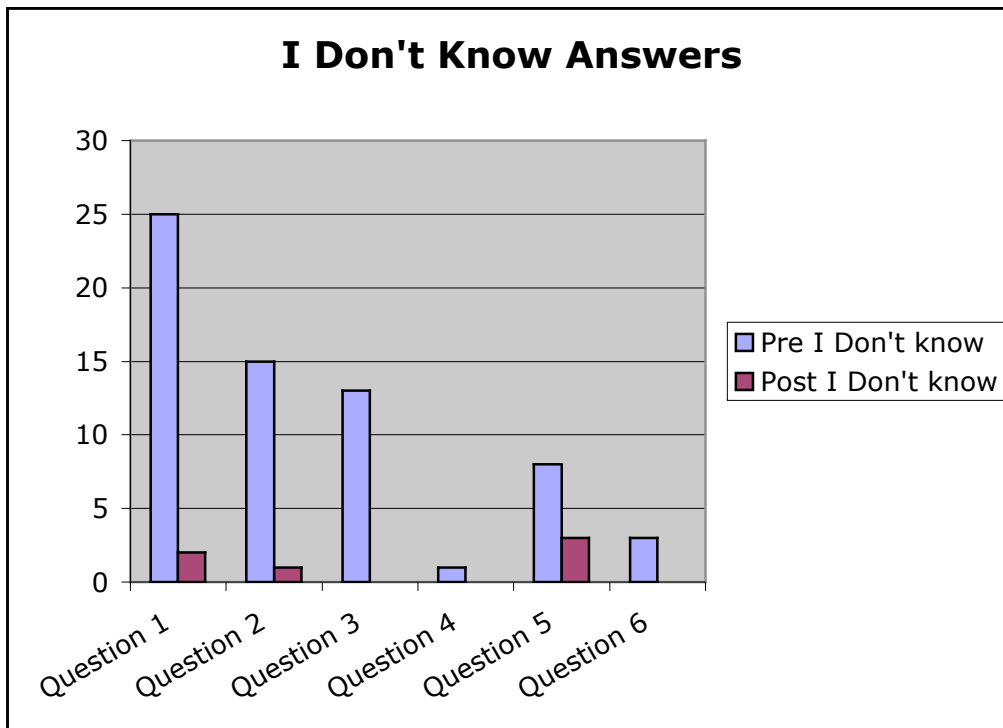
Any changes for Quarter 4 students were made

Final conclusions were made

Data Analysis

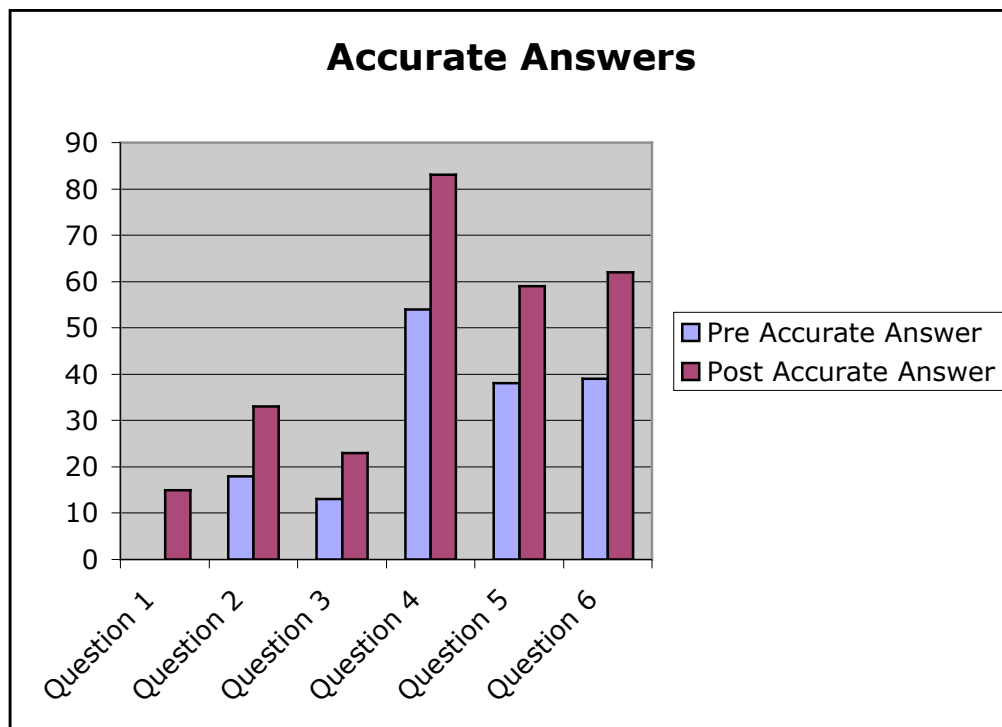
Through the use of the Student Assessment, students were evaluated before and after instruction in Internet Searching strategies and the use of Bloom's Taxonomy. Students were also surveyed regarding their beliefs and attitudes of the Computer Foundations Classes and student Final Projects were evaluated based on the Holistic Scoring Rubric.

Beginning with the Student Assessment, data was collected and analyzed for major trends. Results are as follows:



Using questions 1-6 of the Student Assessment which were focused on Internet searching abilities, a definite decrease was noted in student “I Don’t Know” responses. Prior to instruction, most students had no idea what a Boolean search was (question 1), could not explain how to determine the date a Web page was created, nor determine the validity of a Web site. However, many students were able to come up with keywords, analyze a URL, and observe and analyze the content of a Web page even before any instruction was given in those areas. After instruction, student were definitely more aware of concepts such as Boolean Searches, determining the date and author of a Web page, as well as trying to determine the validity of information displayed on a Web site. It still appeared that reading URLs is a difficult task for them.

Student Assessment responses were also analyzed according to the accuracy of answers given. Results taken from the responses prior to instruction show that many students were capable of producing accurate answers for questions 4, 5, and 6. However, not one student was able to correctly identify words used in a Boolean search. Information attained after instruction was given show that students’ abilities to identify keywords, read URLs, and observe a Web page for information was dramatically increased. The following graph illustrates this finding.



In regards to the first Research Question posed regarding whether instruction in Internet evaluation techniques improves student Internet searching skills, I felt that the data collected from the Student Assessment showed that the creation of an Internet Tutorial and additional instruction on how to conduct better Internet searches greatly benefited my students. Through the use of the pre and post assessment, I acquired proof that the Web page I designed was fulfilling its purpose.

The Student Survey also reinforced this conclusion, as 86% of students felt that instruction I had given them had made them be more critical when evaluating Internet pages. Findings also showed that 89% percent of students surveyed agreed that I model good Internet searching techniques, 75% of students surveyed believe they more critically evaluate Internet sources than they did before taking the class, and 73% of the students feel they are good at finding quality Internet resources. While many students still expressed some frustrations when searching the Internet, they are now better equipped to find sources that will benefit them. Throughout the other projects taught in Computer Foundations class that utilized the Internet for research purposes including a budget creation assignment and a state research project, I have found that my students required less teacher assistance to find the types of Internet sources they are looking for. While teaching my Science classes, I was able to observe students I had instructed in Computer Foundations using the Internet searching skills in the context of another class, which indicated to me that they were applying what they had learned during the Computer Foundations instruction.

While most of the numbers mentioned previously indicated that students in Computer Foundations had improved their Internet searching skills, informal evaluation of their reflections on the DHMO Web site indicates that when the students are looking at Web pages more critically, they are still easily fooled into believing information that is not true. Though I found the DHMO site to be of great benefit for students to review, it's use had produced some outcomes that did not correlate with the Assessment and Survey results. To the untrained eye, the DHMO appeared to be scientifically accurate, trustworthy, and even frightened some students into thinking that DHMO should be banned. Filtering through the information on the DHMO site was extremely difficult, and even after instruction during

the unit, most students believed everything the DHMO site claimed. However, every time I had asked students to find out more about DHMO or look at the Web site more critically, one or two students had been able to discover the truth to what DHMO actually is. I enjoyed seeing the students' reactions when they found out that DHMO is actually water, and that the entire Web site is false. Because they have not yet fully matured, 7th grade students are pretty naïve and will believe just about anything, and I feel that this lesson is a good place for them to learn they cannot believe everything they see. However, I would like to conduct further analysis into why the DHMO Web site is able to deceive my students so well, and if there is anything I can do that could avoid this in the future.

Through evaluation of student's final projects, I was able to determine that most students were able to accurately conduct and analyze searches, review different Internet sites, and draw conclusions. Evaluation shows that 84% of completed student work exists on the top level (4) of the Holistic Critical Thinking Scoring Rubric. Student reflections of this project showed that students felt the creation of this list to be a great resource to them. Although it was due the last day of the quarter, students felt they put forth a good effort on the assignment. The Final Project resource list assignment was to be completed on the student's own time, and was due the last day of class. However, close to 10% of the students did not complete this assignment whatsoever for reasons unbeknownst to the teacher. Possibly introducing the assignment at an earlier date in the quarter or specifying in-class time for the Final Project could help remedy this in future quarters.

The second Research Question posed looked at the role of the teacher changing to that of facilitator and how it would affect the classroom. Through survey comments and teacher observations, a definite comfort level is experienced in my Computer Foundations classes. Results from the Student Survey show that 85% of the students felt comfortable asking me questions, and when asked what I did differently as a teacher, responses included:

- She is very understanding
- Explains thoroughly
- Is nice, caring
- Is helpful
- Makes me feel comfortable

A high level of comfort between students and teacher had been noted during my evaluations from my supervising administrator. In general, students felt accepted, willing to ask questions, and overall were comfortable in the learning setting I had created. Through reflection of my field notes taken over the quarter, I felt that the students had been able to learn about me more as a person, and viewed me as more than a teacher. I enjoyed my day-to-day interactions with the students, and found this to be one of the biggest reasons I love what I do.

Results from Question 4 of the Student Survey show a somewhat interesting change from the general trend of student answers. While administering the survey, I found that a great number of students did not know the meaning of the word facilitator, which I believe may have affected that particular survey question's results.

Research Question three was formulated to see if instructor modeling of good questioning would improve the student's questioning skills. Results from the Student Survey show that 86% of students surveyed felt that I model good questioning techniques, 89% agree that I model good Internet searching techniques, and 80% responded that they now ask better questions from the instruction I gave them. Through reflection of field notes, I have observed an overall higher level of thinking in my current Computer Foundations class than what I remember from the beginning of the school year. One response from the Student Survey was particularly interesting to me. "Ms. Shaffer treats her students right and if she can't answer a question then she will be sure to search for the answer." I view this

statement as an indication that at least one student was learning from me not only how to ask questions, but how to find the answer as well. As the school year goes by, I have found that rather than answering student's questions directly, I instead try to pose more questions to them, urge them to find the answers to their own questions, or help them find resources to answer their questions. Evaluation of students' final projects also demonstrate that students are able to question Internet search results, critically review the Web pages, and compile a list of resources that will be a great benefit to them in the future.

The final Research Question regarded whether students would be able to utilize Bloom's Taxonomy if they were provided instruction in how to use higher order questioning. After instruction, 7% of students replied that they did not know what it was. Results indicate that the students had somewhat of a grasp of the levels of Bloom's Taxonomy, but may not be able to accurately identify which level their questions were on. However, the questions they posed regarding Bloom's Taxonomy levels demonstrated that they were able to come up with many critical thinking types of questions, including:

- Do you recommend this apple to someone?
- What does an apple blossom look like?
- Compare and contrast an apple and an orange.
- What is your opinion of the apple?
- Construct a model of an apple.
- If the apple was dropped, what would happen?
- Does an apple have any chemicals?
- What does the apple look like inside?

After instruction, 58% of students surveyed felt they understood how to use Bloom's Taxonomy in order to create better questions, but I found that when asked to create questions using Bloom's Taxonomy and identify the level they were on, many students were flustered. They couldn't remember the breakdown of levels. Through this project, I have found that introducing Bloom's Taxonomy to students in 7th grade is an acceptable thing to do for their age level, but they are still trying to figure out exactly how to use it. In the end, I feel that 7th grade students are able to use Bloom's Taxonomy, but require a great deal of guidance and can only apply it in a limited way.

Lastly, of interest to me were students' responses to Student Survey Question 15, which did not correlate to any of my research questions. Many students commented that they enjoyed having music played for them during individual work time. I have been playing Disney music for all of my Computer Foundations classes while the students are working independently. Students reactions have been extremely positive to this and they have mentioned to me how much they enjoy it, and will tell other teachers about it. This is a concept that has definitely caught my attention, and I would be interested in further research to discover the impact that music has on student motivation.

Summary of Findings

Curriculum was designed and implemented during Quarter 3 and 4 Computer Foundations classes with specific goals that were aimed to answer questions posed by this action research project. Results from data collection, field notes, and surveys led to the following outcomes.

1. Does instruction in Internet evaluation techniques improve my students' abilities to choose quality Internet sources?

During the course of this research, a definite need for student instruction in searching the Internet was determined. After implementation of the instructional Web site, learning activities, and discussion of

techniques, student understanding and ability to find better Internet resources increased. Students are now better prepared to utilize the Internet as a research tool, and feel more competent in their abilities. In future courses, use of the instructor created Web site will continue. Now that I feel the content of the Web site is fulfilling the purpose that it was designed for, I would like to look at different ways to redesign the Web site to make it more visually appealing and attractive to the viewer. This should be completed before the beginning of the 2004-2005 school year.

2. How will changing the teacher role to a more facilitator role effect how students think and learn?

By the teacher taking on the role of facilitator, students in my Computer Foundations class were encouraged to think independently, creatively, and complete work on their own. Throughout this research, I have found that students are first perplexed when they were not given specific instructions regarding assignments, and were urged to be creative. However, by the end of the quarter, most students found the freedom inspiring, and enjoyed having the ability to think independently. Students also became a part of an inviting classroom environment that was created by the teacher, and felt more comfortable to explore and challenge their own thinking. The practice of being more of a facilitator will be continued in future courses due to the positive student reaction thus far.

3. Will instructor modeling of good questioning techniques improve student's questioning skills?

Through the modeling of questioning techniques by the teacher, students were given real life examples of the thinking process, and how to improve questioning techniques. Student questioning skills were positively impacted through this type of instruction. Teacher notes indicate that students' questioning of the quality of Internet sites was directly impacted, and they are now able to use those questioning skills to evaluate Internet resources more critically. In the future, modeling of questioning techniques will be repeated by the teacher as an instructional strategy.

4. Will students ask questions if they are taught the concept of Bloom's Taxonomy and are provided instruction in higher-order questioning?

Student response to instruction regarding Bloom's Taxonomy and higher-order questioning was generally positive. Comments collected after instruction indicated that while Bloom's Taxonomy is a more advanced topic for students at the 7th grade level, it was well received and students benefited from instruction. While students may not be able to specifically identify the exact level of questioning on Bloom's taxonomy, they were able to rate their level of questioning, and determine if it qualifies as higher or lower order thinking. During future courses, instruction in higher level questioning will be continued, with an introduction to Bloom's Taxonomy included.

One finding from the data analysis established the impact that playing music had on the students in my Computer Foundations classes. Further inquiry through additional research into the effect that playing music has on the ability of students to concentrate and complete assignments, and if there is any correlation between playing music and overall student achievement is a future goal of the instructor. This summer, research will be conducted to determine the effects of music on student achievement. When classes resume next school year, I would like to have a solid knowledge of the impact of music played in the classroom, and determine if it is positive in the classroom environment.

References

Barell, John. (2003). *Developing More Curious Minds*. Association for Supervision and Curriculum Development.

Carr, Kathryn S (1990). How Can We Teach Critical Thinking? *ERIC Digest*. ED326304.

Facione, Peter A. and Facione, Noreen C. (1994). *Holistic Critical Thinking Scoring Rubric*. The California Academic Press.

Sorenson, Juanita S., Buckmaster, Lynn R., Francis, Mary Kay, Knauf, Karen M. (1996). *The Power of Problem Solving*. Massachusetts: Allyn and Bacon.

North Central Regional Education Laboratory (2003). 21st-Century Skills: An In-Depth Look at the 21st-Century Skills. Retrieved May 2, 2003, from <http://www.ncrel.org/engage/skills/indepth.html>