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The effects of cross-age mentoring in an online collaborative environment

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ABSTRACT

This mixed method research was designed to examine the effects of cross-age mentoring in an inter-institutional online learning community. The research questions focused on the impact of mentoring on high school students’ confidence in their information seeking skills, perceptions of their information seeking standards, and the application of these standards to an information seeking task. Also of interest was the dialogic interaction between the students at the two sites, the impact of the facilitator on the process, and the university students’ perceptions about their experience.

The participants included 26 students (mentees) enrolled in an American history class at a rural high school and 18 pre-service teachers (mentors) enrolled in an introductory educational technology course. Mentoring groups comprised of four-five high school students and three-four pre-service teachers interacted via a synchronous online courseware system. Both classes met at the same time of the day, twice weekly, allowing for synchronous interactions. The project was implemented over a five week period during which pre- and post-tests of information seeking confidence and standards were administered and students were engaged in their information seeking tasks. During the course of the project the online interactions were archived and saved for later analysis.

Results revealed that there was no change in the high school students’ confidence in their information seeking abilities. The assessment of their evaluative standards revealed that they became more aware of the importance of evaluating the accuracy of information they located. In addition, a positive correlation was found between their understandings of the importance of evaluating information to determine its relevance to the task at hand and the disposition toward a more expert approach to seeking
Performance on the information seeking task was positively influenced by conceptual scaffolding provided by both the facilitator and the pre-service teachers. Feedback that encouraged the high school students to consider conceptual issues was discovered to be most effective. The findings from this research contribute to the literature on cross-age mentoring between higher education and K-12 students as well as providing insights about strategies that influence students’ abilities to locate, evaluate, and synthesize information.
CHAPTER 1

INTRODUCTION

Research has shown that high school and college students lack essential critical thinking skills including the ability to access, manage, integrate, evaluate, create and communicate information in a technological environment. Educational Testing Service (ETS) examined the scores of 3000 college students and 800 high school students on the Information and Literacy Technology Assessment Tests and reported that only 13 percent of the students were information literate (ETS, 2006). Findings indicated that only 52% of the test takers could evaluate the objectivity of a website and only 65% could evaluate the site’s authority. In addition, only 44% could identify a research statement for a class assignment and 40% knew how to search the Internet with multiple search terms to narrow the results. According to ETS, individuals who lacked information literacy skills are at a disadvantage when it comes to classroom learning and future employment opportunities.

The development of information and communication technologies has provided increased opportunities for collaborative learning alliances between K-12 and higher education. Educational reform efforts indicate that there is a need for interconnecting the levels of education to prepare high school and college students to function effectively in an information oriented society. Warren and Peel (2005) pointed out that K-12 and university collaborations can be implemented to improve low performance scores on state required assessments in K-12 schools, develop a reform plan and improve professional development opportunities to accomplish the school reform objectives. Van Patten and Dennison (1987) emphasized that inter-institutional collaborations have increased in order to address the high drop out rates, lack of adequate job skills and to effectively
prepare high school students for college by improving test taking skills. This research focuses on implementing an inter-institutional learning environment in which pre-service teachers mentor high school students for the purpose of developing information literacy skills.

Definition of Information Literacy

Information literacy has been defined and conceptualized by a variety of researchers and professional organizations. Information literacy involves an active learning process that is described by the American Library Association (1998) as knowing when the information is needed, identifying information needed to solve a problem or issue, finding needed information, evaluating that information, organizing that information, and using information effectively to address the problem or issue. The American Association of School Librarians and the Association for Educational Communications and Technology (AASL/AECT) (1998) described information literacy skills as the ability to access information efficiently and effectively, evaluate information critically and competently, and use information accurately and creatively. The AASL/AECT emphasized that an independent information literate learner strives for excellence in information seeking and knowledge generation and participates effectively in groups to pursue and generate information. Research and information fluency is one of the key standards of the National Educational Technology Standards for Students (ISTE, 2007). There is general agreement among these professional organizations that the information literate learner must be able to recognize information needs, be able to locate information from a variety of sources and media, identify access, retrieve, evaluate, and organize and use information.
Doyle (1992) defined the information literate learner as one who recognizes the information need, recognizes accurate information as basis for intelligent decision making, identifies potential sources of information, develops successful search strategies, accesses sources of information (including computer-based and other technologies), evaluates information, organizes information for practical application, integrates new information into an existing body of knowledge and uses information in critical thinking and problem solving.

Outcomes of Instruction Designed to Enhance Information Literacy Skills

An increasing number of researchers have evaluated the effects of a variety of instructional interventions designed to increase information literacy skills. Mackey (2005) investigated the effects of web development on information literacy (IL) and information technology (IT) skills in an information science course. The participants of the study consisted of 64 undergraduate students at the University of Albany who were enrolled in an information science course delivered through WebCT. The students were required to work collaboratively and individually to create public web pages that provided links to reliable and credible resources and which included evaluations of several of those web sites based on usability and accessibility.

Results revealed that when students were aware that their work would be published their information literacy skills showed increases in the following areas: 53% of the students agreed that they would most likely research reliable sources, 42% agreed that it had an impact on their writing, 61% of the students disagreed that it made writing more difficult, 45% felt that they would most likely proofread and check spelling and grammar, and 45% felt that they would most likely revise their writing again. Sixty percent of the students reported that creating web pages in collaborative groups helped
them to understand the audience for their work and 52% felt that writing web evaluations increased their understanding of the World Wide Web. Thirty percent of the students felt that overall this was a positive learning experience.

Scott and O’Sullivan (2005) conducted action research to examine the search strategies of 89 ninth grade students during an evaluation exercise of four websites. The students were required to locate information from each of the four websites and evaluate those sites according to visual design, navigational technique, organization of content, and usability. The students were required to write reflective essays discussing the search strategies and navigational techniques that they used. The researchers collected data from the evaluations, reflective essays, direct observations of the students’ search strategies, and navigational techniques. The results of the study indicated that the students were unable to narrow searches, unable to conduct effective keyword searches and were unable to recognize useful links. Students would use the website’s search engine and retrieve hundreds of hits. The students became frustrated with the information overload on the Internet. A small number of the students demonstrated analytical and critical thinking skills to complete their evaluations. The researchers concluded that high school students need training in information literacy regarding information seeking on the Internet.

Seamans (2002) investigated nine undergraduate students’ perceptions of information literacy with a mixed method research study at Virginia Tech University. The students responded to an email questionnaire about their library usage and participated in electronic discussions with the researcher-librarian regarding their information seeking behaviors. The results of the online discussions and face-to-face interviews indicated that the undergraduate students used the Internet to search for
information. About half of the students reported that they evaluated the websites. The students reported little use of databases because they found them difficult to use. Students lacked effective search strategies for obtaining information and were not aware of legal and ethical issues regarding the Internet.

Ku, Sheu and Kuo (2007) investigated the effectiveness of instruction designed to develop information literacy with 75 RN-BSN nursing students with an experimental (32) and a control group (43). In addition to instruction on course content, the experimental group received training in searching, screening, integrating, analyzing, applying and presenting information. Both groups rated their information literacy skills with a 23-item questionnaire at the beginning and end of the semester. The results of the posttest scores indicated that the experimental group scored higher than the control group in information integration, analysis and application. The training enhanced students’ ability to integrate information, analyze and interpret information from different books, journals and websites, apply problem-solving strategies and obtain information from a variety of sources.

Students’ Perceptions of Their Information Seeking Efficacy

Research has shown that students possess confidence in their ability to locate, evaluate, and synthesize information, but that there perceptions do not always match their level of expertise. Tan and Theng (2006) investigated 293 secondary students’ perception of their abilities to access, evaluate and use information with project based work in a research studies curriculum. The researchers orientated the students to the Big 6 Information Problem-Solving Model and taught effective research search skills and methods. Seventy projects were evaluated based on the students’ perceptions of their information literacy competencies, research skills, creation of products, personal growth,
ability to work with others and achievement of standards by the American Association of School Libraries. The results of the study indicated that 37% of the students rated themselves as having the ability to define the purpose of a research problem and 48% of the students felt that they were capable of applying the appropriate research method to the research problem. Sixty-six percent of the students were confident in their ability to identify multiple sources of information and 56% of the students were confident in their ability to locate and select appropriate information to answer the research question. Over 63% of the students felt that they effectively communicated information during their project and 56% of the students were confident in their ability to synthesize the information from a variety of sources. Seventy-eight percent of the students reported that their critical thinking skills were increased and 70% of the students felt that they collaborated well with others.

To the contrary, Vickery and Cooper (2003) conducted a self-assessed 12 week audit of 296 undergraduate students’ information literacy and information technology skills at Macquarie University. The biology undergraduates rated their confidence levels in defining a research topic, establish the information requirements for a research question, locate and retrieve relevant information, evaluate, organize and synthesize information, and use technological tools for accessing information (library catalog, databases, Internet). The audit revealed that students felt confident in their information literacy skills and their ability to use technological tools to access information. The results of the study revealed that the test scores at the end of the semester did not correlate with the students’ perceptions of their confidence in their information literacy skills.
Scaffolding Facilitates Learning

Scaffolding provides temporary support to assist the learner with performing the task. Research indicates that scaffolding has a positive effect on learning outcomes. Wolf, Brush, and Saye (2003b) investigated achievement, behaviors, and attitudes of students in two eighth grade social studies classes (35 students each). The researchers utilized a two group scaffolded versus non-scaffolded design consisted of scaffolding as the independent variable and four dependent variables: student achievement, attitudes and behaviors and teachers’ attitudes. The students utilized the Eisenberg and Berkowitz Information Problem Solving (EBIPS) model and Decision Point database to write the newspaper articles on the Selma March. The scaffolded class received training with the EBIPS model, procedural (job-aid) and metacognitive scaffolds (study guides and journal with prompts), feedback from peers to revise the articles and the opportunity to evaluate their peers’ project. The non-scaffolded class received only orientation to newspaper writing and received feedback from the teacher. The results of the study indicated that the scaffolded class achieved higher scores than the non-scaffolded class with quality newspaper articles and demonstrated more on-task behaviors.

MacGregor and Lou (2004) utilized conceptual scaffolding to support inquiry-based learning with two fifth grade classes (26 students each). The researchers examined the effect of concept mapping on information literacy skills and students’ perceptions of accuracy and usefulness of information from websites. The students created a WebQuest on endangered species using the Internet to collect information and created a multimedia slide show which was scored for content, creativity and organization. Students were randomly assigned either to a group utilizing a concept map template to create their slide show and or to group creating a traditional storyboard for their slide show. The results of
observations, interviews, and task performance indicated that the group who organized their information via a concept map outperformed the traditional story board group on the free recall assessment of acquired knowledge.

Chang, Chen, and Sung (2002) conducted a study to examine the learning effects of concept-mapping methods on students’ text comprehension and summarization abilities. The participants of the study consisted of 126 fifth grade students from four intact classes at two Taiwanese schools which were randomly assigned by class to four conditions including a control group and three experimental groups. The three control groups included: map construction by correction, scaffold fading, and map generation. The study was conducted during a seven week time period with the administration of pre- and post- text comprehension and summarization tests. Each class received the same reading materials and instructions on concept mapping. The map correction group received a partially constructed concept map which included some errors in information. The students were required to read the materials and then make corrections to the concept map. The scaffold-fading group was required to read an expert concept map, fill in the blanks of the whole expert concept map, complete a partial expert concept map, construct the concept map with the provided concepts and relation links, and extract the key concepts and relation links from the reading materials to construct the concept map. The map generation group received only the reading materials and had to construct the map without any scaffolds. The findings of this study showed that concept mapping is an effective scaffold to assist with retention of textual information.

Benefits of Collaborative Learning

Research reveals that collaborative learning improves academic performance and increases critical thinking skills. Collaborative learning in the form of peer mentoring has
been found to be beneficial to the mentor as well as the protégé. Gensemer (2000) conducted a meta-analysis of peer mentoring and found that peer mentoring can increase the use of critical thinking and interpersonal and conflict resolution skills. Peer mentoring has been found to lower absenteeism and drop-out rates. The protégés demonstrated increased problem solving skills and time on-task behaviors, improved reading and writing skills, developed leadership skills, and improved in self-esteem and self-directedness. Gensemer (2000) noted that the academic performance and problem solving skills of mentors increased as well as a greater understanding of course materials.

Christie et al. (2004) investigated the benefits of reverse mentoring for high school students and teachers. Arizona State University West collaborated with Cactus High School using an altered version of Harper’s Gen Y model to mentor graduate students in a multimedia course. Eight K-12 students with advanced technology skills mentored graduate students (practicing teachers) in a teacher education program with an electronic portfolio project. The overall results of the study indicated that Gen Y students and teachers developed mutual respect for each other and the collaboration was beneficial to all participants. K-12 teachers gained technology skills and the Gen Y students increased in self-confidence with their expertise.

Big 6 Information Skills Model

While educators utilize a variety of information literacy models to incorporate information literacy into the curriculum the most widely used information literacy model is the Big 6 Skills Information Model (Eisenberg, Johnson, and Berkowitz, 2002). It also is recognized that there is a strong relationship between the elements of this model and the National Educational Technology Standards for students (ISTE, 2007). The model incorporates both information literacy and technology and includes: task definition,
information seeking strategies, location and access, use of information, synthesis and evaluation. *Task definition* is the recognition of the need for information, definition of the problem, identification of types and the amount of information needed. Students will be able to communicate with teachers about assignments and information problems through email, online discussion and real time communication (teleconference or chat).

*Information seeking strategies* involve the consideration of all possible information sources and development of search plan.

According to Eisenberg, Johnson, and Berkowitz (2002), *location and access* is the ability to locate resources and use appropriate computer resources and technologies to access online catalogs, periodicals, indexes, full text sources, multimedia, CD-ROM, websites, databases, electronic references (encyclopedia, dictionaries, atlases, thesauri), search engines, government resources and biographical reference sources. *Use of information* is the use of technology to access information, read guides and manuals, use software and hardware needed to view, read, and listen to files and Internet sites. Students will be able to copy and paste information from electronic sources, use word processors, databases, statistical software, electronic spreadsheets, endnotes, footnotes, and bibliographies for citation and credit of sources. *Synthesis* is the ability to classify and group information using word processor, databases, and spreadsheets. Students will be able to create word documents, charts, tables, graphics web pages and use desktop publishing software, hypermedia and multimedia with digital video and audio.

*Evaluation* is when the focus is on the effectiveness of the final product to meet the original task and how well the students carried out the information problem-solving process. Students will be able to evaluate electronic presentations (content and format), edit and revise work in a word processor, apply and abide by telecomputing etiquette,
abide by electronic acceptable use policies and thoughtfully reflect on the use of electronic resources.

The Big 6 Skills Information Model has provided scaffolding for students during the research process. The model has been proven effective in K-12 settings as well as on the university level. Wolf, Brush, and Saye (2003a) found the Big 6 Skills Information Model as an effective scaffolding tool for guiding research methods for eighth grade social studies students. Chen and Horng (2007) utilized the Big 6 Skills Information Model to integrate information literacy into history curriculum through the research process. The researchers found the model to be an excellent tool for synthesizing information from a variety of resources such as digital archives, textbooks, websites, and human subject interviews. Yale University’s Center for Psychology of Abilities, Competencies and Expertise (PACE) (2005) developed a curriculum unit based on the Big 6 Skills Information Model for fourth grade students. The curriculum unit was called True Wonders which fostered critical thinking and problem-solving skills through research on animals. PACE reported that the Big 6 Skills Model was successfully implemented and as a result of the research project resources are available for educators for classroom use.

The Big 6 Skills Information Problem-Solving Model has been utilized to examine information literacy skills according to gender, grade level and student achievement. Chang (2007) developed a Big 6 Information Problem-Solving Scale (B6IPS) which consisted of three subscales; task definition and information seeking strategies, information access and synthesis, and evaluation. The researcher utilized the B6IPS with 1539 fifth and sixth graders from Taiwanese elementary schools. The B6IPS consisted of 16 items rated on a 5-point Likert scale that ranging from totally disagree to totally agree.
The items contained statements which addressed the ability to pick out keywords in a question or assignment (task definition), use of search skills to expand or narrow the keyword search (information-seeking strategies), ability to locate information from multiple sources (information access), ability to use word processing or multimedia presentation software to organize information (synthesis), ability to evaluate multimedia presentations for content and format and the ability to consider how well a variety of sources was used throughout the project (evaluation).

Chang (2007) examined the mean scores of the three subscales according to the students’ gender, grade level and gender. The results of the study indicated that students scored higher on task definition and information seeking strategies with a mean score of 3.93 and a mean score of 3.53 for information access and synthesis and 3.51 for evaluation. The sixth graders scored higher on task definition and information seeking strategies with a mean score of 3.99 in comparison to the fifth grades at 3.85. The results indicated that the females scored higher than the males on all the subscales; task definition and information seeking strategies with the mean score of 4.01 to the males at 3.84, information access and synthesis females 3.66 to the males at 3.41 and on evaluation the females scored 3.60 to the males at 3.43.

The students were divided into two groups; library use instruction (714 students) and non-library instruction experience (825 students). Chang 2007 found that the library use instruction group scored higher on all three subscales; task definition and information seeking strategies with a mean score of 3.98 to the non-library instruction experience group at 3.82, information access and synthesis at 3.61 to the non-library instruction experience group at 3.38 and evaluation with a mean score of 3.53 to the non-library instruction experience group at 3.47.
Problem Statement

The purpose of this study is to examine the effects of cross-age mentoring in an online community that utilizes scaffolding tools for the enhancement of information literacy. This research is situated in a collaborative effort between K-12 and higher education to increase students’ information literacy skills with emphasis on evaluation and synthesis skills which are outlined in the Big 6 Skills Information Model. This research study will contribute to the literature on cross-age collaboration and mentoring between higher education and K-12 institutions as well as to provide insights about cross-age mentoring and the use of procedural and cognitive scaffolds.

Significance of the Study

There is a lack of literature on empirical research on inter-institutional collaborations. Recent searches of EBSCOhost database failed to yield results on collaborations between high school students and pre-service teachers. The literature on inter-institutional collaborations between high schools and colleges are focused on postsecondary education and student retention. Deutch, Evans, and Scarlatos (2001) conducted the Learning Café Project which was a collaboration between Brooklyn College and four Brooklyn high schools to prepare juniors and seniors for college admission with college credit programs.

The current study consists of the collection of data from two survey instruments and observations from nine online discussion forums between mentors and mentees. The results of this study provide insights to the benefits of cross-age mentoring for the mentees such as increased performance on task and increased communication, research, and writing skills. The benefits for the pre-service teachers (online mentors) were increased communication skills, accountability to students with the application of instructional strategies, and a sense of fulfillment from assisting their mentees.
The researcher/facilitator utilized procedural scaffolding in the form of PowerPoint and RCampus tutorials with hands-on demonstrations. Conceptual scaffolding was provided through the facilitator’s question prompts and mentoring from the pre-service teachers. Procedural and conceptual scaffolding prompted the high school students to employ metacognitive skills in completing the information seeking task.

Research Questions

The following questions provided a focus for this research:

1. Did the high school students’ confidence in their ability to apply information literacy skills increase as a result of their collaborative project-based learning experience?

2. Did the high school students’ perceptions of their evaluative standards improve as a result of their collaborative project-based learning experience?
   
   
   b. Explicit standards (use of information seeking strategies)

3. What was the nature of the dialog within the mentor-mentee online discussion groups?

4. What was the impact of peer mentoring on the students’ performance on the information seeking task?

5. What were the benefits and challenges experienced by the online mentors?

Definitions

● **Information Commitments** are evaluative standards which learners utilize in order to assess the accuracy and usefulness of information from web-based materials and other resources (Adopted from Tsai (2004). Information commitments include evaluation of authority of web-based materials, accuracy of multiple sources and usefulness of content and application of search strategies.
● **Mentoring** is defined as a dyadic relationship in which a mentor, a senior person in age or experience, provided guidance and support to the less experienced person, the protégé. (Adopted from Hunt and Michael 1983)

● **Scaffolding** is stated in Vygotsky (1978) when he defined the Zone of Proximal Development as the distance between actual development and potential development. The focus of this study is on conceptual and procedural scaffolding to facilitate the participants’ growth to their potential development.

● **Conceptual Scaffolding** is when the focus is on what to consider in terms of importance such as identifying key concepts or facts that relates to the given problem with the use of graphical illustrations of relationships, outlines and expert knowledge (Adopted from Hannafin, Land, and Oliver 1999).

**Procedural Scaffolding** assists the learner with a tool or procedure related to the learning task (Adopted from Hannafin, Land, and Oliver 1999).
CHAPTER 2
REVIEW OF LITERATURE

The literature will discuss the use of the Big 6 Skills Information Model for integrating information literacy into the curriculum and use as a metacognitive scaffold in collaborative learning. Hannafin, Land, and Oliver (1999) stated that metacognitive scaffolds guide the learner in what to think about during a learning activity such as framing the problem, defining the task and reflecting on the goals. Collaborative learning is based on the principles of social constructive theory which is utilized by Lev Vygotsky’s Zone of Proximal Development (ZPD). The basic premise of the ZPD is peer collaboration in which scaffolds are provided by the more capable peer to assist less capable peers in performing a learning task. Mentoring is form of scaffolding utilized in collaborative learning where K-12 students are mentored by college students. The basis of the present research is mentoring in collaborative learning between K-12 and higher education to increase high school students’ information literacy skills. A successful collaboration is the CIRCLE Project in which the University of Texas at Austin, Austin Independent School District and Eanes Independent School District constructed knowledge building communities with computer technology. Knowledge building is rooted in critical thinking skills which are increased through collaborative learning as found in Gokhale’s (1995) study which is based on Bloom’s Taxonomy.

The Big 6 Skills Information Model has demonstrated its effectiveness as a metacognitive scaffold through peer collaboration, an instrument to integrate information literacy into the curriculum at the K-12 and college level and as a tool to enhance critical thinking, problem-solving and technical skills. Lev Vygotsky’s theory of the (ZPD) is
applicable to the Big 6 Skills Information Model which is conducive to collaborative learning. The ZPD involves the transfer of skills through collaboration with a more capable peer. Big 6 Skills Information Model correlates with the levels of thought of the Bloom’s Taxonomy and both models contain evaluation and synthesis phases.

Eisenberg and Berkowitz (1988) designed the Big 6 Skills Information Model based on the cognitive objectives of Bloom’s taxonomy. The authors correlated the Big 6 Skills Model to the levels of Bloom’s Taxonomy in terms of information-related behaviors. The knowledge level consists of the recognition of appropriate information. The comprehension level is based on the ability to interpret and translate information. The application level consists of utilizing information to solve problems. The analysis level consists of the ability to categorize information into identifying characteristics. The synthesis level is the organization of information to present an idea or concept and reveal relationships. The evaluation level consists of the ability to judge information based on a certain criteria. Thomas (2004) emphasized that synthesis is the ability to construct new knowledge from ideas or facts. Evaluation requires the individual to make judgments regarding the value of an activity or assignment.

Big 6 Skills Information Model and Metacognitive Scaffolding

Wolf and Brush (2000) investigated the effectiveness of an information problem solving (IPS) model as a metacognitive scaffold. The researchers utilized a two group quasi experimental design of scaffolded versus non-scaffolded with two classes of eighth grade students (35 students in each class). The assignment consisted of writing newspaper articles on the Selma March utilizing a multimedia database called Decision Point (DP). One class was scaffolded prior to the study and was required to use the provided scaffolds to complete the assignment. The scaffolded class received training in
the use of the IPS model while the non-scaffolded class received orientation to newspaper writing only. Metacognitive scaffolds (study guides and journal with prompts) and procedural scaffolds (job-related aid) were available to both classes but only the scaffolded class was instructed to use the scaffolds to complete the assignment. In addition, the scaffolded class received the grading criteria prior to the assignment and had the opportunity to peer review their peers’ articles and to evaluate their final project. The non-scaffolded class received feedback only from the teacher.

The researchers conducted observations and audio-taped both classes’ activities then transcribed the tapes to collect qualitative data on student engagement, attitudes and behaviors. The newspaper articles were evaluated by two neutral scorers using a rubric. Upon completion of the project, both classes of students rated a seven-item attitudinal survey on a 4-point Likert scale. The survey contained items related to the students’ attitude toward the project, the topic and preferred way of learning. Students answered open-ended questions about what they liked and disliked about the learning experience and recommended ways to improve the assignment. The results of the survey, observations and audio-taped sessions revealed that the scaffolded class received significantly higher scores on their newspaper articles. The non-scaffolded class copied everything verbatim in their articles. Wolf and Brush (2000) found that both classes viewed the assignment positively however the non-scaffolded class had more positive attitudes. The non-scaffolded class viewed newspaper article writing as way to improve their understanding of the Selma March and to increase their information processing skills. The non-scaffolded class expressed concern for the heavy workload of the teacher and suggested that the assignment could be improved with more assistance for the teacher.
Wolf, Brush, and Saye (2003a) investigated the effectiveness of the Big 6 Skills Information Model as a metacognitive scaffold. The researchers examined the effectiveness of the Big 6 Model with 18 eighth graders in a social studies class on the American Civil Rights Movement with the emphasis on the Selma March.

Metacognition was operationally defined in terms of observed behaviors such as verbal behaviors, awareness and understanding of task, process of reflecting and monitoring the effectiveness of the research process, and strategies utilized for completion of tasks. The authors based their study on Palinscar’s (1986) definition of metacognition which is the ability to plan, implement and evaluate strategic approaches to learning and problem-solving. The Big 6 Skills Information Model was chosen for the study because of the six steps that engage students in information problem-solving. The research question that was formulated was “How does Big 6 support metacognitive strategies and knowledge management in students?”

The study was conducted in 12 classroom sessions about one-hour and 35 minutes in length which were recorded by the teacher. The instructional context was based on the “Selma March” of the African American Civil Rights Movement. The participants of the study had no prior knowledge of the event. Wolf, Brush, and Saye (2003a) utilized instructional materials which consisted of Big 6 training materials during a workshop, CD-Rom database DP and metacognitive scaffolds embedded into the database to support students in the discovery of information, people involved and events that occurred. The database also provided a journal tool which provided students the opportunities to reflect on their work and research activities. The database also provided a tracking system which recorded students’ navigation paths, time spent, and times logged in and out.

The subject matter was delivered through DP database, video clips, and
newspaper artifacts. Twenty-six events relating to the African American Civil Rights Movement were utilized and categorized as black power, non-violent strategies, and the legal system. Students were assigned to produce newspaper articles on the Selma March using the Big 6 Skills Information Model to complete rough drafts of the articles. Students were placed in groups to provide feedback to peers and through peer review students revised their final papers. The newspaper articles were evaluated with a rubric based on the steps of the Big 6 Skills Information Model. The researcher and classroom teacher developed the rubric and two neutral scorers assessed the articles using the rubric.

The researchers collected triangulated data sources to provide trustworthiness of data such as student logs, journal entries, transcripts of recorded teacher-student interactions, interviews, and students’ articles. Three students were purposively selected for interviews with the researchers at the conclusion of the study. The interviews were recorded and lasted about one hour. The interview questions were based on observations from class sessions and the transcripts of teacher-student interactions. Each student was asked to give their opinion of the study’s activities. The students responded to a 17-item questionnaire on a 4-point Likert scale about perceptions and feelings concerning the research and writing process.

The results of multiple data sources indicated that the Big 6 Skills Information Model supported metacognitive scaffolding and provided a focus for student research and writing activities which enhanced their writing skills and content knowledge. Wolf, Brush, and Saye (2003a) utilized the Big 6 Model as a means to support interaction with students. Students were able to master the subject matter and manage complex tasks when scaffolding was provided. The student logs indicated that students planned ahead and found the writing format helpful in other subject areas. Students reported that their
level of confidence and self-efficacy was moderate to high throughout the activity. Students heavily relied on the Big 6 training materials to complete the project. The tracking system from DP database revealed that the students utilized several types of information and multiple sources. The students also relied on the scaffolding format of the Big 6 Skills Model to guide them with mental modeling and visualization of the series of tasks. Big 6 Skills Model provided vocabulary structures which prompted teachers and students to label behaviors and clarify terminology.

Collaboration and the Zone of Proximal Development

Collaborative learning is based on the principles of social constructivism theory. McMahon (1997) stated that social constructivism views learning as a social process that is enhanced when individuals are involved in social interactions. Knowledge is constructed through the use of language and social activity. Lev Vygotsky, psychologist and social constructivist developed a concept that serves as the basis for peer collaboration, the ZPD. Vygotsky introduced the ZPD in his work, “Mind and Society, “as he explains:

“When it was first shown that the capability of children with equals levels of mental development to learn under a teacher’s guidance varied to a high degree, it became apparent that those children were not mentally the same age and that the subsequent course of their learning would obviously be different. This difference between twelve and eight, or between nine and eight, is what we call the zone of proximal development. It is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under guidance or in collaboration with more capable peers (Vygotsky, 1978, p. 86).”
The ZPD has been the focus of many educational research studies with children and adults. One such study is Bodrova and Leong (1998) which is a case study of at-risk kindergarten children and emergent writing skills. The teachers investigated the effects of the ZDP on the scaffolded writing skills of 34 kindergarten children. According to Bodrova and Leong, scaffolded writing involves two concepts were utilized by Vygotsky: materialization and private speech. The authors stated that Galperin (1969) defined materialization as when mental action is being learned, physical objects and actions are used to represent that concept or strategy. Galperin also defined private speech as a self-directed regulatory speech which involves audible directing of one’s self on how to move forward. Examples of private speech include counting and reading aloud.

The teachers utilized scaffolding techniques such as reading aloud, use of rhymes, and modeling of writing. The kindergarten children engaged in journal writing activities three times a week. Two writing samples were collected and compared, one sample from November, and the sample from May. Gentry’s Scale of Writing was used to examine formation of letters, sounds, and spelling. Gentry’s Scale of Writing consists of four levels: scribbles and pictures, pre-communicative (formation of letters but not sounds), semi-phonetic (incomplete letter formation), and phonetic transitional (letters represent sound with correct spelling). The results of the study indicated that from November to May all students progressed past the scribbling stage: nine students were at the pre-communicative level, 17 students were at the semi-phonetic level, and nine students were at the phonetic/transitional level. The findings of the study indicated that scaffolded writing is an effective method to assist children in reaching the higher level of the ZPD (independence).
Bhavnagri and Bielat (2005) formed a symbiotic relationship during a collaboration in which library instruction was integrated into a graduate level research methods course at Wayne State University. The relationship was symbiotic because Bhavangri, the faculty member possessed knowledge of research methods and Bielat, the librarian possessed library instructional knowledge and technology skills. The library instruction was integrated into the research methods course based on the ZPD, Association of College and Research Libraries (ACRL) Information Literacy Standards and the National Council for Accreditation of Teacher Education (NCATE) Professional Standards. The instructional team held two bibliographic instructional sessions in which they implemented scaffolding strategies such as role modeling, critique of published research articles, identification of independent and dependent variables, development of research questions and hypothesis, and search strategies of ERIC database and library terminology.

Bhavanagri and Bielat (2005) utilized the Blackboard to deliver the course in which 15 graduate students posted their research questions and hypotheses and selected independent and dependent variables to the online discussion board. The instructional team stated that the students needed to develop critical thinking skills which are located in the lower ZPD. Bielat and Bhavangri (2006) proclaimed that the lower ZPD is defined by the learner’s performance without assistance and the upper ZPD is the highest level of performance of the learner with assistance. To scaffold critical thinking skills, the instructional team required the students to examine multiple sources for pertinent information. Students attained upper ZPD through peer teaching with posting to the online discussion of research questions and hypotheses, electronic searches of ERIC database, use of Blackboard as a communication tool, video instruction of students’
presentations on research methods which included focus group interviews, videotaped observations, artifacts, and document analysis.

Bielat and Bhavnagri (2006) administered a pre-class/ post-class survey to measure the students’ progress from lower to upper ZPD during the library research assignment. The survey questions were aligned with the ACRL standards which promote information literacy and the NCATE standards were fulfilled with the use of technology. The results of the surveys indicated that students moved to the upper ZPD through the use of technology with comfort levels of technology use increasing from 50% (pre-class survey) to 83% with the post-class survey.

Collaboration, Critical Thinking Skills and Bloom’s Taxonomy

Interaction is an integral part of collaborative learning and group work. Johnson and Johnson (1999) described the interactive behaviors involved in collaborative learning as: giving and receiving help and assistance, exchanging resources and information, explaining or elaborating information, sharing existing knowledge with others, challenging others’ contribution (cognitive conflict and controversy leading to negotiation and resolution), advocating increased effort and perseverance among peers, engaging in small group skills, and monitoring each others’ contributions. Johnson and Johnson (1999) proclaimed that students engaged in collaborative learning activities achieve at higher levels of thinking and retain information longer.

Panitz (1999) conducted a meta-analysis of research on collaborative learning and found that collaborative learning has academic, social, psychological, and assessment benefits. According to Panitz, academic benefits of collaborative learning include an increase in higher order thinking skills (Webb, 1982), creates an atmosphere for active learning (Slavin, 1990), increases academic achievement, and class attendance (Hagman
& Hayes, 1986). Social benefits of collaborative learning include increased interaction between student and teacher (Cooper, Prescott, Cook, Smith, Mueck, R. & Cuseo 1984) and enhanced social interaction skills (Johnson, Johnson and Holubec 1984). Psychological benefits of collaborative learning consist of increased self-esteem (Johnson and Johnson, 1989), increase in help seeking behaviors, and acceptance of peer review (Hertz-Lazarowitz, Kirkus & Miller 1992). Assessment benefits of collaborative learning include immediate feedback to students, effectiveness of class activities, and student engagement through observation (Johnson and Johnson, 1987).

Research has indicated that collaborative learning increases critical thinking skills. Gokhale (1995) investigated the levels of critical thinking skills individually and collaboratively of 48 industrial technology students at Western Illinois University. The participants of the study were enrolled in two sections of 271 Basic Electronics. Twenty-four students were enrolled in each section of the course. The course sections were randomly assigned to the collaborative learning or the individual learning instruction. The collaborative learning instruction students worked together in six groups with four members each. All participants received a 50-minute lecture on series dc circuits and parallel dc circuits and a worksheet with problems related to series and parallel dc circuits. The worksheet contained both drill and practice and critical thinking items. Group members engaged in discussion to generate possible solutions to the problems. Individuals worked on the worksheet separately to solve the problems. All students were given 30 minutes to work on the worksheet that served as the pretest. After the 30 minutes ended, students were given the answer sheet with 15 minutes to compare the answers to their solutions.
Gokhale (1995) administered a 30-item posttest with 15 drill and practice and 15 critical thinking items. The posttest items were classified according to Bloom’s Taxonomy, the drill and practice items belonged to knowledge, comprehension, and application levels of Bloom’s Taxonomy. Posttest items classified as critical thinking items belonged to the synthesis, analysis, and evaluation levels. The critical thinking items required students to clarify information, combine component parts into a coherent whole, and compare the solutions to problems with the law of electric circuits. The results of the study indicated that the collaborative experimental group scored higher on the critical thinking items than the individual control group and both groups performed well on the drill and practice items.

The researcher administered a 9-item questionnaire with open-ended questions to solicit the participants’ perceptions of the learning experience. The students’ responses were divided into three categories: benefits of collaborative learning, benefits of social and emotional aspect of the learning process, and negative aspects of collaborative learning. Students reported that the benefits of collaborative learning were: increased understanding, pooled knowledge and experience, helpful feedback, stimulated thinking, and new perspectives. Students reported that the social and emotional aspects of collaborative learning consisted of: relaxed atmosphere which made problem-solving easy and fun, greater responsibility for self and group, and made new friends. Students stated that the negative aspect of collaborative learning was the time consuming explanations of the assignment to the group members.

Collaborative Learning between K-12 and Higher Education

Shell et al. (1996) pointed out that there is a lack of literature on collaborative learning between institutions of higher education and K-12 schools. A successful
collaboration is the Collaborative Information Resources Computer-supported Learning Environment (CIRCLE) Project between the University of Texas at Austin College of Education, Austin Independent School District and Eanes Independent School District. Project CIRCLE was established to create collaborative knowledge-building communities based on constructivism with computer technology. The purpose of the Project CIRCLE was to determine the effects of knowledge building communities on students’ intentional learning, knowledge building skills, and perceptions of the collaborative learning classroom. University students and faculty acted as subject experts to guide K-12 students through the learning experience. In year one, 446 students (259 Austin Independent School District (School A); 187 Eanes Independent School District (School B) participated in the CIRCLE. Eight teachers (6 from School A and 2 from School B) participated in this project. In year two, 946 students (310 from School A, 636 from school B) participated in the Project CIRCLE.

Shell et al. (1996) created and administered the instrument; Student Perceptions of Classroom Knowledge-Building (SPOCK) which has six scales: knowledge building (10 items), question asking (4 items), self-regulation (6 items), lack of initiative (4 items), teacher directedness (5 items), and extent of collaborative learning (5 items). Students rated the SPOCK based on classroom situations that related to each of the six scales. Project CIRCLE was based on a learning model of knowledge building and constructivism that involves production of knowledge that goes beyond factual recall and requires construction of new knowledge, linking new knowledge to existing knowledge, and integration of knowledge across topics and domains. Knowledge building is supported by intentional learning which is active self-regulated learning with exploration and problem solving as learning concepts. Knowledge building and intentional learning
were facilitated by computer support for collaborative learning (CSCL) to promote greater collaboration among students and to change the teacher’s role to facilitator of knowledge building. The researchers employed several technologies and collaborative computer tools such as the Daedalus program (Interactive brainstorming and writing tools), telecommunication links between classrooms within and between schools, and Internet access.

In year two, the SPOCK was administered at the end of the spring semester by members of the research team with classroom teachers either present or not at their choice. Due to low technology integration in School B both schools’ data were combined. The results indicated that there were no significant differences between the high and low CIRCLE integration groups which suggested that the integration of the CIRCLE learning model had a positive effect because previously low knowledge building scores increased. Students reported higher perceptions of collaboration with the peers and more question asking when taught by teacher who integrated high levels of technology. In year two, students reported significantly higher levels of question asking and perceptions of collaboration with peers and had lower perceptions of teacher directedness. School A’s cluster of question asking, self-regulation, perception of collaborative learning was positively associated with high achievement. Lack of initiative was negatively associated with higher achievement. School B’s perceptions of teacher directedness were grouped with the lack of initiative. The overall results indicated that the implementation of the CIRCLE learning model and CSCL technologies had a significant effect on students’ knowledge building, intentional learning, and perceptions of the constructivist classroom environment.
Shell et al. (2005) extended the Project CIRCLE to examine the effect of CSCL communities on students’ self-regulated strategic learning. The participants of the study were the same 429 students (249 from School A; 180 from School B) in the fall semester and 317 students (180 from School A; 137 from School B) in the spring semester. The CIRCLE project utilized CSCL technologies, Daedalus Integrated Writing Environment, telecommunication links between classrooms within and between schools, and Internet access. The researchers administered the SPOCK to examine three areas: students’ self-directed strategic learning, student engagement in knowledge building which includes goals for knowledge acquisition and student perceptions of the classroom environment and collaboration. Student engagement in self-regulated strategic learning consisted of assessing the extent to which students used cognitive and metacognitive strategies to facilitate their learning and exercise self-regulation of their learning.

Shell et al. (2005) categorized the high and low CSCL technology groups according to the amount of use. High CSCL technology group utilized a TeachNet account, PsycoWard database, ClarisWorks, and Daedalus to collaborate on research project on psychological and sociological disorders. The project consisted of writing research papers for a research magazine. University students and faculty acted as subject experts and critiqued K-12 student’s papers. The low CSCL technology integration group’s collaborative project was to write poetic productions. However, the students used the Daedalus interchange to discuss their attitudes about poetry instead of producing a final production. The results of the study indicated that students taught by high CSCL establishment group reported higher knowledge building; question asking, and perceptions of collaboration with peers. The results indicated that greater implementation of CSCL communities had a positive effect on question asking and
perceptions of collaborative learning but failed to show an increase in for self-regulated strategic learning.

College preparation is often the reason for some K-12 and university collaboration. Deutch, Evans, and Scarlatos (2001) developed the Brooklyn College Learning Café project which was a collaborative project between Brooklyn College and four high schools: Midwood, Edward R. Murrow, Samuel J. Tilden, and Brooklyn College Academy. The purpose of this inter-institutional collaboration was to expose high school students to the Internet and to provide opportunities for college credit. The Learning Café project team consisted of a project director, project coordinator, two curriculum developers, two multimedia designers, and four high school coordinators. Over 600 juniors and seniors participated in the collaboration. The project team designed the junior year curriculum on information literacy, online critical thinking, and writing skills. The seniors enrolled in a college preparation course on the College Board’s Ex Pan software which involved choice of college, the application process, and financial aid. Seniors created web pages through the Ex Pan software as part of the course. After the completion of the college preparation course, seniors enrolled in a college course for credit in one of the following disciplines: English, Biology or History.

According to Deutch, Evans, and Scarlatos (2001), the Learning Café project was delivered through a relational database and a custom designed browser to support the junior level courses. Filemaker Pro database was utilized to create quizzes and provide links to web and lesson pages which were created in hypertext mark-up language. Macromedia was utilized to generate online multimedia. The project team reported that in spite of the lack of communication between institutions and technical difficulties; the
students’ attitudes toward computers were positively correlated with the web-based training. The students showed an increase in critical thinking and writing skills.

Mentoring Through K-12 and Higher Education Collaboration

Mentoring in K-12 and university collaboration usually consist of the university students mentoring the K-12 students. One unique mentoring situation was reverse mentoring by Generation Yes (Gen Y) students. Dennis Harper’s Gen Y Program developed mentoring partnerships with K-12 students and teachers to integrate technology into the schools. Arizona State University West collaborated with Cactus High School using an altered version of Harper’s Gen Y model to mentor graduate students in a multimedia course. Christie et al. (2004) participated in a four year qualitative study in which Gen Y students mentored graduate students in a 12-day multimedia course to create an electronic portfolio to be integrated into their classroom teaching. Eight K-12 students with advanced technology skills were drafted from a previous K-12 collaboration to participate in a study with 30 to 35 students from a Master of Education program. The K-12 students spent one day a month at the university’s computer lab as part of their curriculum.

Christie et al. (2004) investigated the benefits of reverse mentoring for high school students and teachers. The research team conducted a focus group session with each set of students (eight Gen Y and 11 graduates) to collect data on their perceptions and attitudes. Each session was audio and video-taped and the audio tapes were transcribed. Data was collected from focus groups, observations, and document analysis of teacher created projects. The results of a constant comparative analysis indicated that teachers responded positively to mentoring from Gen Y students and acknowledged their lack of technology skills. Gen Y students and teachers differed in learning strategies. Teachers
preferred step by step proven methods whereas the Gen Y students preferred exploration and learning through trial and error. The overall results of the study indicated that Gen Y students and teachers developed mutual respect for each other and the collaboration was beneficial to all participants. K-12 teachers gained technology skills and the Gen Y students increased in self-confidence with their expertise. As a result of the study, K-12 teachers incorporated the Gen Y model into their curriculum.

Wang, Poole, Harris, and Wangeman (2001) investigated 27 teenagers’ (ages 13-18) perceptions of collaborative learning, confidence in collaborating online, competence in using online tools such as email, chat, webliography (resources), electronic journal, and discussion board threads. The participants of the study were children of employees of the Motorola Company in England and Scotland. The collaborative project was titled “Expeditions 2000” and was implemented by Motorola University for a five-week period in July through August of 2000. Six on-site mentors and four online mentors facilitated the project. The on-site mentors were two public school teachers and four Motorola employees. The four online mentors were graduate students in the teacher education program at Brigham University in Provo, Utah.

The president of Motorola University assigned the participants to the task of developing a marketing plan with four essential elements of marketing (the four p’s): product, price, place, and promotion. Wang et al. (2001) utilized CyberExpeditions, an Internet-based system to facilitate the online collaborative activities. CyberExpeditions provided online communication tools such as email, chatroom, discussion boards, webliography, document sharing, and electronic journal. The participants attended an on-site three-hour orientation to CyberExpeditions online system and were assigned to one of the six mentors with whom they met once a week. The mentors participated in a
one-day orientation on the goals and tasks, teaming building, communicating, problem-solving, and reflection on team experiences.

The online teams of participants completed their marketing plan with the online communication tools then created and presented a PowerPoint presentation to a panel of Motorola experts. The participants reflected on the learning experience through weekly self-reports. Wang et al. (2001) surveyed the participants before and after the project on their attitudes toward collaborative learning in the classroom and online, their competence using online tool, and their confidence in collaborating with others in problem-solving. The participants responded to survey items on a 5-point Likert scale ranging from strongly disagree to strongly agree. In addition, the researchers conducted interviews with the 10 mentors and panel of experts.

The results of the study indicated that the participants experienced an increase in confidence in collaborating online and competence in using online tools. The results failed to show a significant difference in collaborating in problem-solving at school and online and attitudes toward the learning experience. Wang et al. (2001) stated that as a result of Expeditions 2000, the participants experienced improved communication, presentations skills, learned problem-solving and research strategies, recognized the value of teamwork, and developed strong leadership skills. The results of the interviews with mentors indicated that effective mentoring strategies include: flexibility, understanding the objectives of the project and mentoring goals, adaptability and modeling patience, and persistence in the face of technical problems.

Prins, Sluijsmans, Kirschner and Strijbos (2004) proclaimed that peer assessment is a form of collaborative learning which is based on interaction and involves learning strategies such as evaluating peers’ work, utilizing predetermined criteria as basis for
evaluation, and providing feedback through constructive critique. Wen, Tsai, and Chang (2006) investigated students’ perceptions of peer assessment that were enrolled in a teacher education program at two Taiwanese universities. The participants of the study consisted of 280 pre-service teachers and 108 in-service teachers. The researchers administered a 13-item questionnaire with two scales: students’ attitudes toward peer assessment in general (7 items) and online peer assessment (6 items). The study examined the effect of gender on students’ attitudes. The results of the study indicated that both pre-service and in-service teachers viewed peer assessment positively. In-service teachers had more positive attitudes toward peer assessment and viewed it as a learning strategy. Male pre-service teachers viewed peer assessment in general more positively and male in-service favored online peer assessment more than female teachers.

**Scaffolding and Web-based Environments**

Scaffolding supports learning by guiding the learner through the process of completing the task. Hannafin, Land, and Oliver (1999) explained four types of scaffolds: metacognitive, procedural, conceptual, and strategic. The authors stated that metacognitive scaffolds guide the learner in what to think about during a learning activity such as framing the problem, defining the task and reflecting on the goals. Procedural scaffolds assist the learner with a tool or procedure related to the learning task. Procedure scaffolds clarify or instruct the learner how to perform a task with certain tools or resources such as bookmarking information for review in open learning environments. Conceptual scaffolds focus on what to consider in terms of importance such as identifying key concepts or facts that relate to the given problem. Conceptual scaffolds consist of graphical illustrations of relationships, outlines, and expert knowledge. Strategic scaffolds provide assistance with approaches to accomplish the learning task.
such as evaluation of resources, identification and selection of information, and incorporation of new knowledge with existing knowledge. An effective strategic scaffold is to illuminate the available resources and tools to the learner.

Brush and Saye (2002) defined soft and hard scaffolds while designing a learning environment with the DP multimedia database. Soft scaffolds were defined as learning prompts utilized by the teachers when the situation calls for the teacher to intervene when students misunderstand an aspect of the learning task. The teacher provides support and guidance by asking questions related to the subject matter to guide the students’ thinking. Hard scaffolds were defined as planned or predetermined supports that are based on the difficulty of the task. Teachers provide hard scaffolds when hyperlinks to information are embedded in the multimedia to support students’ use of the software. Brush and Saye (2002) investigated the effects of soft and hard scaffolding with an 11th grade history class during a two-week unit on the American Civil Rights Movement to develop non-violent strategies after the death of Martin Luther King. The researchers embedded several hard scaffolds into the DP such as conceptual scaffolds: interactive essays with hyperlinks to events, student guides, and recommended documents. Student journals and storyboard templates served as metacognitive scaffolds to determine useful information seeking strategies and to help students plan their presentations.

Bielat and Bhavnagri (2006) designed a Vygotskian scaffold tool to assist learners in the movement to their upper level of ZDP in a research methods course. The teacher-librarian instructional team collaboratively designed the scaffolding tool. Navaz Bhavnagri (faculty) contributed the PowerPoint presentations on how to select a research topic, formulate a hypothesis, and define the independent and dependent variables. The PowerPoint presentations were posted to the Blackboard website for future reference.
According to Bielat and Bhavvnagri, the PowerPoint presentations served as a “memory mediators” which helps students to remember and scaffolds students’ thinking as discussed by Vygotsky. The students collaborated to identify the independent and dependent variables of research questions which demonstrated Vygotsky’s principle of co-construction of knowledge.

Veronica Bielat (librarian) introduced the students to library terminology and demonstrated search strategies with the ERIC database. The librarian utilized two online tutorials: basic library searches and ERIC with a matrix spreadsheet for recording new concepts and strategies in database searching which served as an organization tool. Bielat posted links to two Wayne State Library tutorials: library resource pathfinders and instructional handouts on Blackboard. The online tutorials scaffolded students in the use critical thinking skills in the development of search strategies for ERIC database.

Students used keyword searches to identify the independent and dependent variables and demonstrated their understanding of the matrix by using it as a navigational tool. Students documented three searches of the database using the matrix. Sixty-four percent of the students reported that they viewed the online tutorials and that they assisted them in reaching their upper level ZPD.

MacGregor and Lou (2004) utilized conceptual scaffolding to support inquiry-based learning with two fifth grade classes (26 students each). The researchers examined the effect of concept mapping on information literacy skills and students’ perceptions of accuracy and usefulness of web-based information such as websites. The students created a WebQuest on endangered species using the Internet to collect information and created a multimedia slide show which was scored by a rubric. MacGregor and Lou (2004) implemented a conceptual map scaffold versus non-scaffold instructional method. All
students received a study guide which required them to find important facts about nine items and each item was scored one point. A random selected group of students (half of each class) received a concept map template to create their slide show and the other half of the class was directed to create a storyboard for their slide show. After completion of the slide show, students responded to a recall protocol on what they learned and each item was scored one point. Students responded to a six-point semantic differential attitudinal scale on the importance and informative quality of websites they used to create the WebQuest. Students were observed during their navigation of websites.

The results of the study indicated that the mean scores for the concept map scaffold group were significantly higher than the non-scaffold group on the multimedia slide show in content and organization. The conceptual map scaffold group received higher scores on the free recall assessment which indicated that they retained the information. The findings of this study indicated that concept mapping was an effective scaffold for students to collect information from websites. MacGregor and Lou (2004) stated that observations and interviews revealed that students rated websites in terms of usability if the website had bold informative headings with multiple subtitles, text boxes, and fast fact sections. Students preferred websites with colorful backgrounds and multimedia features.

Wolf, Brush, and Saye (2003b) investigated achievement, behaviors, and attitudes of two classes of eighth grade social studies students (35 students each class). The researchers duplicated the study conducted in 2000 to investigate the differences in achievement, behaviors, and attitudes of the scaffolded class compared to the non-scaffolded class. The two group scaffolded versus non-scaffolded design consisted of scaffolding as the independent variable and four dependent variables: student
achievement, attitudes, behaviors, and teachers' attitudes. The students utilized the Eisenberg and Berkowitz Information Problem Solving (EBIPS) model and DP database to write the newspaper articles on the Selma March. The scaffolded class received training with the EBIPS model, procedural (job-aid), metacognitive scaffolds (study guides and journal with prompts), feedback from peers to revise the articles, and the opportunity to evaluate their peers’ project. The non-scaffolded class received only orientation to newspaper writing and received feedback from the teacher.

Wolf, Brush, and Saye (2003b) pointed out that four of the six steps of the EBIPS Model: location and access, use of information, synthesis, and evaluation focused on metacognitive skills. Task definition and information seeking strategies provide students with structure to monitor to their learning. The scaffolds were embedded in DP to guide the scaffolded class in their thinking about the assignment. The non-scaffolded class had no prompts and relied on the teacher for guidance. The researchers collected data from classroom observations, transcripts of audio-tapes, attitudinal survey, open-ended questions on students’ perceptions, and interviews with the two teachers. The results of the study indicated that the scaffolded class achieved higher scores than the non-scaffolded class with quality newspaper articles. Behavioral differences consisted of the scaffolded class being on task and the non-scaffolded class writing non-related articles, and coping information verbatim into their articles. An analysis of students’ attitudes indicated that the non-scaffolded class responded more positively to statements of feeling smart while doing the project and liked to do similar projects. Both classes responded positively to learning more about the Civil Rights Movement and neither class experienced anxiety associated with the assignment. The teachers viewed the assignment positively and thought the students performed well. The teacher felt that the EBIPS
provided structure for the scaffolded class and kept them on task. The teacher of the non-
scaffold class felt that in spite of having to do the editing that the class met his
expectations.
CHAPTER 3

METHOD

This research is a triangulated mixed method design (Creswell, 2008) and incorporates the collection of both quantitative and qualitative data to facilitate understanding of the research problem. The quantitative component, a quasi-experimental one-group, pre-posttest design, was used to document the students’ information seeking efficacy, their information seeking commitments, and their performance on an information seeking task. The qualitative data were collected to provide insight about the process in which the students were engaged while working on the information seeking task as well as to document the perceptions held by the university students about their experience.

Participants

The participants for this study were 26 students who were enrolled in an American history class at a rural high school and 18 pre-service teachers enrolled in an introductory educational technology course at a major university. The two institutions were approximately 100 miles apart from each other. The high school students ranged in age from 16 to 17 years and included 13 females and 13 males. The university students were in their sophomore and junior year and included 18 females. The sample was a purposeful sample consisting of participants who were enrolled in the two above stated courses. These two classes were selected so that the students at the two sites could collaborate on the information seeking task via a synchronous online system. Both classes met during the same hour which allowed for participation during scheduled class sessions.
Procedures

After receiving approval from the university’s Institutional Review Board and the signed consent forms from the parents and participants, the research study began. The approved application for exemption and the consent forms are located in APPENDIX G. The research was conducted during the spring 2008 semester over a period of five weeks. The researcher/facilitator introduced the project to the participating students and was present at the secondary school site during all the project sessions.

Mentoring Groups

Six mentoring groups were created. Each group was comprised of four to five high school students (mentees) and three to four university students who served as online mentors. Members of each group were randomly assigned by the course instructors. Each group consisted of a mixture of high and low achieving students from the American history class with a ratio of 3:1 (high:low). Each group also included three to four pre-service teachers from the educational technology class. The information seeking task was designed to correspond with a unit that was part of the high school American History curriculum. The pre-service teachers’ participation was designed to provide them with an educational example of the use of technology to facilitate online collaboration and mentoring as well as to be engaged in a service-learning experience. The university students met for class two days a week. Both classes met at the same time at their respective locations allowing for real time online interaction two times a week.

Project Procedures

The project was conducted over a five week period of time during which the information seeking task was introduced, pre and posttests of information seeking efficacy, and information seeking commitments were administered, and the online
mentoring took place. Nine computer laboratory sessions of 40 minutes each were conducted. The lab sessions were located in the school’s computer laboratory which was equipped with Dell computers with Internet access. The university students met in an instructional computer laboratory located at their campus during their regular twice weekly class time. The university instructor allocated time at the beginning of class for the pre-service teachers to collaborate online with the American history students. Two computer laboratory meetings each week consisted of online collaboration between the American history students and the university students through the RCampus Course Management System (www.rcampus.com). The researcher/facilitator utilized the group discussion forum of RCampus to create group pages for the six groups of mentors and their mentees to communicate.

RCampus is a free open source course management system wiki which consists of a class website, gradebook, calendar, roster, assignments, discussion forum for individuals or group, email alerts, document center and automatic online submission (Refer to Appendix I). Email alerts are an administrative function of RCampus to notify each participant when a posting occurs on the discussion forums. In the current study, the email alerts were sent only to the teacher, researcher/ facilitator, and online mentors. RCampus was selected for this online collaboration because it has the same functions as many popular courseware management systems, but is available to educators at no cost. In addition to the cost advantage, the benefits of using RCampus are that it is user friendly with tutorials, secured with log-in, and is an excellent tool for tracking online submissions and changes. All students were required to use the discussion forum as the primary means of communication.
One laboratory meeting each week in which only the high school students participated was held so that these students could work collaboratively in their groups with their teacher and the researcher facilitator. During these sessions, the teacher addressed issues related to the curriculum goals and the researcher/facilitator addressed any technological issues that emerged. During the other two weekly lab sessions the university students interacted with the high school students in their assigned groups. They reviewed the status of their mentee’s progress on the information seeking task and provided feedback and mentoring to the students. The university students were requested to keep a journal in which they recorded their reflections of their experiences. Weekly prompts were provided by the facilitator to help the students focus on specific aspects of their experience.

Information Seeking Task

The information seeking task that served as the collaborative group project was designed to correspond with a unit from the American History curriculum and to serve as preparation for state-mandated testing of student knowledge. The high school teacher and the researcher/facilitator designed the project so that the history research topics and question prompts served as study guides for the Graduation Exit Exam. Each group was assigned one of the following six topics related to terrorism in America: Oklahoma Bombing, Bombing of World Trade Center, Taliban in Afghanistan, September 11 (9/11), War in Iraq, and Opinions of Americans Regarding the United States Government’s War on Terrorism. Guidelines for completing the task were provided to the students. Each group was required to research their topic and present the acquired information in the form of a PowerPoint presentation. Information to be incorporated into the presentation included the cause and effect of the event, goals and objectives of
the key people involved, and a timeline for aspects of the event. Each multimedia PowerPoint presentation was required to contain a minimum of 20 slides utilizing text, still images, political cartoons, maps, and sound effects. The students researched information on their topics from reliable sources such as the books, journals, magazines, databases and historical (professional) websites.

The high school students were assigned to group roles such as group leaders, data researchers, slide show editors, and graphics and sound designers. The students worked individually and collaboratively at nearby computer workstations which were aligned in rows of five in the school’s computer laboratory. Each student communicated with their mentors and some group leaders posted progress reports of the weekly activities to the discussion forum. The students held face to face discussions with their group leaders who examined the information for accuracy and relevancy while making contributions of information.

The students organized the obtained information into paragraphs and posted them to their designated group pages on the discussion forum for review by the online mentors. A primary goal of this project was to promote an awareness of and use of evaluative and synthesis skills in the information seeking task. These skills are critical components of the Big 6 Skills Information Model (Eisenberg & Berkowitz, 1988). Procedural scaffolding in the form of tutorials, a PowerPoint presentation of the Big 6 Skills Model, and hands-on demonstrations of the RCampus communication tools was provided. Hannafin, Land, and Oliver (1999) defined procedural scaffolding as guides used to clarify or instruct the learner in how to perform a task with certain tools or resources. Conceptual scaffolding was provided through facilitator guidance and cross-age mentoring. Hannafin et al. (1999) noted that conceptual scaffolding should focus on
helping students to monitor and reflect upon their learning process. The university students were directed to provide feedback to the high school students to encourage them in this process. Their mentoring suggestions were posted to the discussion forum for the high school students to view.

An outline of the progression of weekly activities is provided below.

● **Week One.** The members within each group introduced themselves to each other through the group area of the discussion forum. Each group engaged in a brainstorming session to develop slide titles for their subtopics and began searches for relevant images and political cartoons.

● **Week Two.** During the second week, the American history students selected at least five references that contained information relevant to their topic. The sources included their textbook, magazines, journals, databases, and websites. Each group of history students wrote one or more paragraphs as the introduction to their topic for the PowerPoint. Students cited some references properly according to APA citations as a result of prompting from the facilitator. However, students were accustomed to using MLA style and cited some of their sources using that format. The university students responded to the postings with suggestions and critiqued the paragraphs. At the end of the second week, the first draft of the set of paragraphs that covered the project requirements was posted to the discussion forum for review by the online mentors.

● **Week Three.** At the end of the third week, final drafts of the PowerPoint presentations were saved to compact discs because RCampus was not equipped to support PowerPoint presentations. Three neutral scorers evaluated the final projects utilizing the researcher created rubric. The rubric was based on the Big 6 Skills Information Model (Refer to Appendix D).
Role of the Facilitator

The researcher/facilitator administered the instruments via paper and pencil pretest and posttest to the high school students: 24-item Information Commitment Survey and a 9-item Confidence Survey. The week before the project began the researcher/facilitator gave a brief overview of the project and passed out the research packets that contained hand-outs on APA Style Guide, Big 6 Skills Information Model, online search strategies, tutorials on RCampus communication tools, and PowerPoint. The researcher/facilitator was present at all computer laboratory meetings to ensure quality participation. The researcher provided question prompts to facilitate the research strategies of the American history students and the reflective writing of journals by the university students. The university instructor collaborated with the researcher/facilitator and assisted with the registration of the university students, presented a brief overview of the project with tutorials to RCampus and the Big 6 Skills Model, and outlined the roles of the mentors.

The researcher/facilitator provided question prompts and soft scaffolding to assist the students in the construction of the PowerPoint. The facilitator provided questions prompts to promote the peer review process and reflective journal writing of undergraduate students. Chen and Bradshaw (2007) found that question prompts were effective scaffolding tools in an online course with 51 pre-service teachers. The researchers discovered that knowledge integration prompts (critique, interpretation, explanation) were more effective than problem solving prompts (identify the problem, strategies for solutions). The prompts provided by the researcher to the pre-service teacher are displayed in Table 3.1.
Table 3.1 Facilitator Prompts for Reflective Journaling

<table>
<thead>
<tr>
<th>Week</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What does it mean to be information literate?</td>
</tr>
<tr>
<td>2</td>
<td>Examine the introductory paragraph for the “definition of task.” How well did the group define the task? What were the information needs for the project?</td>
</tr>
<tr>
<td>3</td>
<td>What were the mentoring challenges you experienced during this project? Give some examples of how you worked through those challenges?</td>
</tr>
</tbody>
</table>

The following timeline provides an outline of the researcher/facilitator’s activities.

● Week One. During the first week, the facilitator presented an orientation to the scaffolding tools; PowerPoint template with instructions to the project (conceptual scaffold) tutorials to PowerPoint and RCampus (procedural scaffold) and a PowerPoint presentation on the Big 6 Skills Information Model. The orientation included a demonstration on how to post to the RCampus discussion forum. The scaffolding tools were posted to RCampus for future reference. The facilitator posted questions weekly relating to Terrorism in America’s subtopics which addressed the information needs (Refer to APPENDIX E). Question prompts were provided weekly for the university students to promote reflection for the journals.

● Week Two. The facilitator posted weekly question prompts to the discussion forum and addressed all communications. The facilitator checked the references for scholarly and professional sources and correct APA style but correct MLA style was accepted. Students were unfamiliar with within text citations and were prompted by the facilitator to use this
citation. The facilitator provided a demonstration of PowerPoint and the use of communication tools of RCampus.

● Week Three. The facilitator reviewed the final drafts and provided soft scaffolding for groups that experienced difficulties. The Information Commitment Survey and Confidence Survey (posttest) were administered by the researcher/facilitator.

● Week Four. The researcher/facilitator copied the discussion forums into transcripts and coded the students and mentors dialog for emerging themes.

● Week Five. After an initial analysis of the reflective journals was completed by the researcher, the university students responded to a statement synopsis to verify the accuracy of those interpretations.

Data Sources

The data sources utilized to assess each dependent variable are listed and described below.

1. Information Commitment and Information Confidence – These were assessed through pre and post surveys administered the week before the project started and the week after the project was completed. These instruments were administered via paper and pencil and proctored by the facilitator at the high school. Each participant was assigned an identifying number.

2. Performance on the information seeking task - The final revisions of the PowerPoint were evaluated with a rubric by three neutral scorers (high school teachers).

3. Online discussion forums - The researcher examined and coded the dialog of the online communications

4. Reflective journals – The journals in which the mentors’ described their perceptions of the online mentoring process.
Information Commitment Survey (ICS)

The ICS was utilized to assess the students’ information seeking strategies and evaluative standards of accuracy and usefulness of information that they collected (Refer to APPENDIX B). Wu and Tsai (2005) conducted a study with 610 Taiwanese university students regarding evaluative standards, information commitments and information searching strategies. The researchers developed a 24-item instrument which contained two components; Implicit – evaluative standards and Explicit- Information searching strategies. The Implicit Component contains four scales; multiple sources, authority of web-based materials, content usefulness and technical usefulness. The Explicit Component contains two search strategy scales: elaboration/exploration and match. Internal structure validity was established through factor analysis and a structural equation modeling (SEM) procedure. The items for each scale were highly correlated with each other with correlations ranging from .71 to .89. The SEM revealed that the learners’ evaluative standards (implicit scales) had significant effects on their information searching strategies (explicit scales). Lower scores on the implicit factors were indicative of a more surface approach to information searching and are correlated with a high score on the Match explicit scale. Higher scores on the implicit scales are indicative of a deeper searching strategy and are correlated with higher scores on the Exploration/Elaboration explicit scale. The instrument reliability coefficient of the ICS was 0.82. Students rated the survey items on a six-point Likert scale ranging from 6 to 1: strongly agree, agree, somewhat agree, somewhat disagree, disagree and strongly disagree.

The results of the study indicated that learners’ evaluative standards on web-based materials had a significant effect on their information searching strategies in a web-based
learning environment. Tsai (2004) stated that experts in web-based instruction utilized the elaboration and exploration strategy and the novices employed the match search strategy. There were high correlations between standards for accuracy, standards for usefulness, and search strategy. Multiple sources, authority, content usefulness, and technical usefulness scales were also highly correlated. The implications of this study indicated that educators should consider learners information commitments when designing web-based courses and learning activities.

Confidence Survey

A nine-item survey was administered as a pre-post test to assess students’ confidence level in information seeking behaviors. The confidence levels were rated on a 4-point Likert Scale ranging from 4 = very confident to 1 = very insecure (Refer to APPENDIX C). The researcher modified a scale that was used to evaluate a nursing information literacy program. The Confidence Survey was adapted from Fox, Richter and White (1996).

Project Evaluation Rubric

The rubric for evaluating the information seeking task was designed by the researcher and is displayed in Table 3.2. The rubric was based on three steps of the Big 6 Skills Information Problem-Solving Model (Eisenberg & Berkowitz, 1988): definition of task, evaluation, and synthesis.

<table>
<thead>
<tr>
<th>Table 3.2 Project Evaluation Rubric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category</strong></td>
</tr>
<tr>
<td>Definition of Task</td>
</tr>
</tbody>
</table>
Credibility and Validity

Guba and Lincoln (1989) stated that the criteria for validating qualitative research are dependability, confirmability, transferability and credibility. To establish validity in this study, the administration of a synopsis of the statements regarding the university students’ perceptions of the online mentoring established credibility through member checking. A vivid account of all aspects of the study in the online mentoring environment provided a foundation for replication. Open coding of the online discussion forums and the reflective journals provided detailed records of data coding and categorization which established dependability. The three neutral scorers of the PowerPoint established inter-rater reliability of the performance scores. Excerpts from the raw data and the results of the statement synopsis established confirmability and supported interpretations of the research. While the one group design is a weaker experimental design, the use of pre and post testing enhances internal validity.

Summary

A mixed method triangulated design was implemented to address the research questions. The quantitative component was implemented to assess the learners’ information commitments in web-based learning environments. The qualitative
component was conducted to provide a deeper understanding of the information seeking process and how the university students perceived their mentoring experience. The researcher/facilitator provided orientation to the project and posted scaffolding in the document center on RCampus for later reference by the high students. The facilitator provided question prompts to assist the students in the information seeking task and to initiate the peer review process. Question prompts were provided to the university students to stimulate their reflective journaling. (Refer to APPENDIX E).
CHAPTER 4

RESULTS

The results of the study are organized by research questions. The Statistical Package for the Social Sciences (SPSS) 12.0 was utilized to calculate the descriptive and inferential statistics.

Question One: Confidence in Locating Information

Did the high school students’ confidence in their ability to locate information change as a result of their collaborative project-based learning experience?

Confidence in locating information was derived from five items (5-9) on the Confidence Survey. The mean and standard deviation of these items were calculated from both pre and post tests. The results of a paired t-tests indicated that the pretest scores were higher with a mean score of 17.77 and the posttest mean score was 17.23 with the standard deviation of 1.86, $t = 1.221$, and $p = .234$. The results showed a .54 decrease in mean scores of the posttest. The results are consistent with previous research by Vickery and Cooper (2003) who found that first year students were overconfident in their information literacy skills during a 12 week audit at Macquarie University. The audit revealed that students felt confident in their abilities to define a research topic, establish the information requirements for a research question, locate and retrieve relevant information, evaluate, organize and synthesize information, and use technological tools for accessing information (library catalog, databases, Internet). The results of the study revealed that the test scores at the end of the semester did not correlate with the students’ self assessed confidence in their information literacy skills.

Question Two: Improvement of Evaluation Standards

Did the high school students’ evaluative standards improve as a result of their
collaborative project-based learning experience?

Information Commitments are evaluative standards which learners utilize in order to assess the accuracy and usefulness of information from web-based materials and resources. Information commitments were assessed by four implicit scales; Multiple Sources, Authority, Content Usefulness, Technical Usefulness and two explicit scales for information seeking strategies: Elaboration and Match.

The results of multiple paired t-tests indicated that there were no significant differences in the students’ evaluative standards on the pretest and posttest mean scores on the four implicit scales and two explicit scales. However, the posttest mean scores were slightly higher than pretest mean scores on the Technical Usefulness scale from 12.69 to 12.81 and the Match scale from 10.88 to 11.12. The results of the pretest and posttest means scores are in the following tables.

Table 4.1 Pretest and Posttest Mean Scores of Information Commitment Survey

<table>
<thead>
<tr>
<th>Implicit Scales</th>
<th>Pretest Mean Scores</th>
<th>Standard Deviation</th>
<th>Posttest Mean Scores</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Sources</td>
<td>16.00</td>
<td>1.55</td>
<td>15.46</td>
<td>1.82</td>
</tr>
<tr>
<td>Authority</td>
<td>20.35</td>
<td>3.45</td>
<td>18.35</td>
<td>3.86</td>
</tr>
<tr>
<td>Content Usefulness</td>
<td>24.23</td>
<td>3.51</td>
<td>23.54</td>
<td>2.37</td>
</tr>
<tr>
<td>Technical Usefulness</td>
<td>12.69</td>
<td>3.87</td>
<td>12.81</td>
<td>4.50</td>
</tr>
<tr>
<td>Explicit Scales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elaboration</td>
<td>26.04</td>
<td>2.58</td>
<td>24.27</td>
<td>2.69</td>
</tr>
<tr>
<td>Match</td>
<td>10.88</td>
<td>2.72</td>
<td>11.12</td>
<td>2.86</td>
</tr>
</tbody>
</table>

Scale : 1- Strongly Disagree to 6 - Strongly Agree
Table 4.2 Multiple Paired t-tests of Mean Difference Scores on the ICS

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>t</th>
<th>Sig. p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Sources</td>
<td>.538</td>
<td>1.75</td>
<td>1.570</td>
<td>.0645</td>
</tr>
<tr>
<td>Authority</td>
<td>2.00</td>
<td>4.45</td>
<td>2.294</td>
<td>.015*</td>
</tr>
<tr>
<td>Content Usefulness</td>
<td>.692</td>
<td>3.45</td>
<td>1.023</td>
<td>.158</td>
</tr>
<tr>
<td>Technical Usefulness</td>
<td>-.115</td>
<td>4.15</td>
<td>-.142</td>
<td>.444</td>
</tr>
<tr>
<td>Elaboration</td>
<td>1.77</td>
<td>3.41</td>
<td>2.646</td>
<td>.007*</td>
</tr>
<tr>
<td>Match</td>
<td>-.231</td>
<td>2.82</td>
<td>-.417</td>
<td>.340</td>
</tr>
</tbody>
</table>

*Negatively significant at p < 0.05 two-tailed test

The researcher examined the evaluative standards of the high school group leaders and found that there was a slight increase in posttest mean scores on Match from 10.17 to 11.83. The results of multiple paired t-tests indicated that the high school group leaders rated themselves as novice users of search strategies. The group leaders’ results are consistent with the results of the high school students as a whole group. The pretest and posttest mean scores are included in Table 4.3

Table 4.3 Group Leaders’ Pretest and Posttest Mean Scores

<table>
<thead>
<tr>
<th>Implicit Scales</th>
<th>Pretest Mean Scores</th>
<th>Standard Deviation</th>
<th>Posttest Mean Scores</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Sources</td>
<td>16.83</td>
<td>.753</td>
<td>15.50</td>
<td>1.38</td>
</tr>
<tr>
<td>Authority</td>
<td>21.17</td>
<td>3.66</td>
<td>19.17</td>
<td>2.56</td>
</tr>
</tbody>
</table>
The posttest mean scores in the current study indicated a non significant increase in scores for the technical and match scales. Wu and Tsai (2007) examined the learner’s evaluative standards on web-based materials in regard to their online search strategies. The researchers found that technical usefulness was a positive predictor of the match search strategy at $p = 0.01$. The results indicated that technical usefulness and authority were positive predictors of match and multiple sources and content usefulness were positive predictors of elaboration. The researcher of the current study examined the American history students’ evaluative standards of web-based materials as predictors of their online search strategies. The results of simple linear regression analysis indicated that content usefulness was a significant positive predictor of elaboration search strategy at $p = .033$ and technical usefulness was a significant negative predictor of match search at $p=.026$.

The results of the study indicated that the American history students scored high on elaboration search strategy when seeking information for the content of the PowerPoint presentations. Wu and Tsai (2007) stated that learners who employed the elaboration search strategy utilized critical thinking skills by integrating information from several
web-based sources to find the best fit for their search purpose. The results of the simple linear regression analysis are located in the following table.

Table 4.4 Simple Linear Regression for Predicting Students’ Search Strategies

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Search Strategy</th>
<th>Beta</th>
<th>Standard Error</th>
<th>t</th>
<th>Sig. p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple Sources</td>
<td>Elaboration</td>
<td>.177</td>
<td>.285</td>
<td>.880</td>
<td>.387</td>
</tr>
<tr>
<td>Content Usefulness</td>
<td>Elaboration</td>
<td>.418</td>
<td>.219</td>
<td>2.26</td>
<td>.033*</td>
</tr>
<tr>
<td>Authority</td>
<td>Match</td>
<td>.219</td>
<td>.143</td>
<td>1.10</td>
<td>.283</td>
</tr>
<tr>
<td>Technical Usefulness</td>
<td>Match</td>
<td>.123</td>
<td>-.436</td>
<td>-2.37</td>
<td>.026*</td>
</tr>
</tbody>
</table>

*Significant at p < 0.05

Question Three: Nature of Dialog between Mentors and Mentees

What was the nature of the dialog with the mentor-mentee online discussion groups?

The researcher read and coded the dialog that occurred in the online discussion forums. Student dialog was evaluated using a constant comparative approach (Glaser & Strauss, 1967) and the following themes emerged: appreciation for help, evaluation of information for use, seeking help, and synthesis. The results of the open coding are provided in the form of codes and students and mentors’ themes with excerpts from the online discussion forums. The codes and students’ themes are included in the following table.
Table 4. 5 Codes and Students’ Themes

<table>
<thead>
<tr>
<th>Codes</th>
<th>Students’ Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>APR- HLP</td>
<td>Appreciation for Help</td>
</tr>
<tr>
<td>EVAL-INFO-USE</td>
<td>Evaluating Information for Use</td>
</tr>
<tr>
<td>SEE-HLP</td>
<td>Seeking Help</td>
</tr>
<tr>
<td>SYN</td>
<td>Synthesis</td>
</tr>
</tbody>
</table>

**Appreciation for Help**

The American history students and mentors expressed courtesy toward one another throughout the project. The high students were excited to participate with college students and thanked them for agreeing to help them with this assignment. The students welcomed the corrections to their work and appreciated the mentors’ help in finding information. Some examples of their appreciation are included in the following table.

Table 4.6 Statements of Appreciation for Help

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>We look forward to working with you and appreciate your help.</td>
</tr>
<tr>
<td>2</td>
<td>Thanks! We’ll be sure to fix it (response to grammatical corrections)</td>
</tr>
<tr>
<td>3</td>
<td>Here is our paragraph, feel free to make any corrections. Thanks for your help!!</td>
</tr>
<tr>
<td>4</td>
<td>Thanks for your help!! We sent this yesterday, but we forgot to add our citations.</td>
</tr>
<tr>
<td>5</td>
<td>Hello, thank you for working with us to find this information.</td>
</tr>
</tbody>
</table>

**Evaluating Information for Use**

The high school students searched the Internet, databases, books and magazines for relevant information and images on their topic. They evaluated the information in terms of how they could use it to create their multimedia PowerPoint. The students
demonstrated their knowledge of the different uses for information. Some examples of their evaluation of information is included in the following table.

Table 4.7 Statements of Evaluating Information for Use

<table>
<thead>
<tr>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. We just received a book from our teacher with some rather remarkable pictures of the Twin Towers. None of the pictures were of the actual bombing or 9-11, but there are some that can be used for backgrounds or just for informational purposes.</td>
</tr>
<tr>
<td>2. I went through a book to get general background information, a small paragraph to be used in an early slide.</td>
</tr>
<tr>
<td>3. We also have a book of pictures, not specifically of the attack, but of artist's photos in which we can scan and Photoshop over to the PowerPoint.</td>
</tr>
</tbody>
</table>

Seeking Help

The students sought the help of their mentors because they were accustomed to seeking the help of their teachers. When faced with difficulties in locating information, the students asked the mentors to find relevant images and information to their topic. The students sought the help of more experienced persons with the use of grammar and scholarly writing. Some examples of the students’ help seeking behaviors are outlined in the following table.

Table 4.8 Statements of Seeking Help

<table>
<thead>
<tr>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anyone willing to help our group will be greatly appreciated. Who wants to help?</td>
</tr>
<tr>
<td>2. If you could try looking up some pictures of the Pennsylvania field, where the fourth plane crashed, that would be great. We’re having trouble finding those and if</td>
</tr>
</tbody>
</table>
you find any other picture having to do with 9-11 would be awesome also. Thanks

3. Tell me if you think anything needs to be added. If you have any advice at all, we will definitely use it.

4. We have looked and looked everywhere, and we can’t find it (answer to a question). Can you help?

Synthesis

The students employed synthesis skills when they combined information from a variety of sources to create the PowerPoint. Examples of the students’ synthesis skills are provided in the following table.

Table 4.9 Statements of Synthesis

<table>
<thead>
<tr>
<th>1.</th>
<th>I went through a book to get general background information and we are also keeping track of our other websites to cite later.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>L. has uncovered a video of the Trade Center and we also have a book of pictures which we can scan and Photoshop over to the PowerPoint.</td>
</tr>
</tbody>
</table>

Frequency of Students’ Themes by Groups

The researcher organized the students’ themes by group and frequencies of occurrence. The analysis of the theme occurrence indicated that Groups One, Two and Three scored higher frequency of themes than the other groups. Group One had the highest total theme frequency of 16 with the highest frequency of seeking help and expressing appreciation for that help. Group One sought assistance from their mentors when faced with difficulty and expressed their gratitude for the mentors’ help. Group Two scored a total theme frequency of 12 with the highest frequency of evaluating information for use and synthesis of information. Group Three scored a total theme
frequency of 10 with equal amounts of seeking help and expressing appreciation for help. Group Four scored a total theme frequency of six with mostly seeking help. Group Five scored a total theme frequency of five and sought help more than Group Six. Group Six scored a total theme frequency of four but had slightly more synthesis skills than Group Five. Student theme frequencies are outlined in the following table.

<table>
<thead>
<tr>
<th>Group Number</th>
<th>PowerPoint Total Score</th>
<th>Appreciation for Help</th>
<th>Evaluating Information for Use</th>
<th>Seeking Help</th>
<th>Synthesis</th>
<th>Theme Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>35</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>33</td>
<td></td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>33</td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>32</td>
<td></td>
<td>1</td>
<td></td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Mentors’ Themes

The mentors’ dialog was evaluated and the following themes emerged; giving information, praise, conceptual revision and format revision. The codes and mentors’ themes are included in Table 4.11 followed by excerpts of discussion.

<table>
<thead>
<tr>
<th>Codes</th>
<th>Mentors Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIV-INFO</td>
<td>Giving Information</td>
</tr>
<tr>
<td>PRA</td>
<td>Praise</td>
</tr>
<tr>
<td>CON-REV</td>
<td>Conceptual Revision</td>
</tr>
<tr>
<td>FOR-REV</td>
<td>Format Revision</td>
</tr>
</tbody>
</table>
Giving Information

One group of students stated that they were having difficulty in finding certain information. In response to her group’s request, a mentor conducted some information searches on the Internet and provided quality images and relevant websites on the topic. The mentor expressed interest in the information and the success of the group’s final product. Some examples of the mentors’ provision of information are included in the following table.

Table 4.12 Statements of Giving Information

<table>
<thead>
<tr>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I couldn't find many pictures of the Pennsylvania field. I did find a few and I attached them. I also included two websites that I thought were cool. One was a virtual tour of the United 93 crash, and the other was a website that had specific info about each plane that crashed on September 11. I will continue to see if I can find more pictures. Please let me know if there is anything else!</td>
</tr>
<tr>
<td>2. This website is a virtual tour of United 93. I thought it might be some good information! These next two pictures are from the same website and are of the crash site in Pennsylvania.</td>
</tr>
<tr>
<td>3. Ok, this last website was very interesting. It had a breakdown of each plane that was hijacked and lots of other cool information.</td>
</tr>
</tbody>
</table>

Praise

The mentors rewarded the high school students with praise when they did a good job. Praise was incorporated with the corrections as not to seem critical or negative.
Praise served as encouragement for the students when face with obstacles. Examples of praise expressed by the mentors are outlined in the following table.

Table 4.13 Statements of Praise

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The introductions sound great! This topic should not be that hard; I do not think there will be a problem finding information on it.</td>
</tr>
<tr>
<td>2.</td>
<td>Good job on the paragraph! Here are a few suggestions.</td>
</tr>
<tr>
<td>3.</td>
<td>The paragraph sounds great! The only suggestion I would give is to include would be what Yousef’s sentence was after his conviction!</td>
</tr>
<tr>
<td>4.</td>
<td>Group 3, I read over the paragraphs and have no further corrections. Good job with revising the paragraphs!!!</td>
</tr>
</tbody>
</table>

Conceptual Revision

The mentors made suggestions for improvement and restructured sentences to clarify the concept or topic of the paragraphs. Examples of conceptual revisions made by the mentors are included in the following table.

Table 4.14 Examples of Conceptual Revision

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Awkward wording… consider rewording; also change “to be attacked” from passive voice to active voice (perhaps you could say “The first two planes attacked the World Trade Center in New York City.”)</td>
</tr>
<tr>
<td>2.</td>
<td>I suggest that when you research your information, be sure to put it into your own words and elaborate on everything a bit more, especially the first paragraph. When and why did the war on terrorism become a controversial subject?</td>
</tr>
</tbody>
</table>
Format Revision

The mentors edited the student’s paragraphs with the use of simple grammar and format changes. Some examples of the mentors’ format revisions are outlined in the following table.

Table 4.15 Examples of Format Revision

<table>
<thead>
<tr>
<th>Hey guys. Here's a list of grammatical corrections that I noticed need to be made.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentence 1: Change the comma to a period after Bush,</td>
</tr>
<tr>
<td>Sentence 5: Comma after 2001</td>
</tr>
<tr>
<td>Sentence 6: Don't capitalize Introduced,</td>
</tr>
<tr>
<td>Sentence 7: Comma after the first &quot;secretary&quot; and capitalize State</td>
</tr>
<tr>
<td>Sentence 8: No comma after 11 Hopefully, I helped.</td>
</tr>
</tbody>
</table>

The mentors’ themes consisted of giving information, praise, conceptual and format revision actions. The mentors participated in the information searches in response to their groups’ request for assistance. Group One mentors contributed the most information regarding their group’s topic. Group mentors One and Six gave the most praise to their mentees for a good job done. Group Six mentors made the most revisions followed by Groups One and Four mentors. The mentors’ revisions and suggestions greatly improved the content of the multimedia PowerPoint. The frequencies of mentors’ themes are outlined in the following table.

Table 4.16 Mentors’ Theme Frequencies

<table>
<thead>
<tr>
<th>Group Number</th>
<th>Giving Information</th>
<th>Praise</th>
<th>Conceptual Revision</th>
<th>Format Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>3</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>
Question Four: Peer Mentoring and Its Impact on Students’ Performance

What was the impact of peer mentoring on the students’ performance on the information seeking task?

The multimedia PowerPoint presentations were evaluated by three neutral scorers which assessed the groups’ performance on the information literacy concepts of definition of task, synthesis and evaluation. The evaluation of the presentations by three scorers established inter-rater reliability. The results of the rubric scoring of the multimedia PowerPoint presentations indicated that Groups One, Two, and Three received the highest total score of 35 points. Group Six received the lowest total score of 32 and Group Four received the lowest score in the category of “evaluation” with a total score of 33. Group Five received a total score of 33 but scored “competent” in all categories. The PowerPoint scores by the rubric are presented in the following table.

<table>
<thead>
<tr>
<th>Group Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of Task</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Total | 8 | 12 | 36 | 25 |
Facilitation, Question Prompts, Information Seeking and PowerPoint Results

Facilitation was the foundation of the collaborative multimedia project. The high school students looked for some guidance in getting started with information searches. The researcher facilitator provided two question prompts for each group. All of the groups followed the lead of the facilitator by using the answers to the questions to formulate their PowerPoint slides with topic-related information and images. Some groups conducted extensive research on the perspective of terrorism related to the question prompts. Chen and Bradshaw (2007) found that questions prompts were effective scaffolding tools for knowledge integration and problem-solving. Ge and Land (2004) pointed out that question prompts can assist students in developing cognitive strategies such as higher order thinking, reorganization of information and knowledge building in specific content areas with writing and problem-solving tasks.

The facilitator of the current study provided two topic-related question prompts to each group to guide the students in the information seeking task (Refer to APPENDIX E). The facilitator evaluated the six PowerPoint presentations to examine the effect of the question prompts on the students’ information seeking performance. The facilitators’ questions prompts that were answered are located in Table 4.18. The number of question prompts that each group answered and the number of PowerPoint slides created following the facilitator’s lead with questions prompts are outlined in the table 4.19.
Table 4.18 Facilitator’s Questions Prompts Answered

<table>
<thead>
<tr>
<th>Group</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Name the targets (places) in America that the hijackers attacked on September 11, 2001 and their significance.</td>
</tr>
<tr>
<td></td>
<td>2. A granite memorial was dedicated to the six people who were killed in the World Trade Center bombing. Where was the memorial located? What did the inscription read?</td>
</tr>
<tr>
<td></td>
<td>2. Who is Ramzi Yousef? How much property damage was caused to the World Trade Center by the bombing in 1993? (in dollar amount)</td>
</tr>
<tr>
<td>2</td>
<td>1. Why did Timothy McVeigh blow up the Alfred P. Murray Federal Building in Oklahoma City?</td>
</tr>
<tr>
<td></td>
<td>2. What type of and how much explosives did Timothy McVeigh use in the bombing of the Alfred P. Murray Building?</td>
</tr>
<tr>
<td>3</td>
<td>1. What was the relationship between the Taliban and Osama Bin Laden?</td>
</tr>
<tr>
<td></td>
<td>2. Who are the Taliban and how did they originate?</td>
</tr>
<tr>
<td>4</td>
<td>1. What was President Bush’s stated reasons for declaring the War on Iraq? What was Tony Blair’s role in the war?</td>
</tr>
<tr>
<td>5</td>
<td>1. Who is Cindy Sheehan? What did she do to oppose the war in Iraq?</td>
</tr>
<tr>
<td></td>
<td>2. What are Oprah Winfrey’s views on the War in Iraq? Name some of the guests on her show that were opposed to the war and the government’s actions toward the war.</td>
</tr>
</tbody>
</table>

Table 4.19 Facilitator’s Question Prompts and PowerPoint Slides

<table>
<thead>
<tr>
<th>Group Number</th>
<th>Response to Question Prompts</th>
<th>Related PowerPoint Slides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group One</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Group Two</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Group Three</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Maximum variation sampling was conducted by the facilitator of the highest scoring groups (One, Two, Three) and the lowest scoring groups (Four, Six) to examine the groups' performance on the information seeking task and application of that information in creating the multimedia PowerPoint slides. The results of the facilitator’s evaluation indicated that Groups One, Two and Three conducted extensive research based on the facilitator’s question prompts. Group One created seven multimedia PowerPoint slides relating to a question on September 11, 2001. Group Two created nine multimedia PowerPoint slides relating to the questions on the Bombing of the World Trade Center and included an accurate timeline of the events. Group Three created six multimedia PowerPoint slides that related to the questions on the Oklahoma City Bombing, included an accurate timeline and utilized the only political cartoon in the project. Group Four created four multimedia PowerPoint slides relating to the questions on the Taliban in Afghanistan but failed to include a timeline. Group Six created three multimedia slides that directly related to the question prompts on the Opinions of Americans Regarding the United States Government’s War on Terrorism but failed to include a timeline and created the shortest presentation. Examples of an informative and poorly created PowerPoint slides are located in APPENDIX E.

Performance of the Participants

The majority of the high school students were high achievers and all the students were computer literate. The students demonstrated skills in locating relevant information from various sources, evaluating that information for use and synthesizing that
information into a multimedia presentation on their topic. Groups One, Two and Three scored highest on the information seeking task because they communicated often with their online mentors and followed the facilitator’s lead on question prompts for research and slide creation. The American history students demonstrated creativity with use of technology with images and collages, political cartoons, sound effects, and Google earth maps. They utilized Microsoft PowerPoint, Photoshop, and a scanner to complete the multimedia PowerPoint presentations.

The pre-service teachers (online mentors) demonstrated instructional techniques such as evaluating the students’ use of grammar and sentence construction through corrective feedback, explanation of the assignment in details when students misunderstood, explanation of paraphrasing to avoid plagiarism, and encouragement in the form of praise for a job well done. The mentors demonstrated their evaluative skills as they evaluated their mentees’ information problem-solving skill of defining the task which is the first step in the Big 6 Information Problem-Solving Model.

Question Five: Challenges and Benefits of Mentoring Online

What were the benefits and challenges experienced by online mentors?

Open coding of the three reflective journals revealed that the underlying themes and patterns for challenges were lack of communication, confusion from massive amounts of emails from other groups, unfamiliar with RCampus website and lack of face to face connections. The sending of emails was an administrative function of RCampus Wiki to inform each participant of the postings to the open source website. The emails were sent to individual email addresses after the messages were posted to the group pages on the discussion forum. The emails became a nuisance to the mentors some examples of the
challenges of the project and mentors’ responses to the challenges are included in the
following table.

Table 4.20 Statements about Project Challenges and Responses to Challenges

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I think that one challenge would be that we received everyone’s messages even the ones that were not for our group, so this was confusing at times but not a major problem.</td>
</tr>
<tr>
<td></td>
<td>Response: I worked through this challenge by only looking at my messages through the Group page.</td>
</tr>
<tr>
<td>2.</td>
<td>It was difficult to mentor through a website without face to face connections with the high school students. I think in general this lessened the overall effectiveness of the communication.</td>
</tr>
<tr>
<td></td>
<td>Response: The only way through this was to communicate as best as possible through the messages on the website.</td>
</tr>
</tbody>
</table>

The mentors’ responded positively to the benefits of being an online mentor. The benefits included building communication, alertness and accountability to students and sense of fulfillment from helping and contributing to the project. The researcher found that the benefits of online mentoring were consistent with other research findings. The mentors’ responses to the benefits of online mentoring and relating research findings are outlined in the following table.

Table 4.21 Benefits of Online Mentoring.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>It also built communication. Wang et al. (2001) found that online mentoring increased communication skills.</td>
</tr>
<tr>
<td>2.</td>
<td>The emails and online journals helped us to stay alert and accountable to our students.</td>
</tr>
<tr>
<td></td>
<td>Wang et al. (2001) found that mentors provided guidance and support based on the needs of</td>
</tr>
</tbody>
</table>
3. I think it was cool to be able to contribute to the project by finding pictures and information for the students to use. I’m glad that we were able to help. Christie et al. (2004) found that the mentors experienced a sense of fulfillment and value for their willingness to help the mentees.

Mentors’ Evaluation of Students’ Information Problem-solving Skills

The mentors utilized their evaluative skills by examining the high school students’ information problem-solving skill of defining the task to meet the information needs of the project. The mentors posted their responses individually to the reflective journal discussion forum. The facilitator provided the following question prompts: Examine the introductory paragraph or paragraphs for the “definition of task.” How well did the group define the task? Were the information needs for the project addressed? Some examples of the mentors’ evaluation of the students’ information problem-solving skills of defining the task are included in the following table.

Table 4.22 Mentors’ Evaluation of Mentees’ Information Problem-Solving Skills

<table>
<thead>
<tr>
<th>1. The group defined the task well and included most of the necessary information, but they also needed to include the significance of each location that was attacked on 9-11.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The introductory paragraph that Group 1 did was very good. There were a few grammatical errors that H. corrected for them. The information they included was very good. The first paragraph discusses the importance of the attacks and the possible motives behind the attacks. They introduced the importance of each location of the 9-11 attacks. I think these two paragraphs were a very good overview of the points they need to research further for their project.</td>
</tr>
</tbody>
</table>
3. Group 3 wrote about the Oklahoma City bombing in 1995. The introductory paragraphs included detailed information that related to the bombing. The group referred to events that lead up to the bombing, a description of the Alfred P. Murrah Federal building itself, and information on the bombers. There were some grammatical errors, which I corrected and sent back to them. For the most part, the group did a good job on their paragraphs.

Mentoring Strategies that Emerged

The researcher/facilitator examined the mentoring strategies that the online mentors/pre-service teachers utilized during the project. Mentoring themes that emerged were: framing the task, use of corrective feedback, recommendation of resources, use of praise to encourage participation, content evaluation for omitted facts, and increase awareness of plagiarism, and recommend rephrasing of sentences.

• Reframing the Task: A mentor reframed the task for her group by explaining that what the question was asking them to do was to include the significance of each attack on September 11, 2001.

• Corrective Feedback: The mentors provided corrective feedback in the form of conceptual revision and correction of grammatical errors. The mentors utilized Microsoft Word highlighting function to correct errors and make suggestions for the high school students’ paragraphs.

• Recommendation of Resources: The mentors recommended resources of information by providing links to informational websites with additional information on the topic.

• Praise: The mentors utilized praise to encourage participation and to reward the mentees for a job well done.
Content Evaluation for Omitted Facts: Several mentors examined the content of the high school students’ paragraphs and made suggestions that some important facts be included.

Increase Awareness of Plagiarism and Rephrasing: The mentors pointed out to the high school students that they have to rephrase the sentences from information sources into their own words to avoid plagiarism.

Technical Issues with the Online Collaborative Project

The collaborative project experienced technical difficulties that were related to Internet connections which caused the computers in the school’s computer laboratory to operate slowly and sometimes freeze up. Fortunately, the Internet disruptions were short lived and the online collaboration resumed with delayed postings to the discussion forums on RCampus website. RCampus website experienced technical difficulties and would display a message that the site was under construction. The connection to the website was restored after repeated log-ins. There was delayed in registration to RCampus because of the misspelling of the name of a city which the facilitator detected and corrected.

The high school students attempted to save the content of their PowerPoint presentations to compact discs. Unfortunately, the computers in the lab were not equipped with a compact disc burner and the presentations were saved to a jump drive. The facilitator burned the PowerPoint presentations to compact discs at a different location.

Time constraints of 40 minute computer lab meetings and technical difficulties were most challenging to the online collaboration. At the end of each week, the facilitator copied all the paragraphs posted by each group into one full document which assisted in
the revisions. The technical issues experienced in the online collaboration were consistent with findings on research using synchronous tools. Park and Bonk (2007) examined eight graduate students’ perceptions of synchronous learning with the Breese web-based collaboration system to design and develop online lessons. The researchers found that the challenges experienced by the students were time constraints, interrupted Internet connections, and a lack of reflection time.
CHAPTER 5: DISCUSSION

Summary of Findings

The study examined the American history students’ confidence in their ability to locate information as a result of their collaborative project-based learning experience. The results of the posttest mean scores indicated that the students were overconfident in their abilities to locate information from various sources. The pretest mean scores on the Confidence Survey were slightly higher than the posttest mean scores. The findings of this study was consistent with other studies such as Vickery and Cooper (2003) who found that students’ self-assessed confidence rating of their information literacy skills were higher than their academic performance on information literacy assessments.

Response Shift Bias

The higher pretest mean scores in the results of current study could be attributed to response shift bias. According to Klatt and Taylor-Powell (2005), George Howard defined the response shift bias as a “change in the participants’ metric for answering questions from the pretest to the posttest due to a new understanding of the concept being taught (Howard, 1979).” Rohs (1999) stated that response shift bias exits in educational environments which involve knowledge of the subject matter and the learning of skills. The author pointed out that the response shift bias theory proclaims that students’ understanding of the concepts could have contributed to lower pretest scores. To the contrary in the current study, increased understanding of information literacy concepts of evaluation and synthesis and application of search strategies resulted in lower posttest scores. After engaging in the information seeking task, the high school students realized that applying information literacy skills and information seeking strategies were more
difficult than they first perceived. But, they were exposed to these skills and are more aware of how to evaluate websites, what to look for, and what they did not know.

The researcher examined the American history students’ evaluative standards in assessing the usefulness and accuracy of web-based information (implicit standards) and the use of information seeking strategies (explicit standards). The results indicated that there were no significant differences in students’ pretest and posttest mean scores but there were slight increases for Technical Usefulness and Match scales. The results indicated that students rated Technical Usefulness as an evaluative standard which involves the use of the Match search strategy. The ease of retrieval of information appealed to the students’ eagerness to find relevant websites. In reality, high school students are considered novice users of search strategies.

Scott and O’Sullivan (2005) proclaimed that high school students do not possess the cognitive skills to develop effective search strategies for obtaining relevant information from the Web. The researchers found that 89 ninth graders used keyword searches with a search engine to locate information for an assignment. The use of a search engine is an ineffective search strategy because it produces an enormous amount of unstructured information. The students failed to utilize critical thinking skills such as examining the organization of the Web, selecting relevant and subject links, and narrowing searches with Boolean operators and modifiers. Scott and O’Sullivan (2005) emphasized the need for curriculum training for high school students to develop effective search strategies to use the Internet and other online tools.

Guinee, Eagleton, and Hall (2003) investigated the online search behaviors of 161 middle and high school students. The students searched the Internet with search engines such as Google, Yahoo, Ask Jeeves and a web-based software called eTrekker. The
Center for Applied Special Technology developed eTrekker to assist students with organizing and planning their Internet searches and to track their search patterns. The students searched the Internet to locate information on various topics and the students that used eTrekker conducted an information scavenger hunt.

The researchers found that students lacked the ability to effectively search the Internet which resulted in many unsuccessful attempts to locate the needed information. Guinee et al. (2003) stated that students need to use metacognitive skills when searching the Internet such as understanding the organization of search engines and knowing what constitutes an effective search or an unfruitful search. They suggested alternative search strategies such as creating research plans prior to the search, becoming familiar with reputable websites, reading the description before going to the web page, rephrasing the search term and narrowing the searches by using Boolean operators.

The results of multiple paired t-tests of the current study indicated that the high school students’ posttest mean scores decreased substantially on the authority and elaboration scales of the ICS. The students scored poorly on their ability to evaluate the authority of the Internet and ability to use an advanced search strategy. Smith (1997) declared that evaluating the authority of the Internet is problematic because Internet resources often do not include scope notes and information about the credentials of the producers. Credentials should include the name of the organization, expert in the field, author’s contact information, sources of information, and verification of the information.

Lorenzen (2003) interviewed 25 high school students regarding their use of the World Wide Web. The interview consisted of eight questions about locating and evaluating information the Web. The results of the interviews indicated that students had difficulty in selecting a credible website. The majority of the students replied that they
did not know how to evaluate a website. Only a few students knew that the author’s and publisher’s credentials or a bibliography are criteria for evaluating the credibility of a website.

Clark and Slotta (2000) examined 240 high school sophomore students’ evaluation of source authority or credibility of Internet sources. The researchers utilized two scenarios of source authority; one scenario involved a university professor (high authority) who presented the meteor theory of dinosaur extinction and a dinosaur enthusiast newsletter writer who presented the geological theory. In the second scenario the authority levels were switched. The students rated their preference for a theory and knowledge level of the presenter (authority) before and after reading the presentation by the professor and newsletter writer. The students searched the Internet for information on the two theories and evaluated that information which supported their preference. The students were asked to confirm the authority of the presenters and the supported theory in a written assignment.

The results of the study indicated that the students felt that the university professor was a more credible source than the newsletter writer before the intervention but failed to utilize source authority when evaluating information about the theory. Clark and Slotta (2000) pointed out that source credibility or authority is not taught or emphasized in the school system and therefore students can not differentiate the authority of Internet sources. The researchers declared that there is a need to develop educational tools that will assist students with the interpretation of source authority and evaluation of web-based information sources in this digital society.

The researcher examined the effects of the evaluative standards of the implicit scales as predictors of online search strategies: elaboration or match. The results indicated that
the Content Usefulness Scale was a positive predictor of the Elaboration scale search strategy. The results of this study were consistent with Wu and Tsai (2007) who found that students who were oriented to use the relevancy of the content of web-based materials as an evaluative standard were mostly to utilize elaboration search strategy. Lin and Tsai (2007) found that the graduate students utilized both strategies but the students who utilized the elaboration search strategy conducted more skillful searches with advanced keywords, retrieved more relevant web pages, and incorporated multiple sources than the students with the match search strategy. The high school students rated content usefulness as an evaluative standard which involves the use of a sophisticated search strategy like elaboration. Content usefulness is based on metacognitive skills such as evaluating the obtained information for accuracy and relevancy to the search purposes. In the current study, each group held face to face meetings with their group leaders to examine the obtained information for accuracy and relevancy.

The findings of this study provide valuable insights to the information evaluative standards and search strategies of high school students. This research study contributes to information literacy research on high school students. The evaluative standards of web-based information and online search strategies were examined from the high school perspective. Wu and Tsai (2005, 2007) examined university students’ evaluative standards for accuracy and usefulness of web-based information and their online search strategies.

The dialog between the mentors and mentees was centered on seeking help, appreciation for help, evaluating information for use, and synthesis of information. The high school students were eager to seek the help of their mentors and expressed
appreciation for their assistance. Small talk between the mentors and mentees consisted of academic interests, hobbies, classification, major and extracurricular activities. The students obtained information from books, magazines, databases, and the Internet. They evaluated the information in regards to how it can best be applied to meet the information needs of the project task. The students utilized synthesis skills to organize the information from several sources to produce a coherent multimedia presentation.

The mentors demonstrated instructional techniques such evaluating the students’ use of grammar and sentence construction through corrective feedback, explanation of the assignment in details when students misunderstood, and encouragement in the form of praise for a job well done. A mentor went beyond just critiquing the students’ writing to researching web-based information and images for her group and directing the students to other reliable sources of information. The mentor stated that it was a fulfilling experience to provide the students with the information because they were having problems finding the information. Giving information emerged as a mentor’s theme from the dialog along with giving praise, conceptual and format revisions.

Facilitation was a vital part of the study which prompted the students to seek relevant information. The students’ responses to the question prompts provided by the facilitator served as the foundation for several PowerPoint slides on terrorism in America. Chen and Bradshaw (2007) proclaimed that students will construct new knowledge when prompted to think about the subject matter. Research has shown that question prompts are effective instructional techniques that facilitate knowledge integration. Ge and Land (2003) found that the use of question prompts in problem-solving resulted in increased efforts by the students to seek information to solve the problem. According to Chen and
Bradshaw, the students in their study stated that they had a better understanding of the subject matter as a result of the question prompts.

Research indicates that learners respond positively to facilitation with question prompts. Choi, Land, and Turgeon (2008) investigated the effects of instructional modeling, online question prompts and peer interaction on 14 students’ peer questioning and information seeking. College students were assigned to small groups to formulate two types of questions; clarification or elaboration and context or perspective- oriented for online discussion. The instructor participated in the online discussions by modeling each type of question. The researchers defined clarification or elaboration questions as questions which require explanation or identification of information or interpretation of learners’ ideas. Context or perspective-oriented questions require the learners to investigate multiple perspectives of a problem and to seek information beyond the general requirements for answering the question.

Choi et al. (2008) interviewed the students, and examined the online interactions in terms of frequency, length and type of question. The results of the study indicated that the instructor’s participation guided the students in formulating the types of questions and using different perspectives to answer the questions presented to them. The instructor’s facilitation with question prompts lead the students to utilize metacognitive strategies. One student stated that the instructor’s question prompts made him think deeper and encouraged him to explore a variety of sources. Another student stated that he followed the instructor’s leading because he felt that the instructor’s questions would result in more content knowledge.

The current study examined the challenges of being an online mentor of this collaborative project. The mentors stated that the major challenges were a lack of
communication, absence of face to face connections with the high school students which lessened the effectiveness of communication and massive amounts of emails from other groups. The overall lack of communication during this study can be attributed to the limited face to face interactions between the mentors and the facilitator due to the physical distance. The mentors’ reactions to the online learning environment are consistent with other research studies such as Hannay and Newvine (2006) who examined 217 college students’ perceptions of distance education in comparison to traditional education. The researchers found that students viewed online learning favorably only when it is complementary to traditional education rather than the format of course delivery.

The massive amounts of emails were attributed to the administrative function of RCampus course management system. RCampus is an open source wiki and course management system which automatically delivers all communications to all users to keep them informed of new assignments and postings. In the current study, the teacher, researcher/facilitator, and online mentors received the emails. Research states that a disadvantage of using wikis is that they do not provide management of the content and tend to become confusing without close monitoring. Wiebrands (2006) proclaimed that it is necessary to have someone to monitor and maintain the communications because the wiki can become a conglomeration of information. Time constraints, technical issues, and the facilitator’s novice use of RCampus prevented effective maintenance of the content of the emails. The mentors stated that they overcame this challenge by only opening the emails associated with their group page.

The project was two-fold in nature that it served as a preparation for mandated testing. Some students made daily progress reports of their activities such as type of
information collected, projects being worked on and future plans. The students’ progress reports were available to the online mentors, researcher/facilitator, and the teacher. The progress reports enabled the teacher to make instructional interventions when needed. The content of the multimedia PowerPoint presentations were based on the remaining chapters of the course textbook and were applicable to the state required social studies testing.

Implication for Practice

The Terrorism in America project was utilized as a professional development presentation at a school district social studies teacher in-service by the participating teacher. The multimedia presentations demonstrate technology integration into the curriculum with online communication tools, Internet, databases, interactive maps, and sound effects. The American history teacher modeled technology integration for her colleagues. Hall (2006) suggested that modeling multiple technologies use in professional development is an excellent way to encourage pre-service teachers to integrate technology into their classroom activities. The Terrorism in America project appeared in the local newspaper in the education section (Refer to APPENDIX H).

The education system needs to incorporate information literacy skills into the curriculum for K-12 and university students. Research states that high school and university students lack information literacy skills. The online collaboration was based on information literacy concepts such as the ability to recognize information needs, use information appropriately, evaluation of web-based materials and synthesis of information from multiple sources. The students applied the information literacy concepts as a result of the project-based learning project and their writing skills were also
enhanced. However, the students scored low on the ability to evaluate the authority of the Internet and in some cases employed an ineffective search strategy.

Scott and O’Sullivan (2005) emphasized the need for curriculum training for high school students to develop effective search strategies to use the Internet and other online tools. The students often use a search engine to locate information and employ a basic keyword search that results in massive amounts of information to decipher. With proper training, students can employ advance search strategies by using Boolean operators to narrow the results to relevant information. The American history students rated their search strategy as match on the ICS which indicates that they are novice users. Match search strategy involves using a search engine to find the most relevant websites and eagerness to find a single website that contains the most relevant information. Time constraints of the online collaboration and the information requirements of the project contributed to the students’ perception of their match search strategy.

Recommendations for Future Research

This project-based active learning can be utilized with other disciplines such as science, English, and creative writing. The online communication tools could be used to integrate technology into the classroom and integrate information literacy into the curriculum for students of all ages. Chen and Horng (2007) integrated technology and information literacy into the curriculum for fifth graders using digital archives and history. The researchers utilized the Big 6 Information Problem-Solving Model was used to guide the information problem-solving process for the elementary students. In the current study, the information literacy skills of the high school students were evaluated based on three steps of the Big 6 Skills Model: definition of task, evaluation and synthesis. Future research could examine the information literacy skills of the online mentors based on the
model. ETS (2006) found that high school and college students lacked information literacy skills.

Wu and Tsai (2007) examined the information commitments of 1220 university students and found that students utilize multiple sources, authority and content usefulness to evaluate web-based information. The university students utilized elaboration search strategy and could not agree on their use of match search strategy. The online mentors were university students enrolled in a teacher education program. Examination of the mentors’ information commitments as co-participants with their mentees in the information seeking task would be recommended for future research. In the current study, it was not required that the online mentors participate in the information seeking task. The mentors contributed information because the American history students asked for assistance in finding information on their topic.

The current study examined the online mentors’ perceptions of the benefits and challenges of the online collaboration. The high school students also experienced challenges and benefits. Future research could include the mentees’ perceptions of project-based learning using RCampus course management system. Wang et al. (2001) interviewed the mentees and the 10 mentors about the challenges and benefits of using CyperExpeditions online communication system. The American history students were accustomed to face to face learning in the classroom and experienced synchronous learning for the first time. The high students’ perceptions of synchronous learning would provide valuable information for future research.

Future research could include interviewing the teacher about her perceptions of the online collaborative project based on leaning outcomes for the students and the overall success of the project. Wolf, Brush, and Say (2003) interviewed the teachers about their
perceptions of using an information problem-solving model as a metacognitive scaffold to enhance student achievement. The teacher’s interview could be guided by these questions. Did the online collaboration accomplish the intended purpose of preparing the students for mandated testing? What were the benefits and challenges for educators using online tools to teach course curriculum? Would you recommend this project-based active learning and technology integration to your colleagues? Teachers’ perceptions of project-based learning could provide insights for professional development.

Another recommendation for future research is to use other educational course management systems or restrict the online discussion forums to group pages only by unsubscribing to the email alerts. The researcher facilitator was a novice user to RCampus and failed unsubscribe to the email alerts before they became a nuisance. A separate wiki could be used for each group and that would restrict the email alerts to the designated groups.

Limitations of the Study

The study is limited to a relatively small sample of upper classmen at the high school level and undergraduates who are pre-service teachers and possess educational technology skills. The results may be very different with lower grade levels of high school students and undergraduate students from other disciplines. The study was conducted during a five-week period of time. It is likely that a longer engagement with the task and an extension of the mentoring relationship is likely to facilitate more progress in the development of information literacy standards and efficacy.

A major limitation of this study was the physical distance between the institutions. The facilitator’s presence was needed at both sites and a second researcher/facilitator at the university would have improved the outcomes of this study. The university instructor
assisted but did not have the knowledge of the researcher/facilitator about all aspects of the online collaboration. The length of the project was another limitation because five weeks was not ample time to fully implement the project.
REFERENCES


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Ku, Y. L., Sheu, S., & Kuo, S. M. (2007). Efficacy of integrating information literacy education into a women’s health course on information literacy for rn-bsn.


APPENDIX A

TIMELINE OF THE STUDY

Week Prior to Study

1. The facilitator gave a brief overview of the study to American history students and pass out research packets which included; hand-outs on Big 6 Skills Information Model, APA Style Guide, online search strategies and tutorial guides to RCampus.com Course Management System and PowerPoint. The facilitator administered a paper and pencil version of the Confidence Survey and Information Commitment Survey at Sulphur High School.

Week One

1. The facilitator provided an on-site orientation to the scaffolding tools; RCampus.com Course Management System, PowerPoint presentation on the Big 6 Skills Information Model, PowerPoint template, APA Style Guide, and online search strategies.

2. Miss Ardoin provided the topic, “Terrorism in America” which has six subtopics: Oklahoma Bombing, September 11 (9/11), Bombing of the World Trade Center, Taliban in Afghanistan, War in Iraq and Opinions of Americans Regarding the United States Government’s War on Terrorism. The multimedia PowerPoint presentations contained at least 20 slides on each subtopic and contained information on the following;

   ● Cause and effect of the event
   
   ● Key people involved and their objectives and goals,
   
   ● Timeline of the event
   
   ● Image- picture or political cartoon relating to the event
3. Students were randomly selected for groups within their classes and online mentors were assigned to groups. The subtopics were assigned to the groups and the students were assigned to group roles for completing the assignment.

*Computer Lab –1  (Computer Lab Time 40 minutes three times a week)*

4. The facilitator demonstrated how to post to the discussion forum by welcoming the students to the online collaboration and referring to the RCampus tutorial. The students introduced themselves using the online discussion forum. The students used the discussion forum to respond to the facilitator’s posting.

5. The facilitator utilized a PowerPoint template to explain the requirements of the project.

6. Each group was instructed to brainstorm for title slides of their PowerPoint and search for appropriate images or political cartoons. For the next lab meeting history students were instructed to use their textbook to write an introductory paragraph on their assigned topic and to locate four references such as magazines, journals, databases, and historical (professional) websites. (5 references)

7. University students were required to keep a reflective journal of their perceptions of the project and to post those comments in the designated area of RCampus.

*Computer Lab –2*

1. Students posted their introductory paragraph for review by online mentors. Online mentors reviewed the paragraphs and made suggestions using the discussion forum. (Online Collaboration – 30 minutes- 2 times weekly)

2. American history students responded to questions posted by the facilitator that relate to their topic and contents of the PowerPoint.

3. Students searched for images or political cartoons relating to their topic.
4. As a formative assessment, the facilitator provided a full document of the paragraphs of each group for the mentors to critique before the information is entered in the PowerPoint.

**Week Two**

1. Students were required to have five references and title for slides of their PowerPoint and introductory paragraph to their topic.

2. Students cited references properly according to APA citations (refer to research packet) Facilitator will give examples of citations.

3. The university students were required to respond to the postings with suggestions and revisions of the paragraphs through RCampus.com. Microsoft Word highlighting system will be used to make corrections and suggestions. (Online Collaboration- 30 minutes -2 times weekly)

4. At the end of the week students were required to post a rough draft of their paragraphs containing the four information requirements to the discussion forum for review by their mentors.

*Computer Lab 1:* Students utilized Microsoft PowerPoint to create their title slides and introductory paragraph (Facilitator will assist students)

*Computer Lab 2* University students examined the rough drafts and responded with suggestions and corrections.

**Week Three  Computer Labs –Final Draft and Survey**

1. At the beginning of the third week (Monday) the first draft of the paragraphs for the PowerPoint were posted to the discussion forum for review by online mentors. (Online Collaboration – 30 minutes – 2 times weekly)

2. All drafts were critiqued and posted to the classroom’s website on RCampus.
3. At the end of the third week, (Thursday) final drafts of the paragraphs were posted to the RCampus.com. The three scorers evaluated the final project using a rubric. (Refer to APPENDIX D)

4. American history students responded to a paper and pencil version of the nine-item Confidence Survey and the ICS.

5. University students completed their reflective journals which were copied into transcripts by the facilitator.

*Week Four*

1. The researcher/facilitator read and categorized themes and coded the data from the from all of the discussion forums and the reflective journals.

*Week Five*

1. A statement synopsis was administered to the university students through RCampus to verify the accuracy of the statements and to establish credibility through member checking.
APPENDIX B

INFORMATION COMMITMENT SURVEY

When I view some information unknown on the Internet (Multiple Sources)

1. I will discuss with teachers or peers, and then judge whether the information is correct
   A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
   E. Disagree        F. Strongly Disagree

2. I will explore relevant content from books or print materials, and evaluate whether the information is correct
   A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
   E. Disagree        F. Strongly Disagree

3. I will try to find more websites to validate whether the information is correct
   A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
   E. Disagree        F. Strongly Disagree

When I view some information unknown on the Internet (Authority)

4. I will believe in its accuracy if the information is posted in well known websites
   A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
   E. Disagree        F. Strongly Disagree

5. I will believe in its accuracy if the information appears in government websites
   A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
   E. Disagree        F. Strongly Disagree

6. I will believe in its accuracy if the information is posted in professional (official) websites
   A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
   E. Disagree        F. Strongly Disagree

7. I will believe in its accuracy if the information appears in some websites recommended by experts
   A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
   E. Disagree        F. Strongly Disagree

When I view or navigate the Information on the Internet (Content usefulness)
8. If its content fits my searching goals I will consider the information as useful to me
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

9. If it can provide more related links, the information is useful to me
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

10. If it can help me search relevant information further, I will think the information is useful to me
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

11. If it is closer to my searching purpose, I will more believe in its usefulness
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

12. If it is highly related to my intended searching content, the information for me is useful
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

When I view or navigate the information on the Internet (Technical usefulness)

13. If it is presented by animation, I will think the information is useful to me
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

14. If it does not take much time to be retrieved, the information is useful to me
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

15. If it does not require a password or registration, I will think the information is useful to me
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

16. If it is shown in more beautiful websites, I will believe in its usefulness
A. Strongly Agree   B. Agree   C. Somewhat Agree   D. Somewhat Disagree
E. Disagree   F. Strongly Disagree

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When I need to search information on the Internet (Info. Seeking Strategies-Elaboration/ Exploration)

17. I am used to summarizing a variety of information
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree

18. I can use some acquired information for advanced search to find the most-fit information
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree

19. I can integrate the information obtained from a variety of websites
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree

20. I can keep reminding myself about the purpose of my search
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree

21. I can compare different information from related websites (or pages)
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree

When I need to search the Internet (Search Strategy -Match)

22. I usually use only a search engine to find the most-fit websites (or pages)
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree

23. If I find the first relevant website, I will not search others
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree

24. I am eager to find a single website that contains the most fruitful information
A. Strongly Agree  B. Agree  C. Somewhat Agree  D. Somewhat Disagree
E. Disagree  F. Strongly Disagree
APPENDIX C

CONFIDENCE SURVEY

1. About You
   A. Gender -  Male      Female
   B. Age -      16-18  19-25  25-30  31 and older

2. Do you have access to a computer outside of your class?
   Yes                  No

3. Prior Library Use
   I have used the following sources to answer my information needs in the past
   A. Books         B. Internet searches – Websites   C. Databases   D. Magazines   E. Journals

4. I have used one or more of the following libraries
   A. High School Library     B. Public Library     C. University Library

5. I feel confident about my ability to find information in a library
   A. Very Confident    B. Somewhat Confident   C. Somewhat Insecure   D. Very Insecure

6. I feel confident about my ability to find books by using a card catalog
   A. Very Confident    B. Somewhat Confident   C. Somewhat Insecure   D. Very Insecure

7. I feel confident in my ability to find the information I need by using a website
   A. Very Confident    B. Somewhat Confident   C. Somewhat Insecure   D. Very Insecure

8. I feel confident about my ability to locate information to meet the information need using an online database
   A. Very Confident    B. Somewhat Confident   C. Somewhat Insecure   D. Very Insecure

9. I feel confident about my ability to find magazine articles related to my assignment
   A. Very Confident    B. Somewhat Confident   C. Somewhat Insecure   D. Very Insecure
APPENDIX D

POWERPOINT SCORING RUBRIC

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4 Highly Competent</th>
<th>3 Competent</th>
<th>2 Adequate</th>
<th>1 Needs Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of Task</td>
<td>Included detailed information on terrorism regarding the Oklahoma Bombing, 9/11, Taliban in Afghanistan and War in Iraq. Successfully defined the task.</td>
<td>Included adequate information on terrorism regarding the Oklahoma Bombing, 9/11, Taliban in Afghanistan and War in Iraq. Defined the task</td>
<td>Included some information on terrorism regarding the Oklahoma Bombing, 9/11, Taliban in Afghanistan and War in Iraq. Somewhat defined the task</td>
<td>Included some information but left out important facts on terrorism regarding the Oklahoma Bombing, 9/11, Taliban in Afghanistan and War in Iraq. Needs more details for task analysis</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Located information from all types of required references. Used multiple sources of good quality. Well developed paragraphs and includes cause and effect, goals of key people involved, accurate timeline and various opinions</td>
<td>Used multiple sources of good quality. Paragraphs are developed and includes cause and effect, goals of key people involved, accurate timeline and some interesting opinions</td>
<td>Used multiple sources but omitted one required reference. Paragraphs are moderately developed and includes cause and effect, goals of key people involved, accurate timeline and a few opinions</td>
<td>Used multiple sources but omitted one or more required references. Paragraphs are too short and lack some information regarding the cause and effect, goals of key people involved, timeline and only included one opinion</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Slide titles, content, and images are complementary and 4 information needs are met with no errors in spelling/grammar</td>
<td>Slide titles, content, and images are engaging and meets 4 information needs with one error in spelling/grammar</td>
<td>Slide titles, content, and images video are somewhat related to each other and meets 4 information needs with a few errors in spelling/grammar</td>
<td>Slide titles, content, and images do not match only 3 information needs are meet with several error in spelling/grammar</td>
</tr>
</tbody>
</table>
APPENDIX E

FACILITATOR’S QUESTION PROMPTS AND RESULTS

Group One

1. Name the targets (places) in America that the hijackers attacked on September 11, 2001 and their significance. PowerPoint Slides Created Number 2, 8, 10, 11, 12, 13, 14

Group Response:

1. World Trade Center in New York City [2 planes]
2. Pentagon [1 plane]
3. Pennsylvania Field [1 plane]

The significance of the World Trade Center is that it represented America's economic power. The Pentagon represented America's military power. The crashing of the fourth plane in the Pennsylvania Field is said to be an accident. The plane was supposably on the way to the white house when it was over powered by the passengers and landed in the field.

2. Who was Mohamed Atta and what was his role in September 11, 2001?

Group Response:

He was the mastermind behind the Al-Qadea strike on September 11, 2001 he was trained in the summer of 2001.

Group Two

1. A granite memorial was dedicated to the six people who were killed in the World Trade Center bombing. Where was the memorial located? What did the inscription read?

PowerPoint Slides Created Number 11, 12.

Group Response:
The memorial was placed next to the towers and the inscription, along with the names of the six killed read, "On February 26, 1993, a bomb set by terrorists exploded below this site. This horrible act of violence killed innocent people, injured thousands, and made victims of us all.

* Robert Kirkpatrick, Suffern, New York
* Steve Knapp, Manhattan, New York City
* Monica Smith, Seaford, New York (and unborn baby)
* William Macko, Bayonne, New Jersey
* Wilfredo Mercado, Brooklyn, New York City

2. Who is Ramzi Yousef? How much property damage was caused to the World Trade Center by the bombing in 1993? (in dollar amount)  

Group Response:

Ramzi Yousef was the main terrorist behind the attacks. He received 240 years in prison and was fined 4.5 million dollars. Nearly 300 million dollars in damage was reported.

Group Three

1. Why did Timothy McVeigh blow up the Alfred P. Murray Federal Building in Oklahoma City?  

Group Response:

He felt that the federal government was too deeply involved in Americans lives, and what had happened in Waco, Texas in 1993.

2. What type of and how much explosives did Timothy McVeigh use in the bombing of the Alfred P. Murrah Building?  

Group Four

1. What was the relationship between the Taliban and Osama Bin Laden?
Slide Number 4

Group Response:

The Taliban allowed Osama Bin Laden to set up terrorists training camps in Afghanistan.

2. Who are the Taliban and how did they originate? PowerPoint Slides Created Number 5, 6, 7

Group Response:

The Taliban were established in 1994, shortly after the Pakistani government announced they were going to create a trade route through Afghanistan into Central Asia. During this time, Afghanistan was under the mujahideen rule. The Taliban aimed to disarm Afghan warlords, return law and order to the country, and to enforce Islamic law in Afghanistan. By September 1996, the Taliban Kabul, Afghanistan's capital city, establishing their strict Islamic rule. Mullah Mohammed Omar, a 35-year-old cleric who fought against the Mujahideen rule and founded the Taliban militia in the Maiwand district of Southern Afghanistan. The militia was made up of about 30 former Madrasah students. It is now composed of 10,000 to 15,000 men.

Group Five

1. What was President Bush’s stated reasons for declaring the War on Iraq? What was Tony Blair’s role in the war? PowerPoint Slides Created Number 3, 4, 13

Group Response:

Tony Blair was a British politician. He was the prime minister of the United Kingdom from May 2, 1997 to June 27, 2007. Blair had formed a strong political alliance with George W. Bush. He deployed British soldiers to assist American soldiers in Iraq. President Bush's stated reason for declaring the war on Iraq was to find weapons of mass destruction and to protect the people of Iraq from Saddam Hussein.
2. Where did Donald Rumsfeld say that the weapons of mass destruction were located in 2003?

Group Response:

Rumsfeld stated in 2003 in press conference that the weapons of mass destruction were located in Tikrit and Baghdad.

Group Six

1. Who is Cindy Sheehan? What did she do to oppose the war in Iraq?

PowerPoint Slides Created Number 3, 4

Group Response:

Cindy Sheehan was the mother of Soldier, Casey Sheehan who was killed near Baghdad April 4, 2004. Believing the war was a lie Cindy opposed it by protesting against the U.S. occupation of Iraq near George W. Bush's Crawford Texas home.

2. What are Oprah Winfrey’s views on the War in Iraq? Name some of the guests on her show that were opposed to war and the government’s actions toward the war.

PowerPoint Slide Created Number 5
The twin towers were built to withstand the impact of a plane. The steel parts of the building were covered with concrete which guaranteed firefighters a minimum of 1-2 hours of safe work inside the building. But on September 11, 2001, the fires in the twin towers were fed by over 91,000 liters of jet fuel which caused the towers to collapse.

Taliban
(Students of Islamic Knowledge Movement)
- Ruled Afghanistan from 1996 to 2001
- Formed during the war against the Soviet occupation of Afghanistan (1979-89).
APPENDIX F
INFORMATION ABOUT THE PARTICIPANTS

School

Sulphur High School – 11th Grade
Louisiana State University

Classification

Sophomores (7) and Juniors (11)

Major

Elementary Education (11), Early Childhood Education (2), Special Education (1)

Education (4)

Hometown- Sulphur, La., Lafayette, La., Baton Rouge, La., Prairieville, La., New Orleans, La., Carencro La., Gonzales, La., Mandeville, La., Houston, Texas, and Brookhaven, Mississippi

Extracurricular Activities (high School)- baseball, football, wrestling, volleyball, band, fishing and golf

Topic and Group Number

Group One – September 11, 2001

Group Two-Attack on the World Trade Center

Group Three- Oklahoma Bombing in 1995

Group Four- Taliban in Afghanistan,

Group Five- War in Iraq (2003 to Present Time)

Group Six- Opinions of American’s Regarding the Government’s War on Terrorism
APPENDIX G

APPLICATION FOR EXEMPTION AND CONSENT FORMS

Application for Exemption from Institutional Oversight

Unless qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research projects utilizing human subjects, or samples or data obtained from humans, directly or indirectly, with or without consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.

- Applicant, please fill out the application in its entirety and include the completed application as well as parts A-E, listed below, when submitting to the IRB. Once the application is completed, please submit two copies of the completed application to the IRB Office or to a member of the Human Subjects Screening Committee. Members of this committee can be found at http://www.lsu.edu/irb/screeningmembers.shtml

- A Complete Application Includes All of the Following:
  (A) Two copies of this completed form and two copies of parts B thru E.
  (B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1 & 2)
  (C) Copies of all instruments to be used.
  *If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
  (D) The consent form that you will use in the study (see Part 3 for more information.)
  (E) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB.

Training link: (http://cancer.gov/clickit/training/humanparticipant-protocoas.asp)

1) Principal Investigator: [Redacted]  Rank: [Redacted]
Dept.: [Redacted]  Ph: [Redacted]  E-mail: [Redacted]

2) Co Investigator(s): please include department, rank and e-mail for each
If student, please identify and name supervising professor in this space

3) Project Title: The Effects of Cross-Age Mentoring in an Online Collaborative Environment

4) LSU Proposal? (Yes or No) Yes
   Also, if YES, either
   □ This application completely matches the scope of work in the grant
   OR
   □ More IRB Applications will be filed later

5) Subject pool (e.g., Psychology Students) [Redacted] Students with [Redacted] [Redacted] Students with [Redacted] [Redacted]
   *Circle any "vulnerable populations" to be used (children <18 or persons with the mentally impaired, pregnant women, the aged, other). Projects with incarcerated persons cannot be exempted.

6) PI Signature [Redacted]  Date 1/6/08 (no per signatures)
   "I certify my responses are accurate and complete. If the project scope or design is later changed, I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all consent forms at LSU for three years after completion of the study. If I leave LSU before that time the consent forms should be preserved in the Departmental Office.

   ***Effective August 1, 2007, all Exemptions will expire three years from date of approval, unless a continuation report, found on our website, is filed prior to expiration date***

Reviewer: [Redacted]  Date 5/8/08

Study Exempted By: [Redacted]  Chairman [Redacted]  Date 5/8/08

Institutional Review Board
Dr. Robert Mathews, Chair
203 B-1 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.6900
F: 225.578.6792
irb@lsu.edu | lsu.edu/irb

I certify this application has been completed in full and is ready for review.

I certify this application meets all requirements and is ready for review.

I certify this application meets all requirements for submission.

I certify this application meets all requirements.

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I certify this application meets all requirements for submission.
Parental Consent Form

Project Title: The Effects of Cross-Age Mentoring in an Online Collaborative Environment

Performance Site: Sulphur High School

Investigators: The following investigator is available for questions, Gail Johnson at (337) 436-0498 and gjohns9@lsu.edu

Purpose of the Study: The purpose of this research is to examine the effects of cross-age mentoring in an online collaborative environment and the use of information literacy skills with the emphasis on evaluation and synthesis.

Inclusion Criteria: High school students under the age of 18 (16 and 17 years)

Description of the Study: The study will be conducted in three weeks with nine computer lab sessions in which high school students will collaborate with University students to complete a multimedia newsletter on Terrorism in America. The high school students will be tested before and after the study with two instruments that will measure their information seeking strategies, confidence level with information seeking behaviors and evaluative standards of accuracy and usefulness of information. University students will reflect on the mentoring experience in three journals.

Benefits and Risks: Participants will receive extra credit in their courses for their participation. Students that choose not to participate will be able to choose an alternative activity of their choice to earn equal number of extra points. There are no known risks.

Right to Refuse: Participation is voluntary, and a student will become part of the study only if both the student and the parent agree to the student’s participation. At any time, either the participant may withdraw from the study or the participant’s parent may withdraw the participant from the study without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy: The school records of participants in this study may be
reviewed by investigators. Results of the study may be published, but no names or identifying information will be included for publication. Participants' identity will remain confidential unless disclosure is required by law.

Financial Information: There is no cost for participation in the study, nor is there any compensation to the participants for participation.

Signatures:

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to Gail Johnson. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, Institutional Review Board, (225) 578-8692. I will allow my child to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

________________________________________
Parent's Signature                        Date

The parent/guardian has indicated to me that he/she is unable to read. I certify that I have read this consent form to the parent/guardian and explained that by completing the signature line above he/she has given permission for the child to participate in the study.

________________________________________
Signature of Reader                      Date

Study Exempted By:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
203 B-1 David Boyd Hall
225-578-8692 | www.lsu.edu/irb
Exemption Expires: 10/10/2010
Student Consent Form

Study Title: The Effects of Cross-Age Mentoring in an Online Collaborative Environment

Performance Site: Louisiana State University and Sulphur High School

Investigator: Gail L. Johnson is available for questions at (337) 436-0498 and gjohns0@lsu.edu

Purpose of the Study: The purpose of this research is to examine the effects of cross-age in an online collaborative environment and the use of information literacy skills with the emphasis on evaluation and synthesis.

Subject Inclusion: High school students 16 and 17 years of age and undergraduate students at least 19 years old and under 30 years of age.

Number of Participants: 51

Study Procedures: The study will be conducted in three weeks with nine computer lab sessions in which high school students will collaborate with university students to complete a multimedia newsletter on Terrorism in America. The high school students will be tested before and after the study with two instruments that will measure their information seeking strategies, confidence level with information seeking behaviors and evaluative standards of accuracy and usefulness of information. University students will reflect on the mentoring experience in three journals.

Benefits and Risks: Participants will receive extra credit in their courses for their participation. Students that choose not to participate will be able to choose an alternative activity of their choice to earn equal number of extra points. Risks of participation are none.

Right to Refuse: Participants may choose not to participate or to withdraw from the study at any time without penalty or loss of any entitled benefits.

Privacy: Results of the study may be published, but no names or identify information will be included in the publication. Participants' identity will remain confidential unless disclosure is required by law.

The study has been discussed with me and all my questions have been answered. If I may direct additional questions regarding study specifics to Gail Johnson. If I have questions about subjects' rights or other concerns, I can contact...
Robert C. Mathews, Chairman, Institutional Review Board, (225) 578-8692. I acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Voluntary Consent: I certify that I have read the preceding or it has been read to me, and I understand its contents. I have been given the opportunity to ask questions regarding the study's hazards and benefits. My signature below indicate that I freely agree to participate in this study.

Signature: _____________________________    Date ________

Study Exempted By:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
203 B-1 David Boyd Hall
225-578-8692 | www.lsu.edu/irb
Exemption Expires: 7-10-73
APPENDIX H

NEWSPAPER ARTICLE ON ONLINE COLLABORATION

Publication: American Press; Date: 2008 Mar 24; Section: Expressions; Page Number: B3

LSU, Sulphur students collaborate on ‘Terrorism’

Doctoral student Gall Johnson tasked Sulphur High School students and Louisiana State University undergraduates to put their heads together to help tackle terrorism.

The results of their work that began Feb. 18 and concluded March 6 is a multimedia presentation titled “Terrorism in America.”

The dissertation project included the efforts of Sulphur juniors in Joyce Ardoin’s American history class. They created a PowerPoint presentation—which includes maps, collages, photographs, sound effects, political cartoons and links to Google Earth—that demonstrated their knowledge of U.S. history.

Deidra Johnson’s LSU Introduction to Classroom Technology students served as online mentors.

The Sulphur High students taking part were Dustin Barrilleaux, Katie Black, Caleb Boyett, Tyler Caseel, Emily Cessac, Maggie Chais, Caleb Comeaux, Leah Cordill, Devin Forrestot, Mark Freedlund, Leidya Gombore, David Gobert, John Grimes, Party Anderson, Kaylie Gould, Kade Guillory, Cory Kennedy, Marc Kraemer, Daphne McKelvey, Laura Mitchell, Tara Nave, Tanner Pearson, Tonya Schall, James Schwoerner, Hannah Smith, Kali Stoumen and John-Henry Voss.

Sulphur High School students Emily Cessac, left, and Katie Black help classmates prepare a multimedia presentation on “Terrorism in America” as part of a dissertation project with Louisiana State University students.
APPENDIX I

SCREEN SHOT OF RCAMPUS COURSE MANAGEMENT SYSTEM

From RCampus Wiki

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<tr>
<th>Course</th>
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<td>W 07:00 - 09:00 PM</td>
</tr>
</tbody>
</table>
VITA

Gail Lorraine Johnson was born in New Orleans, Louisiana, but grew up in a small town, DeQuincy, Louisiana. She attended Grand Avenue High School for grades 1 through 10. She attended DeQuincy High School for grades 11 through 12 and DeQuincy High School graduated her in 1972. She attended Delta Business College in 1974 for General Secretary.

As life events unfolded, she regretted not attending a four-year college. In 1993, she enrolled at McNeese State University to pursue a degree in sociology. In May 1998, she was graduated from McNeese State University with a Cum Laude degree. Immediately after, she enrolled in graduate school to pursue a master degree in psychology. In May 2001, she was graduated from McNeese State University with a Master of Arts degree in psychology. Immediately after, she enrolled at Louisiana State University for a doctorate degree in educational leadership research and counseling. She received a Doctor of Philosophy degree in December 2008.