

# CLASSROOM THOUGHTFULNESS AND TECHNOLOGY: A CASE STUDY

by

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(Under the Direction of Ronald L. VanSickle)

## ABSTRACT

Technology in the classroom has been called the “silver bullet” that will enhance education reform and produce or increase learning. However, some researchers argue that computers in the classroom are not producing increased levels of learning. There is active debate in the academic community that the cost of providing technology to the classroom exceeds the perceived, potential, or actual benefit. This project explored the impact of technology on classroom thoughtfulness using a case study methodology. The primary focus was to determine to what extent and in what ways do teachers use technology to plan, implement, and assess the results of “thoughtful” lessons? Examining the efforts of in-service educators to promote classroom thoughtfulness using technology has benefit because there are not many research projects on this topic. This is not research focused on a specific technology or program, but focused on teacher efforts and ideas about technology.

Using a descriptive case study method, this research provided in-depth descriptions of teacher attitudes toward thoughtfulness and teacher application of technology to promote thoughtfulness. Two sets of teacher interviews and a classroom observation for each of the five participants at a rural high school generated the material to produce the case study reports. Findings indicated that in general these teachers are eager to increase technology application in

the classroom; however, access to technology, not only in the school but outside of the school environment, hindered this desire. These teachers also recognized that instruction designed to promote classroom thoughtfulness can be accomplished with or without technology. They believed that quality teaching is the key to promoting thoughtfulness and technology is a tool that can be used to achieve that goal.

This study is significant because it provided an understanding of the actual classroom environment where technology was applied. A great deal of research focuses on specific technologies or the impact of technology on testing outcomes. However, this research expands our awareness of actual classroom practice connecting technology with classroom thoughtfulness.

**INDEX WORDS:** Technology, Case study, Classroom thoughtfulness, Computers, Social studies, Teaching, Higher order thinking

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## DEDICATION

To Robyn,

For all of your love and support during this whole process,  
you are the most wonderful person I know. You have made many sacrifices along this journey to  
help me finish this degree. I love you very much.

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## CHAPTER 1

### INTRODUCTION AND BACKGROUND TO THE STUDY

Books will soon be obsolete in the schools. Scholars will soon be instructed through the eye. It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed in ten years.

Thomas Edison, 1913

Instructional technologies are present in education today at greater levels than ever before. The question needs to be asked: How do secondary school teachers harness this technology to produce better quality instruction? Do teachers infuse technology to produce a more engaged classroom? Do they apply technology to classroom pedagogy to create more thoughtful classroom environments? Do they use technology to produce greater levels of higher-order thinking in secondary school classes?

I have been a classroom educator in the social studies for nineteen years. During that time, two issues have circled through my practice and beliefs. First, what is significant and important to teach? Second, how can I teach “it” better? I have taught in four different school systems in the state of Georgia and am currently in pursuit of a second degree at the University of Georgia, but still I am attempting to answer these basic questions. I believe these to be essential questions for every individual involved in teaching.

As I pursued an advanced degree at the University of Georgia, I learned about classroom thoughtfulness as presented by Fred Newmann (1990a, 1990b). The goals of his extensive line of research were to explore a type of classroom thinking that extends beyond the higher levels of Bloom’s taxonomy and to develop a rationale for classroom thoughtfulness with criteria to measure classroom thoughtfulness. The research was thorough and explored many variables

contributing to classroom thoughtfulness which will be explained in greater detail as part of the literature review. Newmann's work helped to answer my first enduring "question" which explores the dimensions of the significant content that I should teach.

My fascination with the possibilities of computer technology in the classroom has been constant throughout my efforts to answer the question about how to teach better, but the rapid changes in technology have outpaced my ability to implement and fully integrate computer technologies into my classroom environment. The Internet, email, productivity software, and presentation programs (including projection screen technology and "SMART Boards") afford classroom educators at all levels the means to influence students in more meaningful and captivating ways than ever before. Thomas Edison felt the same way after the introduction of the motion picture. "Books will soon be obsolete in the schools. It is possible to teach every branch of human knowledge with the motion picture. Our school systems will be completely changed in ten years" (Saettler, 1968, p. 98). I think Edison was both prophetic and overly optimistic. Textbooks still exist in the classroom today but our classrooms have changed greatly every few years because of available technologies. The radio and the movie, which appeared to have great potential for shaping instruction, have been eclipsed by the technology of the digital age. This wide variety of new technologies available to classroom educators assists in answering the second of my two questions which examines how to teach better.

It is at this point the two questions that I have been seeking to answer overlap. What is important? – That I teach students how to become better thinkers. How can I teach "it" better? – By tapping into the resources available through computer technology. There is no question that computers can make teachers more efficient and that Internet websites, email, computer disks (CD), and digital video disks (DVDs) bring more information than ever before to the threshold of

the classroom in new and non-linear formats. What happens to all of that information as it flows through the hands of educators toward the intellects and minds of students? Are we teaching students to be more thoughtful about all the information? To what extent will the criteria that Newmann established as being essential components of classroom thoughtfulness be enhanced through the application of computer technologies? The questions that I am asking are not just personal in nature; they are vitally important to the teaching profession at large.

A number of writers share my vision for the benefits of increasing the use of technology. Zukas (2000) promoted the Internet as a resource for materials that can improve instruction in world history, and I wanted to examine not only Internet technology but the possible application of other technologies. Even though the study completed by Sari Follansbee and the Center for Applied Special Technology (CAST) in 1996 had limitations, it still promoted the benefits of using computer technology, especially Internet access, to improve higher order thinking. A more recent study by Pye and Sullivan (2000) supported the CAST (1996) research, indicating that the Internet was one of the most common computer-based applications applied in the development of higher-order thinking skills. These studies support my effort to examine how teachers use technology in the classroom to promote thoughtfulness.

There are many advocates of increasing the use of technology in the classroom; however, some researchers understand that simply placing computers, associated hardware and software is not the best approach. A series of studies completed by Brush and Saye (2000, 2001) and Saye and Brush (2002), examined the addition of scaffolds as part of a student-centered hypermedia unit teaching about civil rights. Scaffolds are instructional supports to facilitate learning when students are exposed to new material and assist in the learning of complex materials or processes. Scaffolds can include outlines, key questions or graphic organizers and be applied to a variety of

learning situations. Belland, Glazewski, and Richardson (2008) also examined scaffolding, but at the middle school level in science classrooms. Teachers that use technology-based instructional techniques need to be aware that the technology will not teach. Scaffolding, whether internally built into the program or externally created by the teacher, is integral to the effective use of computers in the classroom according to their research. Like this group of researchers, I recognize the benefits of applying technology, but my focus is on how teachers use the technology to promote thoughtfulness in the classroom. Hannafin, Hannafin, Hooper, Rieber, and Kini (1996) also examined technology research and emphasized the need to focus research on learning with media instead of learning from media.

The discussion concerning the most effective methods to implement technology into the classroom goes back as far as the development of the radio, movies and television to which the opening quote refers. Saettler (1968) wrote a history of instructional technology that addressed the ample research investigating the use of film in the classroom. Research on the role of computer technology in the classroom is still needed to determine not only current practice, but also the best practices to integrate technology into the curriculum.

Diem (2000) claimed that technology has not been used effectively in the classroom. He stated that it is easy to deliver technologies to the classroom, but training teachers to be comfortable implementing new instructional methods aimed at active student learning is far more difficult. He advocated research that examines the “holistic effects of technology on the social studies” (p. 498), including qualitative studies similar to the study I completed. He mentioned specifically the areas of academic engagement and technology integration which I expanded to planning, implementation and assessment of thinking skills. He highlighted that the intent of instruction determines how technology will be utilized in the social studies classroom. “This



concept is at the heart of the technology instructional paradox; namely how can we apply technology to best serve education in a democratic society” (p. 153). He advocated that we examine how technology is being used to promote different learning outcomes in the classroom. Shaver (2001) concurred with Diem on the need to examine carefully the claims made by advocates of computer technology. He emphasized the need for “thoughtful curriculum development and careful instructional design [which] are critical to the productive use of electronic technology” (p. 20).

The issue of how to enhance instruction goes beyond Diem’s (2000, 2002) ideas into the practical application of technology. Spires and Jaeger (2002) reviewed the literature in an effort to determine more effective ways to implement Web-based instruction at the university level. One of the findings indicated that professors desired to promote more critical thinking skills as part of instruction; however, they did not discuss specific means to accomplish this. Bennett and Pye (2003) explored the use of instructional technology in the social studies classrooms at the middle school level. As part of their conclusion, they mentioned the need for further research to determine whether students are using higher-order thinking skills while instructional technology is being accessed or implemented in the classroom. The present study helps to answer some of their questions at the secondary level.

In a more recent article, Wenglinsky (2005) questioned the assumption that technology is automatically a positive force in the classroom. He stated that the effectiveness of technology integration must be measured against student achievement. His analysis of National Assessment of Educational Progress (NAEP) assessments and surveys revealed that teachers who used technology in the lower grades to promote higher-order thinking produced greater benefits in scoring; however, he also discovered that most elementary teachers used computers for drill and

practice or as newer toys on which to complete traditional assignments instead using them as agents of creativity. His research on the NAEP scores of 12<sup>th</sup> grade students is most pertinent to this study. The number one indicator for success was socioeconomic status, but student success also was connected to the amount of generic, not history specific, computer use beyond school hours. The key for teachers, according to Wenglinsky, is to plan lessons such that students will access technology-based resources to complete assignments. Also, teachers must ensure that all students have the basic skills necessary to access those rich resources. His commentary raised doubts about implementing the mantra “more is better” when it comes to the computer in the classroom. Instead, he advocated focusing on what teachers are doing in the classroom and how schools can make sure that students have access to the resources necessary to complete rigorous tasks. My research project provided case study data relevant to his ideas.

### Research Purpose and Research Question

In this study, I examined how teachers employ technology to plan, implement and evaluate instruction. These instructional methods were described in terms of their ability to promote classroom thoughtfulness using Newmann’s (1990a, 1990b) six main criteria of classroom thoughtfulness. Classroom thoughtfulness was defined and explored by Fred Newmann and other researchers in a series of articles in the early 1990s. At this time, no other research effort has attempted to connect and evaluate the results of their findings with the benefits of more modern computer technology. This descriptive research project focused on answering the following question:

To what extent and in what ways do teachers use technology to plan, implement, and assess the results of “thoughtful” lessons?

Technology for the purpose of this study was defined as hardware related to computers, software applications that run on computers, and the affordances of the Internet. Technology included computers interfaced with other technology to create new methods of communicating content. Examples include scanning images into computers and downloading video segments from digital camcorders to be included in computer generated media presentations. Thoughtfulness was defined as the collection of characteristics outlined by Newmann that are present in classrooms where teachers try to promote higher-order thinking and learning. This concept of thoughtfulness will be explained in greater detail in Chapter 2. This study explored the methods and means that teachers use to promote higher-order thinking and to develop “thoughtful” classroom lessons as well. The following sub-questions guided the focus of this study:

1. How do teachers use technology to research and develop resources to use in the classroom for instructor or student use that promote thoughtfulness?
2. How do teachers use technology in the classroom to present material and structure lessons to teach new concepts and challenge thinking?
3. How do teachers use technology to assess or evaluate student achievement and understanding of material?

This case study project adds to the literature concerning the application of computer technology to the secondary classroom and the promotion of classroom thoughtfulness.

## CHAPTER 2

### LITERATURE REVIEW

Technology has often been thought of as the silver bullet for education. What is technology and how can we define it? In what ways can we best use this new resource to impact the social studies? Is technology a new tool to add to our current bag of instructional tricks or is it a new methodology that will alter our pedagogy? The difficulty in answering any of these questions rests in the extremely fluid nature of technology use in the academic arena. The application of computer technologies as an instructional tool is a recent development and the impact of technology on pedagogy and the classroom climate has not been fully explored through research. Berson (1996) and Saye and Brush (2002) both commented on the lack of quality research exploring the impact of technology on the social studies.

The growth of instructional technology has been exponential. It used to be that only industry and higher education had the resources to experiment with computer-assisted instruction or computer-mediated instruction on a wide scale. Ten years ago, widespread access to computers in the public school was limited to possibly one computer lab for the entire school, which may or may not have been networked to the Internet. Today, almost all public high school teachers in America have high-speed access to the Internet, mobile laptop labs with wireless connections, several computer labs with “SMART Board”<sup>1</sup> technology, and students who are more knowledgeable about “Google” searching than looking for information in print-based text.

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<sup>1</sup> **SMART Board** is an interactive whiteboard developed by SMART Technologies that is a large touch-sensitive whiteboard that uses touch technology to detecting user input (e.g., scrolling interaction). It is equivalent to normal PC input devices, such as mice or keyboards. A SMART Board has a projector connected to display a computer's

The first step is to review the working definition of technology. Because my focus is on the use of technology to promote classroom thoughtfulness instead of a broader examination of technology use, I will review the literature on classroom thoughtfulness before examining the research literature that discusses the use and impact of technology on higher-order thinking primarily in the secondary social studies classroom. My research project bridged these two research areas and that is why both are included here. There is not a great deal of overlap currently in the research literature, but I connect the two.

Technology for the purpose of this study is defined as hardware related to computers, software applications that run on computers, and the affordances of the Internet. Technology includes computers interfacing with other technology to create new methods of communicating content. Examples include scanning images into computers and downloading video segments from digital camcorders to be included in computer-generated media presentations. Although this definition may appear broad, it fits this research project because I examined all the ways that teachers use technology to plan, implement and assess thoughtful lessons and to promote thinking. My research focused on how teachers used technology to promote thoughtfulness, so the review of literature begins with the research conducted by Newmann and others on the topic of classroom thoughtfulness.

#### Newmann and Classroom Thoughtfulness

There is no question that the field of the social studies presented itself in the beginning of the 21<sup>st</sup> century as a discipline in transition. Many of the leading theorists in the field continued the debate about the nature and purpose of the social studies including Sexias (2001), Thornton (1994), and Parker (2003). However, other research focused on and discussed the quality of

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video output onto the whiteboard, which then acts as a huge touch screen. The SMART Board usually comes with four digital writing utensils that use digital ink replacing the traditional whiteboard markers.

research being done (Wilson, 2001; Bain, 2000), while some researchers identified the voices not being heard in the social studies and the gaps in the research (Howard, 2003; Ladson-Billings, 2003). Prior to the evolution of this discussion, a small group of researchers emerged in 1990 (Newmann, 1990a, 1990b; Onosko, 1990; Stevenson, 1990) that focused their research and writing efforts on the development of higher-order thinking skills in the social studies. At about the same time this research interest began to present itself in journals and conferences, technologies emerged as tools that could radically change all areas of pedagogy. The expanded power of the personal computer combined with the information explosion on the Internet created the possibility of a new type of instruction that requires research and conceptualization to determine the best ways to harness those tools for effective and authentic social studies teaching. The computer's interactivity and non-linear presentation capability changed the teacher's ability to present challenging, interactive, complex and engaging instruction in a manner never before possible. The transition from filmstrips to video does not even compare to the paradigm shift in instructional opportunities due to computers.

Consider first the definition of the concept of higher-order thinking. Bloom's taxonomy stated that higher-order thinking occurs when students synthesize or evaluate (Huitt, 2004). However, Newmann (1990a, 1990b), Stevenson (1990) and Onosko (1990, 1991) took a more productive approach and described characteristics of thoughtful classrooms. They focused on student and teacher behaviors, what is actually happening in social studies classrooms and barriers to the promotion of higher-order thinking. Newmann (1990a) identified six key components of thoughtful classrooms.

1. "There was **sustained examination of a few topics rather than superficial coverage of many**" (p. 51). (bold text added) Newmann explained that in order to

master higher-order challenges, in-depth study is required. Lessons that provide limited coverage do not allow for the building of the “complex knowledge skills and dispositions” necessary to master topics.

2. “The **lessons displayed substantive coherence and continuity.**” “Intelligent progress on higher-order challenges demands systematic inquiry” (p. 51). Lessons should work to integrate ideas instead of teaching material as unrelated bits of information.
3. “**Students were given an appropriate amount of time to think,** that is, to prepare responses to questions” (p. 51). Quality thinking takes time, but many classrooms rush this process and pressure students for responses before adequate time for reflection has taken place. In order to promote higher-order thinking, there must be some time allowed for quiet so that students can think about the ideas presented and prepare additional arguments or support.
4. “The **teacher asked challenging questions and/or structured challenging tasks** (given the ability level and preparation of the students)” (p. 51). By the definition Newmann developed students must be faced with challenging questions or tasks that “demand analysis, interpretations or manipulation of information” (p. 51). The teacher must ask students to go beyond recitation of previous material and ask students to use prior knowledge to develop new ideas.
5. “The **teacher was a model of thoughtfulness**” (p. 52). Teachers need to support student thinking by demonstrating their own efforts to deal with difficult material and developing an understanding of complex problems. Teachers can also demonstrate thoughtfulness by showing appreciation for students’ ideas.

6. **“Students offered explanations and reasons for their conclusions” (p. 52).** The answers to complex problems that teachers should propose as part of a thoughtful classroom (Indicator 4) are not always easy to determine and may require more than just looking at a page in a textbook. Students’ answers should include the reasoning behind the answer and the information that supports the students’ conclusions.

Newmann (1990a) spent considerable time explaining the rationale behind the promotion of classroom thoughtfulness and proposed seventeen indicators or dimensions of classroom thoughtfulness broken down into three categories: (1) general lesson characteristics; (2) teacher behaviors; and (3) student behaviors. One of his goals was to take the number of indicators and possibly reduce them to a smaller number of essential or key characteristics of classroom thoughtfulness. The reason behind the effort to shrink the characteristics to a smaller number became evident in his next article (1990b) that explained how the six were selected. The rationale was to use the key indicators to help teachers reflect on their practice as well as making the research process that he conducted more manageable. After going through a complicated process of evaluation, the six criteria listed above distinguished themselves as critical elements of a thoughtful lesson or classroom.

Neither Stevenson (1990) in his discussion of the social studies classes that engaged and disengaged students nor Onosko (1991) in his article discussing barriers to promoting higher-order thinking mentioned the use or implementation of technology as a possible remedy to these problems. I believe that promoting higher-order thinking with the thoughtful classroom model will produce student engagement and achievement. Further, given Newmann’s (1990b) characteristics of a thoughtful classroom and the student and teacher behaviors that lead to a thoughtful classroom, I believe the type of instructional practice advocated in his article is the



answer to many of the questions posed by the leading social studies theorists. Whether the social studies teachers approach the classroom from a direct-instruction perspective or the reflective inquiry model, the emphasis must be placed on developing a thoughtful classroom, not just activating the verbs listed in Bloom's taxonomy.

A decade after Newmann and his colleagues reported their research; neither Wilson (2001) nor Sexias (2001) mentioned the influence of technology in their reviews. Sexias did talk about the "text" that 21<sup>st</sup> century citizens will work with and made a case for the inclusion of different "texts" that are more representative than traditional textbooks (pp. 559-560), but he did not note how computers provide access to the variety of "texts" available. Both included substantial references to Newmann's work on higher-order thinking and the contribution to both areas of study. Even in Thornton's (1994) review of research, he did not deal with technology in his elaboration of the three traditions, even though he did include an analysis of textbooks. The issues that Thornton promoted are inclusion, perspective taking, and the possibility of teaching more history. All of these issues can be pedagogically enhanced through technology, but it was not explored in their reviews. My research project examined the connection between teachers' efforts to plan, implement and assess lessons that promote classroom thoughtfulness and how technology impacted these efforts.

#### Research Literature Selection

The first part of the literature review identified the current research available that explores the connection between technology and higher-order thinking. I focused on two questions when I reviewed the literature on technology and the social sciences:

1. How can computer technology be used in the secondary level history classroom to increase higher-order thinking? This included research on the impact of scaffolding on efforts to facilitate and promote higher-order thinking.
2. Are there specific uses of computer technology that facilitate a thoughtful classroom?

I initially searched EBSCO's online journals using the keywords "computers" and "social studies" and generated 342 results. After examination of each title and abstract to determine the suitability of each study to my questions, I selected over 30 articles to evaluate further. I wanted to redirect my study to include the concepts of higher-order thinking and the impact of technology on promoting that type of thinking in the classroom. Searches involving the term "technology" and "higher-order thinking" were also conducted yielding 153 results. I also conducted searches using the keywords "constructivism," "technology" and "social studies." Later, I searched for articles written by John Saye because of his work on embedding scaffolds within technology applications and how the scaffolds enhance student learning. I located additional articles by cross-referencing the bibliographies of many of these articles. I also contacted Dr. Fred Newmann to obtain a list of articles associated with his research on classroom thoughtfulness.

The number of articles written in the last twenty years concerning computers in the classroom is substantial, and even the fields of the social studies and history have large segments with this literature focus. When the same article titles and abstracts began showing up in my different searches I gained confidence that I had examined most of the research in this area. However, I rejected many of these articles for lack of relevance to the research questions. I rejected other articles because they were narrative essays about technology instead of research, and some were summaries of technology programs available as opposed to a presentation of

research findings. Below, I incorporate these articles into my conceptualization of what technology is and how it relates to the field of the social studies.

### Criteria

Originally my criteria focused on articles about technology-based instruction related to World History at the secondary level, but I broadened my focus to include American History and other social studies subjects. Also, I expanded from the secondary level to include research from the elementary grades to the undergraduate level. I selected articles within the last seven to ten years because of the rapidly changing nature and availability of technology and changes in the amount of software generated for the social studies in particular. There is a large body of work devoted to the impact of technology on learning and thinking, however, that description of technology is too broad for my study because it spans innovations from radio to television, filmstrips to overheads. Not all of the research that I located has been included in my analysis because I eliminated studies that did not help to answer my questions examining technology and higher-order thinking, and some were eliminated because they were not research based. After reducing the number of articles identified through the various sources above, I selected several articles that fit my criteria and were focused research, from either qualitative, quantitative or mixed methodology studies.

### Findings (General)

Berson (1996) broke down the research on technology in the social studies into five key areas: (1) drill and practice, tutorials, study guides; (2) games and simulations; (3) inquiry and problem solving; (4) graphics; and (5) word processing and writing. Berson (1996) mentioned the limited research base on the effectiveness of these types of software applications on student achievement and motivation. He integrated both quantitative and qualitative research studies for

the past eight to nine years and suggested additional research areas that can be investigated. He indicated that the use of “scaffolds” has benefit for the effectiveness of computer simulations according to the research that he reviewed. He stated that computers need to be more than an appendage to instruction and should be integrated into pedagogical styles and that research on using the computer to “facilitate the process of inquiry” was still needed. In his conclusion he mentioned a difficulty for researchers who want to investigate computers and technology in the classroom. “The inherent difficulty of evaluating the effectiveness of computer-assisted instruction is the perpetual modifications in goals and expectations for this technology” (Berson, 1996, p. 496) This supports my original comments that the impact of technology on secondary education is a topic that still needs development through research to improve our understanding of the best means to integrate this innovation.

Zukas (2000) comprehensively examined goals and concerns for the instruction of world history and a description of different ways the Internet can be used to achieve these ends. He provided detailed descriptions of projects and resources available to the teacher to facilitate the integration of Internet technology into classroom pedagogy. He concluded with a valuable description of the positive and negative issues involved in accessing the Internet and using the information obtained as an instructional tool. Even though this article was not research based, I include it here as a sampling of some of the many articles that promote the use of technology in the classroom, however, as will be evident at the end of this review, quality research that explores actual benefits of technology use in the classroom, specifically the secondary social studies, is limited. This article provided a good overview of possibilities and limitations of technology based instruction and helped me frame my research.

I organized most of the remaining research around the two questions that I wanted to answer. The first group of articles examines the effects of technology in a general way, focusing on some of the changes that take place in an environment rich in technology, including the use of scaffolds to enhance student learning and achievement. The second section focuses on using technology primarily to access the Internet and databases.

### *Technology Enhanced Environment and Scaffolds*

Richard Diem (2002) proposed that technology can offer pre-service teachers a “new and exciting platform” (p. 1) to engage learners and extend their learning and skill development. Because most pre-service teachers are exposed to technology applications in methods classes, Diem developed a rubric to assess technology use in methods classes and then examined the possibilities and limitations of technology applications in methods classes. He stated that students’ knowledge increased during the methods courses, but secondary school field sites were ahead of the university in technology use. The most common use of technology found in this study was the Internet. Significantly for my research was the finding that pre-service teachers increased their desire from the beginning to the end of the course to learn how to apply technology in learning environments. This study illustrates a phenomenon where the student is ahead of the teacher. Many students are more adept at computer applications than teachers, and many pre-service teachers are more inclined than instructors to use technology and apply it to an instructional environment. Diem concluded that changing this deficiency of technology use in the classroom needs to begin at the pre-service level.

Dils (2000) presented a case study from a middle school classroom on the effectiveness of using technology in a constructivist approach and how that methodology can address several different types of learning styles. He used a democratic values inventory in a pre-test/post-test

format to assess student attitudes about democratic participation. One class of the five that he taught was conducted in the traditional model as a control group and the rest were taught with technology to enhance instruction. The results indicated an increase in students' attitudes favorable toward technology for the experimental groups. The author concluded that this research may tentatively support the idea that technology can help achieve curricular goals. One drawback to the study is that the author did not indicate what happened to the average scores of the control class on the democratic values inventory. Another concern is the lack of longitudinal data to determine whether gains were maintained once the novelty effect of using the computers faded.

Hopson, Simms and Knezek (2001) investigated how a technology-enriched classroom impacts student development of higher-order thinking skills and they examined the effects of this type of environment on student attitudes toward computers. The authors defined higher-order thinking skills as skills that allow students to “function at the analysis, synthesis, and evaluation levels of Bloom’s Taxonomy” (p. 110). The study was conducted in Texas at the 5<sup>th</sup> and 6<sup>th</sup> grade level and lasted two years. The Ross Test of Higher Cognitive Process (Ross & Ross, 1976) was used to measure the effectiveness of the treatment. The results indicated no significant difference on the analysis and synthesis level; the only significant result was at the evaluation level. Scores were generally higher for analysis and synthesis, but significantly higher for evaluation (Hopson et al., 2001, p. 114). Learning in the technology-enriched classroom was more student-focused and oriented around problem solving. This study added to the limited research base focusing on computer use to develop higher-order thinking skills. Once students overcome the barriers to using the technology applications which required certain computing skills they were able to take control of learning and pursue more “obscure and hypothetical solutions” (p. 117).

Rice, Wilson, and Bagley (2001) studied the changes in one teacher's attitude and instructional practice over a five-year period as they made efforts to increase technology use in the classroom. Data was collected using email, interviews, classroom lesson plans, course materials, and observations. Four main categories of results were reported including changes in teaching practice and benefits to the teacher and his students. Initially changes came from instruction focused on using the Internet for research, the development of web pages for students, and the use of PowerPoint for presentations. As additional technology applications became available, more student based instructional practices were implemented. Students used critical thinking skills to present textbook materials using computer software and to develop higher-level review questions for other students to answer (Rice et al., 2001, p. 217). The teacher found that pedagogical practice needed to change in order to implement technology that promotes independent thinking. Students must be taught to think and reflect on the meaning of information and to construct new conclusions. However, the teacher mentioned resistance to this type of instruction because students want "others to do it for them, it is easier that way" (Rice et al., 2001, p. 221). This argument has been mentioned before. Students resist independent thought, but that complaint is older than the introduction of technology into the classroom. My research focused on the opportunity that technology provides to promote classroom thoughtfulness, not student resistance.

Saye (1998b) presented a study that examined teacher dispositions toward implementing technology-based instruction in the classroom environment. He theorized that technology would "encourage the establishment of empowering learning environments" (Saye, 1998b, p. 215). His broad definition of technology included more than computers and extended to videodiscs, televisions, and VCR's. He collected data through interviews of students and teachers, classroom

observations, and document collection. He developed two main conclusions and typologies for the integration of technology. “Voyageurs” embrace technology, use it to empower students, and create active student-centered learning experiences. “Accidental tourists” use technology to “reinforce traditional, teacher-centered practices” (Saye, 1998b, p. 216). He concluded that teachers who fall on the voyageur end of the spectrum of technology use and implementation are more likely to use it to promote higher-order thought process in an open and flexible classroom climate that is student-centered and to integrate knowledge (Saye, 1998b, p. 225).

Saye (1998a) presented a case study of an instructional technique involving several different types of technology to teach civic issues in a high school classroom. He discovered greater student engagement and growth through a process that allowed multimedia and hypermedia to be integrated with teacher directed small group “Socratic” discussions. According to Saye, the benefit of using the technology with collaborative student directed learning projects and at the same time involving the teacher in assisting these student groups in understanding their findings was significant. He did not believe that the technology was an appendage to instruction but an integral part of the pedagogy. “The technology-assisted environment was more than an entertaining holding action: it served as a real instructional partner” (Saye, 1998a, p. 7). This article presented his foundational work on the use of scaffolds to assist student learning. Although the scaffolds used in this study are external to the technology, later studies done by Saye and Brush (2002) embedded the scaffolds within the technology to support learning and achievement.

Brush and Saye (2000) presented a case study on the problems of implementing a student-centered unit of instruction. Data sources included observation, interview, teacher debriefing, and student products. Observations of classrooms indicated that student presentations



did not include great depth, but observations and post treatment interviews showed increased student engagement and understanding of content. They recommended increased attention to the needs of teachers when they try to develop and implement this type of lesson. They noted that using scaffolds could help solve this problem.

Brush and Saye (2001) empirically and longitudinally examined how scaffolds can be embedded in technology-supported student centered learning units. Scaffolds guide and assist students conducting self-directed learning and can address several student issues. They described Decision Point, which is a program that includes “an integrated set of multimedia content resources and tools” (Brush & Saye, 2001, p. 338) to examine the civil rights movement of the 1960s. They reported that embedded scaffolds assisted students and enabled them to work at a higher level of thinking while accessing a database of information.

Saye and Brush (2002) discussed the implications of embedding scaffolds in a hypermedia environment to enhance student engagement and learning. The focus was on problem-based instruction and developing critical reasoning and how a technology-focused lesson can develop critical reasoning skills. This was a follow up study to develop the scaffolds necessary to enhance student work. Data were collected in four different ways: student projects, student interviews, student paths through the database, and classroom observation. Student performance increased during this second study and was significantly higher than the scores generated from the first study (Brush & Saye, 2000). The researchers recognized the limitations of their study, and encouraged future research along these lines in other settings.

#### *Research on Internet and Databases*

Sari Follansbee of the Center for Applied Special Technology (CAST) conducted a study focused on the effectiveness of online access to information to improve student learning and to

look at factors that influence online communication in the classroom. The study was done in a controlled environment in seven major US cities during the 1995-1996 school year. The civil rights movement was the subject focus for this research, similar to the instructional focus of the work done by Brush and Saye (2000). The unit of study had curricular supports to help students and teachers organize their work and “develop strategies to analyzing and synthesizing information” (CAST, 1996, p. 2). These curricular supports are very similar to scaffolds as described by Brush and Saye. Within this study, students in both the control and experimental groups had access to computer tools and resources, but only the experimental group went online and used the Internet to obtain information. The author concluded that online access, not just access to computers was a key factor in developing students to become “independent, critical thinkers, able to find information, organize and evaluate, and then effectively express their new knowledge and ideas in compelling ways” (CAST, 1996, p. 2). Teachers reported that students in the experimental group desired more computer resources and supports for the purpose of higher-level activities as opposed to the control group where computers were used for basic skill development and reward and reinforcement functions. This illustrates a key difference in computers being used as an appendage to current practice or as a tool for increasing higher-order thinking. Limitations to this experimental study included the lack of random classroom assignment to control and study groups, intrusion of real-world problems on the data collection, and the small number of teachers. It would appear that this study was written and presented with laypeople as the audience. No descriptive statistics were presented about the number of participants, means and standard deviations for project scores, and there were no references to additional research supporting or contradicting the theories that were tested.

Pye and Sullivan (2000) stated that databases and the Internet are the most commonly used computer-based applications used in the middle school in Texas. This study promoted computer-based instruction as a means to develop higher-order thinking skills. Their research presented data from surveys on actual computer use in the classroom that indicated that reality did not match what teachers said was happening regarding technology use in their classrooms. This study surveyed a random sample of 120 middle school teachers on computer-based applications during instruction. The results indicated that computers were used 73% of the time and that accessing the Internet for information, games or web-quest type activities was the predominant form of instruction. Further, student enthusiasm increased and there was a positive effect on the classroom environment when technology was used as a means of instruction.

Scott and Sullivan (2000) presented an action research study to add empirical research on the use of the Internet in the classroom. Students were given a questionnaire about Internet use, and then they were directed through an Internet web site evaluation exercise followed by written essays evaluating their use of the Internet. Students generally felt a need to improve their “information literacy skills” to better use the Internet and were frustrated because of the possibility of getting bad information from the Internet. Student essays reflected appreciation for the acquisition of evaluation and search strategies that enabled them to maximize their use of the Internet. In conclusion, the authors stated that “students and teachers need to master information literacy skills if they are to harness the potential of the Internet” (Scott & Sullivan, 2000, p. 125). This mastery includes more than the ability to access information and extends to the critical thinking ability to transform data, through inquiry, into information.

## Discussion

I organized my articles into two broad categories for discussion. The first category covered the broad general area of a technology-enhanced or technology-enriched environment and included the articles by Diem (2002), Dils (2000), Hopson et al. (2001), Rice et al. (2001), and Saye (1998b). This category also included articles that examine the use of scaffolds to enhance technology instruction by Saye (1998a), Brush and Saye (2000, 2001) and Saye and Brush (2002). Articles that were focused on Internet and database use included CAST (1996), Pye and Sullivan (2000), and Scott and Sullivan (2000). Table 2.1 summarizes all of the research and how the results are related to the promotion of higher-order thinking skills or a thoughtful classroom. I included the higher-order thinking skills as described by Cradler, McNabb, Freeman, and Burchett (2002) and the minimal characteristics for classroom thoughtfulness as outlined by Newmann (1990a). I graded each article on whether or not it evidenced the particular skill and I also assigned a zero (0) or neutral category if the research was not determinable in that area. I found that almost all of the articles promoted some type of skill development on the computer and involved some aspect of the synthesis and analysis skills presented by Cradler et al. (2002). However, there was more variety when each article was examined for its promotion of the minimal criteria for classroom thoughtfulness.

The work done on scaffolding by Brush and Saye (2000, 2001) and Saye and Brush (2002) indicated that imbedded scaffolds in a hypermedia environment can assist in the development of critical thinking skills and the creation of a thoughtful classroom. Two weaknesses in the studies are allowing students enough time to respond and teacher modeling of thoughtful behavior. I gave those two areas negative marks because the researchers indicated that several student responses to the lesson included comments about not enough time to complete

the project or not enough time to become familiar with the technology. Also, teachers were actively involved in providing “soft” verbal scaffolds, and there was not sufficient discussion in the research about teachers demonstrating reflection and thoughtful behavior. However, this research on scaffolding was not focused on the development of higher-order thinking, it looked at better ways to use scaffolds to increase achievement through a technology based, hypermedia lesson.

Table 2.1

*Technology and Higher-Order Thinking*

Aspects of Technology Use	HOT Skills Development (Cradler)	Minimal Criteria for Classroom Thoughtfulness (HOT) (Newmann)					
	Info research Compare/contrast Synthesizing Analyzing Evaluation	Few Topics studied	Coherence and Continuity	Student time to respond	Challenging questions or task	Teacher modeled	Student reasons for concl.
<b>With Scaffolding</b>							
Saye (1998a)	+	+	0	+	+	+	0
Brush & Saye (2000)	+	+	0	-	+	-	-/0
Brush & Saye (2001)	+	+	0	-	+	-	0
Saye & Brush (2002)	+	+	+	+	+	-	+
<b>Internet &amp; Database</b>							
CAST (1996)	+	+	-	-	+	+	0
Pye & Sullivan (2000)	+	0	0	0	0	+	0
Scott & Sullivan (2000)	+	-	-	+	+	0	+
<b>Technology Environment</b>							
Diem (2002)	+	-	-	+	+	-	0
Dils (2000)	+	-	0	0	+	+	-
Hopson (2001)	+/-	0	0	0	+	+	0
Rice et al. (2001)	+	0	-	0	-	+	-
Saye (1998b)	+/-	0	-	+	+/-	+	0

Note. This table examined how each type of technology can be or was being used to create HOT.

Note. Explanation of symbols – no evidence of characteristic (-), evidence of characteristic (+), not determinable (0)

There was a fair amount of consistency in the research regarding asking challenging questions or tasks. Almost all of the research indicated that using technology to enhance or alter traditional instructional practice challenged the students to new levels of skill development and thinking (Brush & Saye, 2000, 2001; CAST, 1996; Diem 2002; Dils 2000; Saye, 1998b; Saye & Brush, 2002).

I examined my questions from several different perspectives. I had articles that studied technology applications at the elementary, middle and high school level and they were divided among qualitative and quantitative designs. This information is included in Table 2.2.

Table 2.2

*Typology of Reviewed Research*

Type	Number of Studies
Studies that involved a specific aspect of technology	
Scaffolding	4
Internet/ Database	3
Technology Enhanced Environment	5
Studies listed by primary method of study	
Qualitative	5
Quantitative	3
Mixed Methods	4
Academic level of studies	
Elementary	2
Middle School	2
High School	7
College	1

I further organized my research into a data table that identified both research type and design frequency. Table 2.3 lists all of this information. The benefit of organizing my research along these categories was to assist in identifying areas of limited research or patterns within design frequencies. After looking at the tables, it is evident that the research has been spread across

Table 2.3

*Research Data Table*

Article	Type				Focus <sup>1</sup>
	Qualitative	Quantitative	Mixed Method		
Brush/Saye (2000)	X				Student
Brush/Saye (2001) <i>J of Ed Media</i>		X			
CAST (1996)			X		All
Diem (2002)			X		Student
Dils (2000)	X		X		Both <sup>2</sup>
Hopson et al. (2001)		X			
Pye/Sullivan (2000)		X			
Rice et al. (2001)					
Saye (1998b) <i>J of C &amp; S</i>	X				
Saye (1998a) <i>Social Ed</i>	X				Both
Saye/Brush (2002) <i>Ed Tech, R&amp;D</i>			X		
Scott/Sullivan (2000)	X				

  

Article	Design Frequency						
	Case Study	Survey Questionnaire	Interview	Student Product	Classroom Observation	Action Research	Pre-Post Test
Brush/Saye (2000)	X		X	X	X		
Brush/Saye (2001) <i>J of Ed Media</i>	X		X	X			
CAST (1996)		X	X	X			
Diem (2002)		X	X	X <sup>3</sup>	X		
Dils (2000)		X		X		X	X
Hopson et al. (2001)		X					X
Pye/Sullivan (2000)	X	X					
Rice et al. (2001)							
Saye (1998b) <i>J of C &amp; S</i>	X		X		X		
Saye (1998a) <i>Social Ed</i>			X	X	X	X	
Saye/Brush (2002) <i>Ed T</i>			X	X	X		
Scott/Sullivan (2000)	X						

<sup>1</sup>Focus examines the general purpose of the study whether it looks at teacher attitudes and beliefs or student attitudes and behaviors or both.

<sup>2</sup>Looks at technology in relation to student-abilities and teacher-centered instruction.

<sup>3</sup>The product was produced by teachers.

several types of methodologies and designs. However, more research needs to be conducted similar to the works of Brush and Saye (2000, 2001) and Saye and Brush (2002) which focused on scaffolding. The authors indicated that they are still working on developing this line of inquiry and suggested additional research to pursue. Brush and Saye (2005) presented a paper that continued their focus of research examining the ability of students to engage a specific social studies issue through a multi-media environment and to demonstrate higher-order thinking skills.

### Implications

After reading and reviewing the volume of research, I returned to the two questions that guided my search.

1. How can computer technology be used in the secondary level history classroom to increase higher-order thinking?
2. Are there specific uses of computer technology that facilitate a thoughtful classroom?

The research indicated, although not conclusively, that technology can be used to develop higher-order thinking skills, but further research needs to be more focused. Only one article (Hopson et al., 2001) focused on higher-order thinking specifically. I had to determine whether I believed higher-order thinking was part of an investigation based on my understanding of Newmann and using the information presented in the research design. The data are limited and need to be more focused on the direct connection between the two ideas. Because there was a distinct body of research on the application of scaffolding to promote higher-order thinking, I was able to develop some ideas about this issue. Scaffolding does assist students to achieve when using hyper-media presentations, and there are opportunities to examine a few topics in greater detail. Scaffolding also presents challenging tasks to students which are another characteristic of classroom thoughtfulness (Newmann, 1990a, 1990b).



The line of inquiry that explores the connection between technology applications in the classroom and the development of higher-order thinking skills must be pursued further to define the connection and develop the best type of instruction to make it happen. Newmann (1990a, 1990b) developed the categories and descriptors of classroom thoughtfulness and Hopson et al. (2001) used the Ross Test of Higher Cognitive Process (Ross & Ross, 1976) to obtain data that are more empirical than classroom observation and survey to answer their questions. The use of technology as an instructional tool to affect higher-order thinking is an important and current question that can be answered through this current proposal. The impetus for conducting a case study research project instead of survey based research comes from the survey research done by Pye and Sullivan (2000) that indicated that survey results do not always indicate a match between reality and the information gained from surveys.

During the course of this project, additional research was conducted that connects with the questions I am trying to answer about how teachers use technology to promote classroom thoughtfulness. In the last five years, several articles were published dealing with the issue of technology in the classroom, but very few tackled the problem of using technology to promote classroom thoughtfulness.

Belland, Glazewski, and Richardson (2008) reported that problem-based learning (PBL) in middle school science classrooms enhanced learning through the addition of different types of scaffolds. Most of the classroom resources they examined involved computer-based programs for the students to use while trying to solve real world authentic problems, but the emphasis in this article was to help educators define and develop scaffolds to assist middle school science students develop critical thinking and reasoning skills. Although the resources that were evaluated were comprehensive and the promotion of critical thinking skills is essential for

academic success, research still needs to be done to determine the effectiveness of such strategies in promoting classroom thoughtfulness. This effort complements the work of Brush and Saye on the use of scaffolds to help solve unstructured problems in history, but it does not focus on promoting classroom thoughtfulness through technology. An earlier study done by Kay and Knaack (2007), also looked at the use of technology, specifically interactive web-based tools described as “learning objects” in the secondary school science classroom. The writers noted that little research had been done on the use of these learning objects in the secondary classroom and that most of the research had been done at the college or university level. While the overall results of study indicated that students and teachers were receptive to using and continuing to use learning objects, further research was recommended that would include pre and post testing to determine if any actual learning took place. Although their review of literature was extensive, it all focused on the field of science education. There still exists a gap in the literature concerning technology and the social sciences.

Another area of study that has received some research attention lately is the use of technology at the university level for distance learning and online learning environments for corporate training. Jonassen (2002) argued that pedagogical strategies employed for online learning purposes are not that different from current practice within the classroom and that should change because of the nature of learning. In formal education he argued, students “learn about” topics, but in the real world, learning is “activity based” and focused on problem solving, so the structure of the teaching should emphasize solving problems, not recalling and forgetting content. He called for change at the university and corporate levels of instruction, but did not have any models yet in place to research this shift in pedagogy. Although this focus is still on problem solving, which Newmann argued is a key minimal component of classroom

thoughtfulness, this line of research if ever pursued does not help to answer the questions that we are examining.

In 1998, Stoney and Oliver conducted a study to determine if higher-order thinking and cognitive engagement could be enhanced through a multimedia environment. Their results indicated that a well-designed interactive environment led to cognitive engagement and then to the promotion of higher-order thinking. Part of these results stemmed from the motivating and engaging nature of the online game that was used. However, this research project was conducted with only eight individuals and was completed at the university level. Again, this study illustrated the need for more research at the secondary level that examines the use of technology to promote thoughtfulness in the classroom. Continuing on in the thread that examined thoughtfulness at the university level, Hung, Bailey and Jonassen (2003) discussed the ability of problem-based learning to effectively impact learning. Although not a research article, they articulated many of the concerns that teachers may have when thinking about implementing problem-based learning. Two of the concerns involved depth versus breadth of coverage and higher-order thinking versus the acquisition of factual knowledge. These two areas (depth and higher-order thinking) are key components of a thoughtful classroom and this article reported on several research efforts (Gallagher & Stepien, 1996) and a meta-analysis that indicate the benefits of problem-based learning. However, the authors fell short of recommending the benefits of technology in solving some of these tensions.

Jonassen and Ionas (2008) also explored the benefits of learning causal reasoning processes and described three different methods to instruct for understanding and application of causal reasoning. One particular method included exploring simulations as well as using expert systems (computers) and student-centered modeling tools. However, they indicated that

“research is necessary to validate and contrast the effectiveness of each of these methods”

(p. 306). My project did not examine causal reasoning processes specifically, but it focused on how teachers used technology to promote higher-order thinking skills, including causal reasoning.

Other researchers agreed with my premise that teachers using technology will be able to enhance or increase higher-order thinking or classroom thoughtfulness. Jonassen (2006) discussed changing our understanding of concepts in learning and advocated that we should teach learners how to “use a variety of tools to build models of what they are learning” (p. 193). These tools should also help learners “engage in solving complex and ill-structured problems” (p. 193). Newmann (1990b) advocated that students be challenged with complex problems and difficult tasks. My research project explored the technology tools that teachers use to prepare and implement this type of thoughtful lesson.

There have been several studies done internationally that also relate to this topic. Iyamu & Ogiegbaen (2008), Liu & Zhu (2008) and Subramaniam (2007) explored the issue of technology integration in the classroom from the different perspectives of social studies, geography and teacher mindsets. Iyamu and Ogiegbaen (2008) examined computer use in the developing country of Western Nigeria. They interviewed 200 teachers and found that most of these educators use computers less than one time per month. The report indicated that technology and computer use was significantly related to pre-service and in-service training on computer use and availability of computers in the classroom. In Singapore, Liu and Zhu (2008) explored the use of the Global Information System (GIS) as an instructional tool to promote a more constructivist academic climate in geography classes. They emphasized that the constructivist learning environment should promote engagement, meaningful learning, and higher order

thinking. The researchers created a program to interface with GIS that would remove some of the complexity and help promote more inquiry learning using the GIS database. They recommended additional research to review the results of integrating these programs into Singapore geography classes. Subramaniam (2007) also researched computer integration in Singapore but focused on science teachers. The research examined teachers' mindsets and how they influence the process and focus of computer lessons. They recommended a shift away from educational computing as a "skills-based" approach to focusing on the interaction between teachers and students when they are using computers to facilitate engagement in the classroom.

It is fascinating to discover this type of material and to recognize that other countries are dealing with some of the same challenges concerning the integration of computers into the classroom. Researchers in some countries like Western Nigeria are trying to determine the best way to increase the use of computers in the classroom (Iyamu & Ogiegbaen, 2008), while in Singapore some of the research focus has been on the application of technology to promote thinking and engagement (Subramaniam, 2007). Trying to incorporate more of the international research would make this paper cumbersome and not provide greater clarity to our problem. There are also significant differences in the structure of the academic setting, teacher training and access to technology between the United States and these different countries which would have to be explained.

Finally, two studies examined a possible connection between technology-rich environments and learning. Hsieh, Cho, and Schallert (2008) studied the effects of three different goal orientations (mastery, performance-approach, and performance-avoidance) and self-efficacy at the middle school level. The research was conducted to determine the level of achievement for students' science knowledge after being "engaged in a technology-enhanced learning

environment” (p. 33). This project focused on self-directed problem solving without using textbooks where students start with a problem as part of the lesson and then work collaboratively to find a solution. According to the researchers, students engaged the technology and experimented with material to develop new knowledge and information. However, they pointed out that the study was correlational and did not indicate causality between the variables. They recommended further academic research at different academic levels to determine the impact of goal orientation and self-efficacy. The second study completed by Mendez and Montanero (2008), was designed to determine if a hypergraphic mediated electronic learning environment produced better multicausal reasoning than a more traditional hypertext technology or an even more traditional textbook driven environment. The hypergraphic group students did better on every causal reasoning assessment, but no statistically significant results were observed. They concluded by indicating the need for more specific research in this area of study. Classroom thoughtfulness is a much broader construct and includes more elements than multicausal reasoning; however, my aim was similar and gave further insight into their research effort. Note the distinction that my research focused on how teachers used this technology, not the impact on students.

The body of work reviewed indicated to me that a more thorough examination of how teachers are integrating technology into the classroom as part of their pedagogy was definitely needed to determine the benefits and drawbacks. School systems have spent a great deal of money for hardware and software purchases as well as personnel for maintenance, installation and networking. This research project begins to answer the questions of technology integration into the classroom by focusing on how teachers use computer technology to develop, implement

and assess lessons that promote classroom thoughtfulness. The next chapter will explain the research methodology.

## CHAPTER 3

### METHODOLOGY

#### Introduction

The increased use of technology in education and the implied assumption that increased use will improve student learning (Diem, 2000) made this study vital. As I discussed earlier, there is a gap in the literature about how teachers use technology to promote thoughtfulness in the classroom. I selected the case study method because it provides the best opportunity to examine technology use by teachers in their specific classroom environments. This case study was designed to investigate the main question:

To what extent and in what ways do teachers use technology in planning, implementing, and assessing the results of “thoughtful” lessons?

Sub-questions are listed below.

1. How do teachers use technology to research and develop resources to use in the classroom for instructor or student use that promote thoughtfulness?
2. How do teachers use technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking?
3. How do teachers use technology to assess or evaluate student achievement and understanding?

#### Case Study Design

Although many people are familiar with the term “case study,” there is no consensus about what makes a case study (Merriam, 1988). However, case studies “are a useful way to



systematically look at a specific case, collect data, analyze and interpret findings within their context and report results” (Anderson & Arsenault, 1998, p.152). Case study research done well relies on quality data and seeks to establish the same elements of reliability and validity as other research traditions (Anderson & Arsenault, 1998). The primary sources of data for this project were interviews with five current in-service high school teachers supplemented with data collected from classroom observation and document analysis. The benefit of this approach is to answer questions in the teachers’ own words instead of analyzing responses to predetermined options from a survey. This type of qualitative approach helps to present an “educational problem in all its personal and social complexity” (Stake, 1998, p. 254).

The purpose of qualitative research is to develop answers to questions by understanding the experience of the participants through their verbal narratives, and through observations, instead of manipulating numbers generated from surveys or test data. As such, qualitative research designs do not seek to control or influence behaviors, but rather, to “describe the nature of a belief, attitude, event, or behavior” (Merriam, 1988, p. 68). When quantitative data are examined, the resulting analysis can explore numerical frequency and distribution, however, qualitative data involve information that cannot be given numerical values (Yin, 1993). The idea is to develop through the open-ended nature of a qualitative design “a more authentic understanding of people’s experiences” (Silverman, 1993, p. 10). Applying these open-ended methods allowed this project to discover the reality of how teachers were actually promoting thoughtfulness in the classroom and how they were using technology to promote, develop and assess these lessons. Instead of examining test scores and frequency of computer lab use, the teachers and I were able to discuss and explore the impact of technology on classroom thoughtfulness. The aim of a case study according to Bromley (1986) is “not to find the ‘correct’

or ‘true’ interpretation of the facts, but rather, to eliminate erroneous conclusions so that one is left with the best possible, the most compelling, interpretation” (p. 38). The research questions of this study focused on exploring how teachers use technology to plan, implement, and assess lessons from the perspectives of the teachers themselves and this topic lends itself to the case study method. According to Yin (1994), case studies are best when examining events in the context where such events are occurring.

The most complex definition of a case study involves two parts summarized below.

1. A case study is an empirical inquiry that examines a current issue in its real-life Context, and
2. Case study inquiry deals with a distinctive situation and will rely on multiple sources of evidence that require data triangulation (Anderson & Arsenault, 1998, p. 153).

The United States Government Accounting Office (GAO) (1990) defined six types of case studies and this study was a merger between the illustrative and exploratory types (Anderson & Arsenault, 1998). It was illustrative in that it described and added realism with in-depth examples about teaching in a particular school. Also, it was exploratory because my goal was to generate hypotheses about the application of technology for later investigation in terms of Newmann’s research (1990a, 1990b, 1991).

Yin (1994), Stake (1995), and the GAO (1990) provided key procedures to use when developing case study research in order to preserve the rigor of the methodology and provide for broader applications of the reports developed. Researchers use cases to understand the whole of a particular situation; Stake (1995) referred to this as the boundaries of the case. The key is to select the correct cases in order to find the answers to the questions and maximize the time allowed for the study.

Merriam (1988) outlined four key characteristics that are essential for a good case study after reviewing and summarizing five different sources discussing case studies. Case studies need to be particularistic. This means that the study focuses on a specific event, situation or program and looks specifically at the way people deal with problems. This case study focused on the issue of developing classroom thoughtfulness using technology. Approaching this issue of classroom thoughtfulness and examining how teachers use technology to promote classroom thoughtfulness gives this study the holistic perspective it needs to be a good case study. Second, a good case study needs to be descriptive. This refers to the end product narrative produced as a result of the case study. The report should be a complete description of the events or phenomena that were studied. Findings are not reported as numerical data but as descriptions of situations that can be analyzed. In this study, each narrative has followed a similar outline pattern so that the reader can easily compare information presented. This study has included quotations, interview material and observational data to help create a “thick description” of the events at the school. Third, a case study should be heuristic which means that it “illuminates the reader’s understanding” (p. 13). This new understanding can help to expand the reader’s understanding or confirm previous knowledge. This study has brought about a new perspective about the relationship between technology and the development of classroom thoughtfulness. The study is also constructed so that the reader can also develop additional conclusions from the material. Finally, a good case study is inductive in that generalizations and hypotheses are developed after examining the data. The hypotheses are considered tentative and the focus is on the discovery of “new relationships, concepts, and understanding” (p. 13). Although this study started with a hypothesis and guiding questions to focus the research, the outcome was not predetermined and data were not used to verify a foregone conclusion.

### Setting and Participants

This study took place at Mount Carmel High School which is a rural high school in northeast Georgia with approximately 1400 students. Most of the students came from the lower middle socioeconomic class. The school had approximately 89 percent white students, 10 percent African-American and 1 percent from other ethnic backgrounds including a growing Mexican minority. The teaching staff averaged more than 11 years of teaching experience, and over 50 of the 84 certified teachers earned master's degrees or beyond. This site was chosen primarily because of its convenience for research, but also because it provided a good sample of students and faculty within a one school community. There were various levels of experience and exposure to technology within the student body and faculty. Also, this school fit a very common profile of rural schools throughout the entire state of Georgia and this study provided insights that other school systems might use to generate further studies in their own school environments (Georgia DOE Report Card, 2004-2005). Because I worked at this school for eight years, I already had established rapport with the faculty, administration and school board, and I was uniquely situated for this study because of my location within the school system (Glesne, 1999). I was able to locate research participants who provided rich background data and provided inside information to me because of my familiarity with the site.

The first step in the case study research process was to identify teachers that promoted thoughtfulness as a regular part of their classroom instruction, and these teachers became the cases. The entire faculty and administrative staff at the high school participated in the selection of teachers. All teachers were given a nomination form that described the indicators of thoughtful classroom instruction. They each wrote down the names of two faculty members that consistently promoted "thoughtful" instruction in their classrooms. A sample teacher nomination

form is included as Appendix A. In an effort to avoid nominations on the basis of friendship or popularity, additional nominations were solicited from building level administrators and department chairs. Recognizing that all of the teachers nominated could not be included in the study, I approached the top five candidates about participating in the research project. Table 3.1 summarizes the background data of the participants.

Table 3.1

*Participant Background Data*

Teacher	Experience	Subjects	Awards
Colbert	22 years, 8 at Mount Carmel	Advanced Placement History, Psychology, Sociology	Teacher of the Year 1993 & Star Teacher (Franklin) 2003 Mount Carmel Teacher of the Year and County Teacher of the Year, Star Teacher 4 times
Clancy	21 Years, 13 at Mount Carmel	World History	Teacher of the Year 1995-1996, 01-02, and county Teacher of the Year
Frank	11 years at Mount Carmel	Physical Science	Teacher of the Year 04-05
Thomas	18 years, 11 at Mount Carmel	Chemistry	Teacher of the Year 07-08, Teacher of Promise High School Teacher of the year – National Chemical Association
Benson	31 years, 29 at Mount Carmel	Family and Consumer Sciences I and Family and Consumer Sciences II	

The sample was a convenience sample selected from the faculty of the high school where I teach. I presented my ideas to the faculty and used the nomination process outlined above to recruit five participants in this study. At that time, there were over 80 classroom instructors at the high school. The five teachers selected represented a wide variety of academic areas including social studies, science, and home economics; however, not all of the academic areas were represented by the teachers nominated. Even though all of the academic content areas were not represented, wide selections of courses were represented by examining the classes taught by

these teachers, which ensured that data collection took place from a variety of content areas. According to Stake (1998), a case should be representative of a population of cases and this study will be representative of the profile outlined above that includes a medium-sized, rural high school and from a faculty with the characteristics described earlier. Although the teachers were selected by their peers on the basis of their ability to promote thoughtfulness in the classroom, this select group represents diverse content, experience, and academic background. Teachers were not selected based on the level of student abilities within their classrooms, but included students from all academic ability levels. The convenience sample selected from this particular school shares similar characteristics to other schools in this geographic area.

#### Data Collection

The five selected teachers were willing to participate in the process and underwent two rounds of interviews facilitated by me. The first interview focused on the teacher's efforts and practices to teach for "thoughtfulness." I used Newmann's (1990a, 1990b) research as a guideline to discuss their classroom practices. The first interview was more structured than the second and was used primarily to determine teacher beliefs and practices in the classroom.

Glesne (1999) recommends additional data collection methods to help triangulate and validate the information collected in addition to interviews. After I analyzed and reviewed the teachers' responses to the first interview, I also observed the classrooms of each of the teachers for a whole period. I kept research notes that enabled me to write rich case descriptions. I also asked the teachers to select a lesson that displayed and promoted thoughtfulness and included the use of technology. Each teacher selected a lesson that evidenced good discussion and opportunities for teacher-student interaction; however, the application of technology to classroom instructional techniques was not a major part of four of the five lessons. Following

each classroom observation, I conducted a follow-up interview to discuss the classroom observation and questions related to the application of technology in the teacher's classroom instruction. This second interview was focused more on the teacher's use of technology in developing, implementing, and assessing "thoughtfulness" in their classrooms.

I transcribed and member-checked the interviews during the data collection process and developed themes as they emerged from the conversation. Each teacher reviewed the content of a transcribed copy of the first interview a few days prior to the second interview. Member checking produced greater validity in the research process and a more complete case study. At the beginning of the second interview, I asked whether changes or modifications were needed in the first transcript. At the conclusion of the data collection process, I wrote a case study for each participant and asked each participant to review it for errors or unclear information. Each completed case study is presented in Chapter 4.

I interviewed each teacher on two different occasions to develop a better understanding of the teacher's classroom practice and to be able to write a detailed and descriptive case. The first interview focused on the teacher's understanding of Newmann's construct of classroom thoughtfulness and how to apply it to their classroom (see Appendix C). The teachers articulated their perspectives on higher-order thinking, classroom thoughtfulness and the application of technology to social studies instruction. I noted the applications of technology, although there were very few of them, but did not expand upon them until the second interview. I conducted a second interview after the classroom observation and typed up the notes made during the observation. The second interview focused on the use of technology in planning, implementing, and assessing thoughtful lessons discussed during the first interview. The interview guide for the second interview was developed using responses to the first interview and questions from the

classroom observation. This practice of sharing completed transcripts increased the amount of member checking and data validity (Lather, 1986). I recorded the second interview and gave teachers summary notes so they could verify the content at a later date. According to Stake (1998) triangulation strives to “arrive at the same meaning by at least three independent approaches” (Stake, 1998, p. 263). After allowing for member checking and review of the first interview transcriptions, I contacted each teacher and we scheduled a time for me to observe in his or her classroom for a complete 90 minute lesson. I was able to enter the class before the students and observe, and I had a short conversation after class with the teacher if time permitted. I observed the entire lesson and used my own checklist to record incidences of observed thoughtful classroom behaviors and made notes indicating high levels of classroom thoughtfulness and the application of technology when that was evident (see Appendix D).

The two-step interview process, classroom observations, research journal, and artifacts from the classroom provided an adequate level of triangulation for this study. Samples of all documents used in data collection are included in the Appendices. Because of my dual role as teacher/researcher in the school setting, I already had an established rapport with the teachers which generated high quality information during the interviews.

I was very familiar with the research location and may have been at different places on the teacher/researcher continuum at different times, so I worked hard to document personal subjectivities and biases (Glesne, 1999). Peshkin (1988) discussed the importance of identifying subjectivities throughout the study, not at the end when all of the analysis is complete. My research journal helped me keep track of this; however, allowing the participants to review the interview transcripts and to review their own case studies helped eliminate personal bias. Working with teachers that I knew and working in the school where I teach created a unique



research environment. While convenience and access were a motivating factor in selecting Mount Carmel, I also wanted to complete some research that would benefit this school and provide some insight on how to improve classroom thoughtfulness through the use of technology. I am sure that my subjectivities influenced my desire to see outcomes and results that would verify my research question; however, through journaling, reflection on the data, and using my advisor as an additional reviewer, I have tried to reduce the impact of my perspective. The research journal provided a location for questions and observations that I developed about the research process and other questions that I needed to answer.

The first round of interviews and classroom observations were conducted in the fall. The second rounds of interviews were not completed until the spring semester of the same school year. All interviews were audio taped and transcribed and member checking occurred throughout the research process and during data analysis in order to maintain face validity (Lather, 1986) during the project. The teachers selected the date for the classroom observation after the completion of the first interview. Because the teachers were aware of the questions that I was examining for the project, they were allowed to self-select a lesson that would demonstrate classroom thoughtfulness and the inclusion of technology. Allowing teachers to self-select the classroom observation is similar to the research design employed by Newmann (1990a, 1990b). Lesson plans and some samples of student work were also collected when they were considered relevant to the discussion of thoughtfulness or the use of technology to implement or assess the lesson. A post lesson conversation usually took place, if there was time, and the discussion focused on the levels of thoughtfulness exhibited and the application of technology during the instruction.

This study was completed during the 2007-2008 school year. Participant selection and initial interviews were conducted during the fall. Classroom observation and the peer review process of the initial interview transcripts were also completed at the end of the fall semester. Second interviews were conducted during the spring semester of the same school year. The summer and fall of 2008 were used to assimilate and review data and allow for final member checking of case studies. However, the data and all teacher information have been and will be kept confidential and pseudonyms are used for all participants. In addition, all interview transcripts and notes will be kept in a locked cabinet to be destroyed no later than 10 years after the study is completed.

### Data Analysis

I started coding (i.e., identifying key terms and concepts that emerged consistently throughout the conversations, interviews and observations) as soon as the first round of interviews was complete. Each interview was digitally recorded and a copy of the transcript was provided to each teacher in order for them to verify the material. No personal data were collected during the interview other than information about experience, teaching/course load and academic background. Newmann (1990b) has already established the criteria for a thoughtful classroom and each criterion describes an observable behavior that was discussed during the interviews.

Anderson & Arsenault (1998) described four steps involved in analyzing data: interpreting findings while in the field, coding data into themes, looking for negative case information and testing alternative interpretations (p. 158). As themes began to emerge, they were explored and discussed during classroom observations or during the second interview. This is the advantage of a two-tiered set of interviews. This project followed those guidelines, looking for patterns and themes to emerge during data collection. I summarized the data and presented

the summations as part of the case studies in Chapter 4. I first collected interview data and classroom observations during a single semester so that instructors were working with the same set of students and the interviews and observations were focused on the current courses taught. As I reviewed interviews I created a chart (see Figure 3.1) listing the teachers across the top and codes and themes down the side. As I listened to the interviews and read the transcriptions, the comments made by the teachers about certain topics were written in the chart and similar comments by other teachers were entered into the appropriate sections. I have included a sample of the chart here.

Common Themes	Colbert	Frank	Thomas	Clancy	Benson
Access	SES in our community limits some access to tech		Computer lab good for differentiation, but hard to get lab time	Like to have SMART Board in classroom, allow for more implementation in classroom, time constraints in the lab limit use, not all students know HOW to use technology **lack of universal access to tech, limits Clancy from complete application **	Access limited from lab
Classroom Pedagogy Skills	Technology can be used to create alternatives, tools to present materials	Discussion, investigative lab work	PPT's with <b>images</b> to create more engagement, <b>pictures</b> help teach and lead to additional questions (p. 2)	Technology to engage students but without content knowledge tech ineffective (yellow p. 1)	Able to promote thinking with or without tech – 2 reasons – nature of the course and have already taught without technology – can do it either way

*Figure 3.1. Common themes.*

## CHAPTER 4

### CASE STUDIES

#### Introduction

The case studies presented below represent a summation of the material that was discussed during the interview and observation process during the research project. The first part of the chapter includes a brief description of the community and school setting. The case studies which will follow have been organized according to the following outline in order to provide for consistency.

#### Case Study A

1. Information about teacher A
2. Classroom setting
  - a. Physical setting
  - b. Social/instructional setting
3. Perspectives on teaching for higher-order thought and classroom thoughtfulness
  - a. Priority of teaching for higher-order thought
  - b. Students and higher-order thinking
  - c. Constraints on teaching for higher-order thought
  - d. How to teach for student higher-order thinking
  - e. Teacher self-assessment regarding classroom thoughtfulness
4. Technology use and classroom thoughtfulness
  - a. Research question 1
  - b. Research question 2
  - c. Research question 3
  - d. Attitudes, aspirations regarding technology and classroom thoughtfulness

The case studies were designed to allow the reader an understanding of each participant and how he or she conducted instruction and classroom practice, his or her perspectives on student thinking and the use of technology, and how each rated his or her classroom on Newmann's (1990b) six minimal criteria for classroom thoughtfulness. The impact of technology

on each teacher's classroom is discussed here, but will be elaborated on in the findings in the next chapter. Four summary tables follow the five case studies and provide an overview of each teacher, including biographical and academic information, teaching responsibilities, sources of coverage pressure, and composite results of a self-assessment on Newmann's criteria for a thoughtful classroom.

### Community Setting

This research project was conducted at Mount Carmel High School, a school of approximately 1,400 students, located in a rural northeast community in the state of Georgia. This community was a typical southern community with a 2001 census population of 25,750. There were fall festivals, 4<sup>th</sup> of July parades, and a Christmas parade as part of this very rural, family-oriented community. The county was located close to several major and mid-major cities; therefore, it became a commuting community for these cities. There were six small municipalities located within the county; only one had a population over 500. About 25% of the land was prime agricultural land, and poultry and egg production were the most important agribusinesses in the area (Madison County Government, 2010). According to the Georgia Department of Labor website, the per capita income was \$ 28,808 with median family income at \$41,398 (Georgia Labor Market Explorer, 2010). Major employers in the county were the school system followed by retail trade and construction, and even though unemployment in the county was at 7.8% in (2009), it was ranked as one of the ten counties in Georgia with the lowest unemployment rates. About 30% of the county's population graduated from high school and 27% completed some college. Eleven percent earned a college degree and 7% had advanced degrees (Georgia Area Labor Profile, 2009).

### School Setting

Most of the students at Mount Carmel came from the lower middle class socioeconomic class. The school was approximately 89% White, 10% African-American, and 1% other including a growing Mexican minority. The teaching staff averaged more than 11 years of teaching experience, and 52 or more of the 84 certified teachers had a masters degree or beyond. During 2009 Mount Carmel did not meet Annual Yearly Progress (AYP). It met AYP for 6 out of 7 categories; but, it did not meet AYP criteria for academic performance. The graduation rate was 70.3% for the 2009 school year (Georgia Department of Education, 2008-2009). Algebra I, United States History, and Economics were the only Georgia End-of-Course-Tests where the school did not have a passing percentage. The school had an average 80% pass rate for all subject areas among first time test takers on the Georgia High School Graduation Test. Approximately 20% of the graduates of Mount Carmel entered the work force, 50% attended two-year colleges, and 30% went on to four-year schools. Mount Carmel offered all of the required courses to obtain a degree in the state of Georgia as well as Advanced Placement (AP) offerings. The school fielded athletic teams for both boys and girls in tennis, basketball, soccer, track and field, soccer, golf, rifle, cross-country, and it offered volleyball and softball for women and football and wrestling for men. Band, cheerleading and color-guard were also available. Clubs listed on the school's website reflected a wide variety of academic and special interest opportunities for students.

Mt. Carmel was selected as the site for this study primarily because of its convenience for research, but also because it provided a good sample of students and faculty within a one school community. There were various levels of experience and exposure to technology within the student body and faculty. Also, this school fit a very common profile of rural schools throughout

the entire state of Georgia. Therefore, this study might provide insights that other school systems can use to generate further studies in their own school environments (Georgia DOE Report Card, 2004-2005).

### Case Study A – Laura Colbert

#### *Information about the Teacher*

Mrs. Colbert had taught for 22 years and the past eight years at Mount Carmel. She earned a Bachelors of Education degree from The University of Georgia and a Masters in Elementary Education from Piedmont College, and she obtained Gifted and Advanced Placement (AP) certification. During the study, Mrs. Colbert taught both Psychology and Sociology, which were one semester courses, and AP U.S. History, which was a year-long course, creating three course preparation responsibilities for her. In 1993, she was selected Teacher of the Year for her school and Star Teacher, as well as being selected school and county Teacher of the Year for Mount Carmel in 2003. She was recognized as Star Teacher four times while at Mount Carmel. The AP course was limited to 21 students; most of those students were considered gifted students, and contained an equal mix of boys and girls. There were no African-American students in the AP class and only two Hispanics. The Psychology/Sociology course was considered an academic elective so most of the students were Advanced College Preparatory (ACP) students. One of her Psychology/Sociology classes was predominantly female (22 out of 27) while the other course was evenly split between boys and girls. There was a wide range of ability in her Psychology/ Sociology classes, from special needs children to gifted kids, and a variety of ethnicities in those classes. In addition to her teaching responsibilities, Mrs. Colbert worked with the teacher mentor program and led school committees.

### *Classroom Setting*

*Physical setting.* Mrs. Colbert's classroom was located on the front hallway of the school in the 100 wing of classrooms. Her room was located among a block of rooms devoted almost exclusively to social studies teachers. The room was set up in a traditional format with desks on the left and right side of a center aisle. Her classroom accommodated 29 student desks and was equipped with a teacher desk and table on one side of the front of the room and a projector screen and whiteboards across the rest of the front where she could write notes, show overheads or use her computer projector. Along the walls she displayed several flags of the different branches of the American armed forces as well as posters of Georgia Performance Standards (GPS) and Mount Carmel's Social Studies themes. The room was not cluttered and allowed easy access to all areas by the teacher and the students. During my classroom observation, Mrs. Colbert used the space very well and the students moved smoothly from whole group to small group instruction. At times they were focused on the overhead, at times on the teacher, and other times their focus was on their small group discussions.

Mrs. Colbert's classroom usually was well ordered and organized and there was very little clutter on her desk. Instructions for the day were posted clearly on the board. When I observed the classroom, the students entered the room and either started to work on the daily assignments or engaged in discussion with the teacher about questions from the previous day's assignment. The only visible technology was the LCD projector, but it was not set up for use on the day that I observed. Mrs. Colbert's teacher workstation at her desk was connected to the Internet, and she had a laptop available at her desk.

*Social/instructional setting.* During the classroom observation, Mrs. Colbert conducted a lesson that examined the concept of "Total War" as practiced by Grant during the Civil War. The



classroom was setup as a traditional classroom with all desks angled toward the front of the room facing the whiteboard where an overhead projector was set up. There was an opening “ice-breaker” activity for the students to complete followed by some discussion, after which the teacher gave students a packet of material to use during the day’s activities. After a short lecture on Grant’s philosophy of total war, the students were instructed on their group work tasks and how to conduct the document analysis. Questions to be answered by the students were listed at the back of the packet. During the group work time, Mrs. Colbert actively monitored student progress through a variety of methods that encouraged efficiency and progress. Students were actively engaged in developing thoughtful answers and completing the assigned tasks. As different parts of the assignment were completed, students notified the teacher in writing using mini-white boards. At one point individuals from each group would approach the overhead projector and write on the “T-chart” one pro and one con about Grant’s strategy. After the chart was partially complete, Mrs. Colbert called all groups together to examine and review the content on the chart. The subsequent question and answer period was effective as the teacher asked for clarification and explanation in greater depth about the ideas on the overhead. This discussion lasted for the remainder of the class, and before the bell rang, she reminded students to complete the final part of this assignment at home. The classroom was then reorganized into rows again.

### *Perspectives on Teaching for Higher-Order Thought and Classroom Thoughtfulness*

*Priority of teaching for higher-order thought.* Mrs. Colbert was an experienced teacher who enjoyed teaching. She stated in her interview, “When it comes to the classroom, [and] being with kids, I absolutely love what I do.” Her job frustrations were due to paper work, duties, and extracurricular assignments. As a classroom educator, Mrs. Colbert’s highest goal was to make

sure that students knew her classroom was a safe place, but that included going beyond physical safety. She wanted her students to feel safe enough to take risks by asking questions and expressing opinions. She said, “I just think trust in the classroom is really important.” After establishing trust as part of the classroom environment, her second goal was to create a climate for learning. She believed that students learn in different ways, all students can learn, and she must do what is necessary to help students learn. She also believed that students would rather develop thinking skills than focus specifically on content, although she thought that developing student thinking skills was more challenging. She believed students would prefer to be known as good thinkers with reasoning ability rather than just knowers of discreet facts.

Teaching satisfaction for Mrs. Colbert came from interaction with the students and seeing them return later having accomplished something, such as earning a degree or having a family. On a daily basis, Mrs. Colbert was satisfied when students were not afraid to ask questions or challenge her in the classroom, and thought for themselves.

When it came to instruction in the classroom, Mrs. Colbert’s goals were focused on teaching for the test. Regardless of personal perspective on testing or individual classroom philosophy, testing was a big part of the curriculum. She believed that teachers should teach so that students have opportunities to achieve success on whatever test is required. Additionally, her instructional goal was to create a “whole thinker.” She wanted to think that something in her class helped her students become lifelong learners. She stated, “I think it is important for students to develop a love for learning in and of itself.” Mrs. Colbert’s desire for students to become independent thinkers and learners related back to her goal to develop their confidence in themselves and their abilities to analyze, distinguish, and discern between fact and opinion. In her opinion, these lifelong skills are beneficial for all students.

*Students and higher-order thinking.* One of the most difficult things for her students to do when they encountered thinking tasks was to justify their opinions. Her favorite phrase was to ask the students to “connect the dots for me.” According to Mrs. Colbert, getting students to see the big picture and “connect the dots” is a very difficult thing for students to do. However, she noted that from her experience, higher level students in ACP or AP did better with higher-order thinking skills than technical level classes. Mrs. Colbert believed that exposure to a wide variety of experiences impacts the thinking ability of students. This exposure can be through various mediums like television, newspapers, books, magazines, travel or other background experiences; but, students who have had those opportunities tend to be better thinkers. Also, she believed parental support is another key ingredient that impacts student thinking.

*Constraints on teaching for higher-order thinking.* Mrs. Colbert expressed the belief that the conflict between depth and breadth of coverage was one of the largest challenges that teachers faced and that this conflict was largely due to standardized testing. She dealt with that conflict in ACP History because it only lasted one semester, but she had more latitude and time in AP history because the course was two semesters long. She indicated that this frustration was shared by teachers in other disciplines, like math and science, because teachers could not cover all of the content needed for testing, much less for the sake of learning. The state tried to help resolve this dilemma with the Georgia Performance Standards, but it was still a big issue. Mrs. Colbert believed this pressure came from internal and external forces. Externally, the pressure came from the demands of standardized tests after “x” number of weeks of instruction. Internal pressure came from the desire of teachers to explore issues in depth when they lacked the time and resources to do that. A teacher became frustrated trying to develop the interest of the student for learning while exposing him/her to the material required on the test. As a result, Mrs. Colbert

identified state tests and guidelines as the number one source of coverage pressure. The key was to find the balance between accountability, which is provided by the state test, and “testing our kids to death.” She said, educators need to find the common ground, but the state test and guidelines generated the pressure. The complete ranking of the sources of pressure for all the participants in the study appears later in the chapter.

When Mrs. Colbert identified three things that inhibit student thinking, she returned to the topic of classroom climate and the amount of trust that students felt in the classroom. First, students who did not feel that teachers are receptive to challenging questions or opinions are reluctant to share and that inhibits their thinking. Second, she believed that students themselves inhibit their own thinking by not seeing themselves as good students or thinkers. According to Mrs. Colbert, this could also relate to the community or culture in which they live. Finally, she identified the curriculum as inhibiting thinking because of the coverage pressure that teachers feel, so they skip activities that might promote thinking and allow students to be expressive. In order to manage the coverage conflict, Mrs. Colbert used curriculum maps to identify the essential information to be taught and learning logs for students to write about the topics discussed each day.

*How to teach for student higher-order thinking.* Mrs. Colbert’s conception of thinking that guided her instruction was based on Bloom’s taxonomy, which she considered a good tool to organize instruction and promote higher-order thinking. She also used a variety of classroom instruction techniques to improve thinking, such as discussion and graphic organizers. Writing was another tool she used to determine whether students understood the content and to help them develop their own thoughts. Mrs. Colbert did not believe that engagement and thinking were the same thing. Students could complete a task without really thinking about it. However, she did

state “that student engagement promotes student thinking.” The best case would be where engagement and thinking are hand-in-hand, but that is not always the situation in the classroom.

*Teacher self-assessment regarding classroom thoughtfulness.* We discussed her classroom practice using Newmann’s research on classroom thoughtfulness as a guide, and she completed a self-assessment using questions that identified the minimal characteristics of classroom thoughtfulness. The questions are listed below with her responses to follow, and this information is summarized for all participants at the end of the chapter. A sample of the complete self-assessment with the questions and the rating scale is included in Appendix D.

1. How often do you require your students to provide reasons and explanations for their responses to questions?
2. How frequently do you give students extended (beyond 10-15 seconds) time to think about and respond to questions?
3. In my classroom there is sustained examination of a few topics rather than superficial coverage of many.
4. During the course of a week, how often will you structure challenging tasks or ask challenging questions?
5. Do your lessons display coherence and continuity?
6. How would you rate yourself as a model of thoughtfulness?

Mrs. Colbert wanted to indicate that “always, or nearly always,” she required her students to provide reasons for the answers to her questions, but the reality in her classroom was that she “usually” made her students give explanations. She also believed that she usually gave students extended wait time to answer questions before moving on to another topic or question. The AP course, which was a year-long course, generally had more time to give sustained study of

specific topics. During the course of a week, she generally gave challenging tasks about half of the time. The AP course concentrated on document analysis as well as essays and other writing activities. She indicated that most of the time her lessons displayed coherence and continuity. She spent a lot of time reading and studying in preparation for class, and she tried to be organized and have good flow in the classroom as the lesson moved from one activity to the next. She believed she modeled thoughtfulness most of the time in her classroom, because she wanted to establish trust and create an environment where students felt they could take risks, so she worked hard to build that type of classroom setting by modeling thoughtful behavior.

### *Technology Use and Classroom Thoughtfulness*

After the classroom observation, during the second interview, the use of technology in the following three areas was discussed: (1) lesson planning; (2) implementing lessons; and (3) the assessment of lessons. These three topics provide insight into answering the three research questions that guided the study.

*Research question 1 – How do teachers use technology to research and develop resources to use in the classroom for instructor or student use that promote thoughtfulness?* In the planning of lessons, Mrs. Colbert used technology extensively, especially to access primary sources from the Internet. According to her, a wide variety of resources was available online which helped to produce a rich classroom environment. Also, she gathered images from the Internet to enhance PowerPoint presentation of material. She believed images helped enhance lessons and helped students comprehend the concepts. She also scanned hard copies of documents to be inserted into PowerPoint presentations or to display for the class. Finally, word processing made the creation of classroom documents so much easier for her. She could create notes using the Cornell method, with the margins and graphic organizers that could be saved and

modified for subsequent lessons. She liked to use tables and graphic organizers to arrange content because she was a visual learner, and visuals helped her students.

*Research question 2 – How do teachers use technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking?* The main technology tools that she used to implement her lessons were PowerPoint presentations using the computer and a projector. She also used the overhead projector to display graphic organizers that the students completed. Although she used the overhead projector during the lesson which was observed, she mentioned that with the SMART Board it would have been more effective. The SMART Board technology provided better opportunities to engage students, she believed, but the SMART Board technology was not available in her classroom. She also accessed audio recordings from the Internet to provide students the opportunities to hear the voices of history in the first person. Computers allowed her greater access to material than was traditionally available in the classroom. She believed this access enhanced and enriched the environment for her students.

Mrs. Colbert stated that she would have required expanded use of technology if the resources had been available in her classroom. There was a computer lab with 30 student stations; however, it was in great demand because of the number of teachers wanting to use it. Mrs. Colbert wanted student laptops with wireless access throughout the room so students could explore the Internet for more information as interest and class activities dictated. This would have allowed students, at their own level, to explore certain topics with more depth, which is an indicator of classroom thoughtfulness according to Newmann. Once again, the lack of resources inhibited this opportunity.

*Research question 3 – How do teachers use technology to assess or evaluate student achievement and understanding?* She tried to use technology to assess student understanding by removing some content from her PowerPoint lectures and replacing it with questions to see if students could fill in the information. She believed the visual images were beneficial to the students, and she used this strategy with reviews and quizzes.

Mrs. Colbert used technology in her classroom to promote thoughtfulness through web quests where students accessed multiple sources of information and pulled information together in a summative assignment. Her psychology and sociology students benefitted from online IQ and personality testing which helped reinforce the concepts and provided self analysis. Differentiation was not a buzz word of education when Newmann conducted his research, but the concept of exploring and teaching toward student interest was part of classroom thoughtfulness. Technology certainly would allow for differentiation, which means tailoring instruction to meet the needs of individual students, according to Mrs. Colbert.

*Attitudes, aspirations regarding technology and classroom thoughtfulness.* The ideal classroom, according to Mrs. Colbert, could be set up with technology stations that allowed students to explore multiple sources and to create products using a variety of computer software. Different types of stations (reading, math, phonics) are used in many elementary school classrooms and Mrs. Colbert expanded on that idea with the addition of technology. Utilization of technology stations would allow students to move around the room and to choose different types of assignments, but Mt. Carmel lacked the technology to create such an environment. She believed that one of the difficulties with implementing more technology enhanced lessons related to the issue of access. According to Mrs. Colbert, there was a gap between the kids who had access to technology and those who did not. One of her assignments involved the creation of a



portfolio of work. There were many opportunities for students to access technology (PowerPoint presentations, word processing, Internet information, images, etc.), and some students did not have the access outside of the school environment which created a disadvantage for them. The socio-economic status of the community was relatively low and the availability of technology in the homes of students was limited. Mrs. Colbert believed there is a strong correlation between “how able a student is to use technology and how well they think,” because technology can promote thoughtfulness on the part of a student through increased access to information. According to Mrs. Colbert, other students recognized the need to access and take advantage of technology because it was available everywhere and could enhance or assist their life in some way. Students who have greater access to technology were very comfortable with it because technology has been a part of their everyday lives.

#### Case Study B – Samantha Benson

##### *Information about the Teacher*

Samantha Benson had taught at Mount Carmel for 29 years and from the first day she walked into the classroom she enjoyed the opportunity, saying “I loved it and I love it today. I am in my element and where I want to be.” She had been a teacher for over 30 years and taught numerous courses in the field of Home Economics which was re-named Family and Consumer Sciences (FACS). She earned an Associate’s Degree from Anderson College and Bachelors and Masters degrees from The University of Georgia. During the research project, she taught Foundations 1 and 2 at Mount Carmel which involved instruction in life skills and family living skills. She described Foundations I (FACS 1) as being about the “very basic life skills and how to be a good consumer.” It also involved instruction on safety and sanitation. Foundations II (FACS 2) took the concepts a step further. Mrs. Benson described it a FACS I on ‘steroids’

because it took all the concepts from FACS I, and advanced them to a higher level. An important aspect of her class was the inclusion of students from all ability levels. Her classes were not leveled as were other teachers'. Her highest priority goal as a teacher was to communicate to every student that came into her classroom that she cared about them. After that her goal was to teach them some life skills so that "when they walk out of my room they know how to cope with living."

### *Classroom Setting*

*Physical setting.* Mrs. Benson's classroom was located along the back hallway of the school toward the corner of the building. It was structured differently from a regular classroom because of the course that she taught. The outside edge of the classroom contained four mini-kitchens along with sewing tables and stations. The center of the room had six tables with chairs around each table for student work. The room was spacious and well lit for student work and it had an open, airy feel. This classroom was situated near other classrooms where additional Career, Technical and Agricultural Education (CTAE) laboratory classes were taught.

*Social/instructional setting.* All of the students in the Foundations II class that was observed had taken a previous class from Mrs. Benson that included many of the basic requirements needed for this class, and the students were very familiar with class procedures. The student groups worked on a cooking lab during this observation day and after instruction by the teacher, group work began quickly. Because of the space, four groups worked at the cooking stations while four groups worked independently at the tables; each group was made up of three students. The four groups working at the tables cooked the day before and were wrapping up the paper work portion of their project. During class, Mrs. Benson circulated through each group monitoring the project, keeping students on task, and answering questions.

Students developed a breakfast menu based on a list of ingredients supplied by the teacher. The menus and a menu lab planning sheet which the students used to help assign tasks and roles for the project had been created during a previous class. Students in the groups that cooked the day before completed other parts of the project or took care of housekeeping duties like cleaning tables or organizing stations. The groups from the day before also helped evaluate the finished projects using the rubric created by the teacher. The students constantly assisted each other during the class time. They asked questions and showed each other how to do the work. There was a lot of shared responsibility for the project and all of the students were engaged.

Mrs. Benson mentioned as she passed by that she wanted the students to have the opportunity to create and plan a menu and then practice the skills necessary to create the meal. Most of her students did not have cooking experience or cooked only simple foods at home, or their families went out to eat regularly. In order to keep the class on schedule, Mrs. Benson frequently reminded the students of the time remaining in class. During the observation, the researcher talked with several students about the class and all commented positively indicating they learned a lot. The students were responsible for complete kitchen clean-up and making sure the area was ready for the next class. Mrs. Benson said that completing an entire cooking lab for all eight groups in the time allowed was a real challenge and most cooking projects required two days to complete.

After the cooking projects were completed, the students presented their finished menu items for the class to evaluate using the rubrics provided. The teacher reminded them that the evaluations should be completed as a group and that students should discuss their scores in order to reach a consensus. After all written evaluations were completed, the students were allowed to

sit down and eat the foods they had prepared. All materials were cleaned and put away, and Mrs. Benson started to prepare for the next class which was a sewing lab. The bell rang and students were dismissed.

*Perspectives on Teaching for Higher-Order Thought and Classroom Thoughtfulness*

*Priority of teaching for higher-order thought.* As Mrs. Benson gave her perspective on teaching for higher order thinking, she stated that she thought students do not really care about higher-order thinking skills. “That’s not high on their priority [list]. The average kid is trying to figure out what can I do to get by in here.” Regardless of student interest in content versus thinking skills, Mrs. Benson tried to incorporate both because of the nature of her course content. “I have got to teach those higher-order thinking skills because then they do not get the life skills because it is all wrapped up in there, but they have got to get the subject matter, so mine go hand in hand.” Mrs. Benson was so focused on the integration of content matter with higher-order thinking skills that she did not want to distinguish between the two in terms of which one was more difficult to teach or which one gave more satisfaction. She consistently said you cannot teach one without the other, that they “just go together,” and “if my students have achieved, they have achieved both.” Mrs. Benson’s instructional goals for her classroom were to prepare students for life, to prepare them to make good decisions when they spend their money at the grocery store, buy insurance, or become parents. Her goal was to help them have a better life.

*Students and higher-order thinking.* Mrs. Benson identified an area of student resistance to thinking tasks. She stated that students in her class resisted making their own decisions. They wanted her to tell them how to complete projects or assignments. They did not want to make those decisions, so they wanted to put them off on somebody else. “They have a very hard time taking that step without reinforcement or a lot of feedback.” However, she mentioned that some

students were more resistant than others to that type of thinking task. The difference in resistance levels depended on the student's home background and what they had been allowed to do or trained to do in terms of personal life skills. The second key factor influencing resistance to thinking tasks was the student's sense of adventure. Mrs. Benson identified as the risk takers those students who were willing to go off and try new things. According to her, this also went back to their home background, the amount of interaction the students had with parents, and whether or not the student had been allowed or encouraged to try things at home. The opposite end was the student who came from a home where the parent said "let me do this for you, it is easier for me to do it than to let you make a mess."

The best thinkers in Mrs. Benson's class were not always the students with the highest average, but were usually the students willing to present new ideas and ask the "What if. . ." questions. These students usually had a variety of experiences, were willing to break away from tradition, and thought outside the box more often. She mentioned again that some of her students lived very sheltered lives and often were reluctant to move beyond what was safe and think in unconventional ways. They resisted open-ended exercises and were more interested in providing what the teacher wanted to hear instead of putting forth their own ideas.

*Constraints on teaching for higher-order thinking.* Mrs. Benson also dealt with the conflict between depth versus breadth of coverage. She indicated that she could not cover all of the material even if she had an entire year of 90-minute classes; therefore, she had to prioritize what was important, and there were several factors involved in making that decision. She had to consider her priorities as well as those of Mount Carmel and the needs of her students. She developed an advisory council to help make those decisions each year, but the biggest challenge she faced was the move from 50-minute classes to 90-minute blocks. She indicated that she had

to make big deep cuts in her curriculum and that left important things “cut on the floor like fabric removed from a pattern.” It was a real struggle for her because sometimes students needed reinforcement of some concepts and that meant going back and re-teaching which resulted in cuts somewhere else. “It’s like hitting the top of the iceberg and running; we don’t do anything really in depth.” She enjoyed the second year students because then she could go deeper with them into the material, but she struggled and evaluated every year what she was teaching and what the students needed. Block scheduling helped some with lab work to resolve this conflict between depth and breadth of coverage, but because all the activities had to be completed in one day, classroom management issues increased. With four kitchens, 28 students, and eight groups shifting every 45 minutes; it just took a little creativity. Having another teacher that taught the same subject has been a good source of collaboration as they evaluated what they taught and how they taught the concepts.

According to Mrs. Benson, student thinking could be inhibited by the student’s self-concept. Students afraid to make a mistake in front of their peers were more likely to not try because of the embarrassment issue. She worked with them to get past that, sometimes by letting them work individually rather than in groups. She returned to the idea that students who had been allowed or encouraged to take risks through experiences either at home or in the community were more willing to speak and share their ideas in the classroom. She mentioned that the home environment was a place where the concept of speaking and sharing ideas could be nurtured or hindered which impacted their desire to think and share ideas in the classroom. “Some students would just as soon not try rather than risk it.”

*How to teach for student higher-order thinking.* Her conception of teaching focused on the individual nature of students. Teaching is all about the students according to Mrs. Benson,

and teachers need to recognize that the students come from different backgrounds and experiences, so teachers must start there and take them as far as they can. “Sometimes that means you let them have a little more time, and sometimes they might have a hard time with it, but the main thing is they just need to know that you care about them.” Her concept of thinking involved engaging students personally at the outset of class to pull them in and encourage them so they produced, were more engaged, and were willing to be challenged during class.

Case studies were one of the main instructional tools that Mrs. Benson used to promote student thinking. She liked to use real life stories and let the students figure out how to solve the problems. When grading these assignments, she preferred to use rubrics because there was no single correct right or wrong answer. She looked to see if resources were used, the problem was solved, and whether they went beyond what was available in the textbook. She indicated that some students became very aggravated with this type of open-ended case study or role play. Through peer teaching and co-teaching, students created artifacts that assisted in the presentation of information. Often they made posters or created PowerPoint presentations, but sometimes they acted out what they were trying to communicate to the other students. She did not agree that student thinking and student engagement were the same thing. Students could respond to her questions by finding the answer in the book; that was engagement. When students were required to resolve problems in different scenarios, they needed to be able to think to accomplish that task and that was student thinking, according to Mrs. Benson.

*Teacher self-assessment regarding classroom thoughtfulness.* We discussed her classroom practice as compared to Newmann’s research on classroom thoughtfulness. She completed a self-assessment based on the questions below. A chart at the end of all the case studies summarizes the responses of all the participants.

1. How often do you require your students to provide reasons and explanations for their responses to questions?
2. How frequently do you give students extended (beyond 10-15 seconds) time to think about and respond to questions?
3. In my classroom there is sustained examination of a few topics rather than superficial coverage of many.
4. During the course of a week, how often will you structure challenging tasks or ask challenging questions?
5. Do your lessons display coherence and continuity?
6. How would you rate yourself as a model of thoughtfulness?

Mrs. Benson indicated that she usually asked students for explanations. “If I am going to ask them a question, I am going to want to know why.” She also usually gave students extended time to think about and then answer questions. She stated that scenario type questions usually require more time for responses than simple review type questions. “Frequently” was her response to question number three; however, she did admit that time was a factor for exploring topics in depth. She wanted to explore topics in more depth but tried to do it as often as time allowed. During the course of a week, Mrs. Benson structured challenging tasks about half the time. She felt her lessons were planned from beginning to end and displayed coherence and continuity always or nearly always. In response to the last question, she answered daily, “the description of a model of thoughtfulness sounds like what we do pretty much every day.”

#### *Technology Use and Classroom Thoughtfulness*

*Research question 1 – How do teachers use technology to research and develop resources to use in the classroom for instructor or student use that promote thoughtfulness?*



During the follow-up interview with Mrs. Benson, she discussed her use of technology to develop and implement lessons as well as technology she used for assessment purposes. Mrs. Benson then returned to the use of technology to promote classroom thoughtfulness. She used the Internet extensively when preparing for lessons and to update their content in the area of Family and Consumer Science instruction. The Internet was also useful in providing rubrics to assist her with the assessment of the projects she used to promote thoughtfulness. She used digital photographs to assist visual learners and to diversify her lessons. Mrs. Benson also explored a collaboration project with one of the teachers in the technology department and used technology as the tool to facilitate cooperation between the two classes.

*Research question 2 – How do teachers using technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking?* Mrs. Benson utilized a variety of technology to implement her lessons. She used digital cameras to record and display student work and used the Internet to pull rubrics, lesson plans and PowerPoint quiz games into the classroom. Second year students were able to use whatever technology they were comfortable with as they developed cooperative learning activities. There were several pieces of technology unique to her classroom, including Digital Sewing Machines and “Baby Think It Over.” The sewing machines had graphic computer interfaces which made it easier for special needs children to use them and to complete assignments. The “Baby Think It Over” was a doll with a mini-computer inside that was programmable to monitor whether its needs were met at the appropriate time when the “baby” was taken home overnight by a student. For example, the computer monitored whether food was provided and diapers were changed. It also recorded responses to crying and whether or not the ‘baby’ was left unattended or was abused by shaking. Although these types of technology were not included in the definition

established at the beginning of the research, they certainly promoted thoughtfulness according to the standard established by Newmann.

*Research question 3 – How do teachers use technology to assess or evaluate student achievement and understanding of material?* Rubrics and scantron scored tests were used to assess student work in Mrs. Benson's class, but there was not a great deal of additional technology used in this area other than computers to create evaluation rubrics or printouts for student presentations. She liked to use PowerPoint presentations to provide the main bullets of a lesson that either she taught or other students taught through cooperative learning. The students filled in the details. The rubrics that she provided require students to think about how best to complete an assignment in order to earn a better grade on the project.

*Attitudes, aspirations regarding technology and classroom thoughtfulness.* During the second interview we examined the main characteristics of classroom thoughtfulness and explored ways that technology could promote thoughtfulness in her classroom. Mrs. Benson indicated that she had a great deal of teaching experience which meant that she had been teaching before different types of "technology" had been introduced into the classroom. She believed that as technology changed, students changed as well. Students wanted to be entertained and so she felt she had to keep up with the "bells and whistles" to keep them engaged. Previously, colored overheads and filmstrips were exciting technology in the classroom and then even VHS videos were "old hat." She indicated that engaging in classroom thoughtfulness was easier before the introduction of the modern technology. She did not have to worry about keeping students entertained, and they already expected to think in the classroom; therefore, they did not need the "razzle-dazzle" required by her current students. "Pre-tech students" as she

described them, “were more focused and could go into more depth with their thinking. Today’s students expect to be entertained.”

During the first interview, Mrs. Benson mentioned that students who did some of the best thinking in her class had a variety of experiences outside school and at home that encouraged them to take risks. These students had been challenged to attempt things on their own and had more responsibility and confidence in their thinking. She did not see a direct connection with technology in this area. Technology may or may not have played a part in their development of self-esteem and thinking skills. She believed that she could promote thoughtfulness with or without technology because of her experiences. “I can teach the concepts without technology or use technology to enhance the discussion, but the students will still get the concepts.” She admitted this might be because of the subject matter that she teaches, but because she was from the “old school” she did not have to have the technology to make it work. Some of the newer teachers might not have been able to do that because they were accustomed to using the technology.

### Case Study C – Edward Clancy

#### *Information about the Teacher*

Dr. Clancy has taught for 22 years and had spent the last 14 years at Mount Carmel. He earned degrees from North Carolina State University (Bachelors), University of North Carolina at Greensboro (Masters) and The University of Georgia (Doctorate), and he also obtained gifted certification, middle school certification, and teacher support staff certification. He loved teaching high school because it gave him the opportunity to influence students beyond a single course. He had the privilege of touching the lives of students all across the high school because he could interact with them even when they were not in his class, which was a contrast to when

he taught mostly history majors at the college level. Most of his students were seniors taking either honors World History or World History ACP (Advanced College Preparation).

### *Classroom Setting*

*Physical setting.* After the first interview, Dr. Clancy selected a lesson for me to observe that he believed would be considered a thoughtful lesson. Dr. Clancy's classroom was set up in the traditional manner with several rows of desks oriented to the front of the room where the board was located. He had a large world map on the rear wall of the classroom and a large collection of books on one side of the classroom. His teacher desk was located on the side of the classroom which allowed for easy access across the front of the room. The overhead projector screen and white board were in the front of the room and were easily visible from all of the student desks. There were 16 students in the observed class.

*Social/instructional setting.* As students entered the room, they were reminded about projects that needed to be turned in, and class began with one student finishing a presentation for the class about a political cartoon. The goal for the remainder of the class was to complete the notes and discussions started the day before and then examine assigned readings written by Lenin. Highlighters were distributed for the purpose of reviewing the notes during the short lecture given by Dr. Clancy. During the lecture, Dr. Clancy used several examples to amplify the material and provided anecdotes from history to add depth and application. The students and the teacher engaged in good dialogue discussing art as government propaganda, and then they transitioned into the discussion of the readings. The discussion over the readings was a running dialogue of questions and answers between the teacher and the students. Certain questions focused on specific parts of the readings while other questions prompted the students to summarize or analyze the documents. Dr. Clancy explained Lenin's concept of imperialism and

why it led to Lenin's desire to destroy capitalism. As the class moved to the discussion of the third document, there were fewer student questions and more teacher lecture about the article. The entire class was spent with students in their seats working on notes or in class discussion about the readings. Based on student response and participation during the observation, only about half of the class appeared to be actively engaged in the discussion. Dr. Clancy possessed an extraordinary amount of content knowledge about Russia and its culture which added depth to the discussion.

### *Perspectives on Classroom Thoughtfulness*

*Priority of teaching for higher-order thought.* Dr. Clancy loved teaching and believed that he was a good talker and story teller like most social studies teachers. He placed a high priority on teaching students skills. Skills would help them survive in the academic world and this meant getting them beyond just the knowledge of his course to the note taking, reading, comprehension and writing ability that would be necessary at the next level of their life. When asked about exposing students to subject matter versus developing student thinking skills, Dr. Clancy believed that exposition of subject matter would be more interesting. His belief was connected not just to the subject matter that was taught, but how the teacher presented the material. If the teacher was excited, then students would pick up on that and be more engaged. "If you present it in a fashion that requires them to think about it and interact with you, they really enjoy the learning of the material itself." However, according to Dr. Clancy, developing student thought and reasoning skills would be more challenging. "Teaching the material is not that difficult, but teaching them to learn to reason about the material, to look at a question and eliminate answers through reasoning" is more challenging. Dr. Clancy found great satisfaction when these classroom discussions spilled over into dinner table discussions at home. When

parents told him they were discussing his class at supper that affirmed his career choice. “When I can touch a public school kid and they are suddenly talking with their parents about stuff we talked about in class, I know that I am in the right place.” When Dr. Clancy talked about his instructional goals, he mentioned the coverage conflict that the other teachers also noted. Primarily though, he desire to teach students past the basic historical information and get them to a level where they could understand why an event occurred and what problems or issues caused the event. The knowledge he found interesting and wanted his students to know was “what got us into that event and what were the results coming out of it.”

*Students and higher-order thought.* In his classroom, students generally resisted the thinking tasks that involved the evaluation of primary sources and the writing of essays. Honors students had difficulty determining what the author was trying to communicate and the context of the article, while ACP students struggled with thinking through an argument and organizing the information and their thoughts in an essay. The technical level students struggled with anything above rote memorization. Pushing them to analyze or move beyond the basic levels of Bloom’s taxonomy was a real challenge for Dr. Clancy. Students whose parents had more education, generally understood the need to push through these thinking tasks and develop reasoning skills. However, some students whose parents had not pursued additional education had a more difficult time trying to work through thinking tasks. Dr. Clancy felt that many students’ parents did not have much education and did not stress the importance and value of getting an education, and therefore it was difficult for the students to overcome that socialization in their family. Dr. Clancy also mentioned that this perspective on parental influence on academic achievement was not a broad generalization, just his observation, and then he shared a personal story from his own background. Both of his parents did not pursue degrees past high

school, but they insisted that all of their children go to college and emphasized the importance and value of an education. The best thinkers and writers in his class were the students who avoided quick short answers and examined the primary sources, thought about what drove a person to write an essay, and gave detailed written or verbal analysis. These students exhibited thoughtfulness in their writing and looked at details and motivations of the original authors.

*Constraints on teaching for higher-order thought.* Dr. Clancy discussed the conflict between depth versus coverage and mentioned that unless the State Department of Education changed the testing methodology, teachers would have to emphasize breadth versus depth because of what had to be covered under the new standards. The pressure for students to do well on the test required that teachers focus on coverage of material instead of taking an event or time period and digging into it deeply with thoughtfulness. He also discussed the contrast between the GPS (Georgia Performance Standards) training taking place for social studies and the current testing methodology. He praised the GPS training because it emphasized teaching themes and concepts and providing thoughtful instruction, but he felt that the testing did not coincide with this thoughtfulness and he asserted that this produced an instructional dilemma for teachers.

The pressure to emphasize coverage came primarily from two sources. According to Dr. Clancy, the high stakes test put pressure on him to have the students prepared for an exam, either End of Course Tests (EOCT) or the Georgia High School Graduation Test (GHS GT.) On the other hand, the internal pressure as a professional trying to teach the material in a meaningful fashion was a real challenge. Dr. Clancy asked, “How can they understand how one thing leads to another if they do not understand the context? You have to have the details to understand the events.” Dr. Clancy felt that the pressure of testing was also one of the factors that inhibited student thinking. “If you have a test that students have to do well on because the state has set

these guidelines, then that is going to force you to go faster than you normally go. If you want to promote student thinking and reasoning and the ability to think through problems with appropriate activities and exercises beyond just a set of notes, then you have to have time to do that.” Dr. Clancy believed the state presented a mixed message between how it wanted teachers to teach the GPS and the assessments it used to evaluate student learning. The organization of the curriculum was a second factor that he felt inhibited student thinking. There was not enough time to cover the numerous discrete bits of information and still promote thoughtfulness and give students time to evaluate the information and process how it is interconnected. He used the example of the American Revolution to illustrate the need for students to carefully consider all of the factors involved. He believed that he had to teach beyond the GPS, emphasizing more than just taxes and representation, to get the students to a point where they could understand what the colonists were feeling and find out if the students could have experienced the same thing. He thinks the GPS standards focus on too many individual historical details and ignore some of the larger themes and causation within history.

Dr. Clancy attempted to resolve this conflict by giving his students many details in the form of notes and also by telling stories that illuminated the details. This was easier with older students. The challenge was to review the notes and details from day-to-day, constantly to go back to them, and to connect with more recent and modern history, forcing the students to jump back and forth and compare different events to discover connections. Dr. Clancy usually ended up frustrated because he did not have enough time to find a resolution, and the students were constantly asking good questions that were sideline questions but also important concepts. It was difficult to tell them “we do not have time to answer that.” The result was rushing through the content somewhere else and creating additional stress.



*How to teach for student higher-order thinking.* One thing that drove Dr. Clancy's instruction was the connection to his concept of thinking—everything is related and interconnected. He pushed students to understand that ideas, knowledge, and philosophies are all interrelated, and when students understood how they connect to each other, they would have a better understanding of what drives people to do what they do. "I always tell them that to understand modern history you have to look back 500 to 600 hundred years." In order to promote this type of thinking, Dr. Clancy used primary source readings and class discussions, and he challenged and questioned students about what they read and heard. He noted:

If you just accept it (whatever the textbook or teachers says) without thinking about it, without questioning it, without trying to arrive at an understanding of it, then all you are doing is passing on what has been passed on for generations.

He pushed his students past just accepting what the textbook said to examining several sources of information to see if the information correlated and supported the facts.

Dr. Clancy did not think that engagement and thinking were the same thing. Some students did not participate well in class and found it difficult to participate orally in discussions. However, when they wrote essays their evaluation of the material was very good; therefore, he knew they had been listening and learning during class. Sometimes students would be engaged and ask questions, but their focus was tangential to the discussion and led the class away from the material. They were engaged, but not in the way that Dr. Clancy wanted, because the focus shifted away from the main topic at hand.

*Teacher self-assessment regarding classroom thoughtfulness.* Using a chart listing Newmann's criteria on the characteristics of classroom thoughtfulness, Dr. Clancy evaluated his own practice. His answers are summarized here as well as on the chart at the end of the case

studies. I have listed the questions as they appeared on the original document and presented his responses below.

1. How often do you require your students to provide reasons and explanations for their responses to questions?
2. How frequently do you give students extended (beyond 10-15 seconds) time to think about and respond to questions?
3. In my classroom there is sustained examination of a few topics rather than superficial coverage of many.
4. During the course of a week, how often will you structure challenging tasks or ask challenging questions?
5. Do your lessons display coherence and continuity?
6. How would you rate yourself as a model of thoughtfulness?

Dr. Clancy believed his classroom was very thoughtful based on the responses to the questions. He indicated that he usually required students to provide reasons and explanations for the answers they gave in class and that he always or nearly always gave students extended time to think about responses to questions. He thought that a sustained examination of a few topics was a daily description of his classroom and that during the course of a week he usually structured challenging tasks. When asked about the coherence and continuity of his lessons, he replied with “always or nearly always.” He also indicated that most of the time he was a model of thoughtfulness.

### *Technology Use and Classroom Thoughtfulness*

*Research question 1 – How do teachers use technology to research and develop resources to use in the classroom for instructor or student use that promote thoughtfulness? In a*

later interview, Dr. Clancy discussed his use of technology in the classroom in the areas of teacher preparation, implementation of lessons, and assessment. He also discussed technology as it related to the promotion of thoughtfulness. Dr. Clancy used the computer a great deal in his preparation for class to develop notes and presentations for his students. However, because of access limitations, students used the computer lab only once per month which limited the benefit of computer technology because it could not be integrated into the classroom environment. Dr. Clancy's perspective was that technology was viewed as a panacea for education and that was not appropriate because education improves when teachers get excited and invest in the field. He expressed his belief that technology would not help you become a better teacher unless you were passionate about what you are doing.

*Research question 2 – How do teachers use technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking?* Greater access to technology in his room would have allowed him to implement technology-aided lessons and presentations, but that would have been for enhancement of the lesson, not as a requirement. When teaching about the Holocaust or the Renaissance, for example, he has used technology to help teach through pictures and art and make the lesson more successful, but that could be done without PowerPoint. However, he believed that technology used to engage students without the prior acquisition of content knowledge would make the technology ineffective. Technology was a great thing to use as a teacher but it did not make a class; the teacher must teach in such a way that students leave the room talking about the lesson.

*Research question 3 – How do teachers use technology to assess or evaluate student achievement and understanding?* Dr. Clancy only used word processing technology for assessment and that was only to type tests, quizzes, and rubrics. Students sometimes used

technology for projects that he assigned, but the purpose of the project was to demonstrate knowledge of the content and in these cases students used the technology with which they were most comfortable.

*Attitudes, aspirations regarding technology and classroom thoughtfulness.* Dr. Clancy believed that technology helped promote thoughtfulness when it was used to help students extend learning opportunities beyond the classroom environment. One example is using technology to access additional readings and materials for thoughtful expression or to provide images that the students could write about and discuss. Consistent with his earlier comments about the impact of testing, Dr. Clancy did not see technology as being a part of the coverage versus depth conflict. He believed the underlying concepts that required the high stakes test created a failing environment, but he did acknowledge the benefit of some of the online test preparation programs that were available. However, these programs did not promote thinking, just drill and practice. Dr. Clancy believed that access to technology could help students develop their thinking because it provided them with additional sources with which to defend their answers, but not all students had access in their homes and many were not comfortable examining the Internet for quality information. A second challenge was to make sure the information came from reliable sources, and many students had not been trained in evaluating material from the Internet.

#### Case Study D – Alex Frank

##### *Information about the Teacher*

Alex Frank had been teaching at Mount Carmel for 10 years. He held a broad field certification for science in grades 7-12 and gifted certification for science in grades K-12, but not Advanced Placement (AP) certification. He earned degrees from Clayton State College and The

University of Georgia in Biology and earned a master's degree in secondary education from Piedmont College. He taught 9<sup>th</sup> grade physical science, both Advanced College Preparation (ACP) level and Technical Preparation level courses. Two preparations were required; however, they were very similar because he was covering the same material in each class, just going a little deeper to differentiate for the advanced class. He earned Teacher of the Year honors for the 2005-2006 school year and worked with Piedmont College to teach pre-service teachers and mentor first-year intern science teachers. Mr. Frank had the least number of years experience of all the teachers in the study and said that he enjoyed teaching most of the time. One of the things that Mr. Frank enjoyed the least was trying to motivate students who are not interested in being in school. He stated, "You become more of a rule enforcer than a content teacher."

### *Classroom Setting*

*Physical setting.* As part of the data collection process, Mr. Frank selected a date for classroom observation during a physical science class taught to honors freshmen. The class was held in a traditional classroom, but Mr. Frank conducted limited labs in the room so there was a lot of additional equipment in the room for this purpose. The student desks were arranged in five rows with a lab teacher station located in the front of the room. There were several cabinets located along one wall to store equipment, and there was a teacher desk with a computer in the front corner of the room. A large white board covered the front wall and there was a screen for overhead presentation or projection of computer images.

*Social/instructional setting.* His average class size was 23 students and the classroom demographics reflected the demographics of the entire high school. There were 25 students, 13 boys and 12 girls, in the classroom that was observed. The focus of the lesson was on balancing chemical equations related to the chemical reactions that the students had witnessed the day

before. The teacher demonstrated the process of balancing equations on the board, going through a period of question and answer with the students to recall previous knowledge about equations and the mathematical process of balancing. A second example was worked through to make sure that students understood the process, again with a lot of questions and answers for recall and to make the connection with math class and coefficients. The demonstration was done on the board so that all students could see the process and then the students completed a question on their own. Mr. Frank explained the process that made the balloon stand up on top of the glass beaker and made the connection between the hydrogen in the balloon which was part of the reaction to the Hindenburg dirigible that burned in the United States. The students wanted to see the response, so Mr. Frank burned the balloon, but there was not a large reaction. He then moved the discussion to talking about how to increase the amount of gas in order to get a bigger response.

After their break, students worked on balancing more equations and Mr. Frank talked about generating answer possibilities using trial and error to solve the problems. The next sample equation demonstration was the chemical reaction that had been illustrated with the balloon, the acid and the zinc. Generally, the same students responded to the teacher's questions. The students were given time for independent practice on a sample created by Mr. Frank. After this practice, he discussed with students how this topic might show up on the End-of-Course-Test (EOCT) for Physical Science. Additional independent work was assigned and one student volunteered to solve the problem on the board. Mr. Frank directed students to the portable SMART Board to pull up a web site that students could access for additional practice. Some students suggested the answers that should go into the formulas presented on the web page using educated guesses, and they defended why they chose the numbers. The teacher suggested a strategy of using the lowest number possible and explained why that number would be the best

place to start. The final part of the lesson was a PowerPoint slide show that displayed different types of chemical reactions with both visual images and the chemical equations. This PowerPoint presentation also reviewed how material might be presented as a possible EOCT question item. As students left the room when the bell rang, they looked at the balloons that had been exploded and the coins that had been placed in the chemical solutions.

### *Perspectives on Classroom Thoughtfulness*

*Priority of teaching for higher-order thought.* When Mr. Frank discussed his classroom practice he identified his highest priority goal as preparing students to pass the Georgia High School science graduation test. He believed that exposing students to subject matter was more interesting to students than developing thinking and reasoning skills, and he was most interested in this area as well. He recognized the need to increase his classroom focus on thinking skills. However, Mr. Frank really enjoyed the subject matter that he taught and tried to convey his enthusiasm to his students. Developing the thought process was also more difficult according to Mr. Frank, “because it is not as concrete and it’s harder for students to be aware of, and there is not a lot of metacognition going on with 9<sup>th</sup> graders.” He believed most students do not really think about their own thought process, and “we are doing well to get them focused on the subject matter” during class.

Mr. Frank found satisfaction in the classroom when students asked questions that demonstrated genuine interest in the subject matter. “I like to see students who are really interested in what we are learning about, particularly when it’s students that are not normally what I could consider good students.” Mr. Frank also mentioned the satisfaction from student questions “where we step away from just the factual knowledge and we can see that their imagination has been sparked.” Mr. Frank’s instructional goals were focused on test preparation

through reaching the Georgia Performance Standards (GPS) and building a firm understanding of the subject matter that is in the standards. He voiced a criticism of the standards because of the large amount of content contained in the standard topics requiring a sacrifice of detail. “We go with quantity over quality in some ways.” He elaborated on this by saying that the purpose for revamping the Quality Core Curriculum (QCC) was to deal with the issue of breadth versus depth; not much breadth was eliminated, but the Georgia Performance Standards did require more depth.

*Students and higher-order thought.* Students in his class resisted thinking tasks that they did not see as relevant to their daily lives. If students did not see a connection with their daily lives their interest dropped, so Mr. Frank incorporated connections to the real world as much as possible, but when he moved into more abstract topics he saw an increase in student resistance. Some students were less receptive to higher-order thinking and those were the students who did not see themselves pursuing a degree after high school. “They are more tied up in the here and now and it [content] needs to be relevant to their life right now or they don’t have much interest,” according to Mr. Frank.

His best thinkers had a natural curiosity about them and that separated them from the rest of his students. He agreed that having a knowledge base was important, but the students that stood out were the ones who “can take information and develop new ideas with it.” The best thinkers in his class wanted to learn and asked questions that showed initiative and a “taking of responsibility for their own knowledge.” They let him know what they did not understand and what points needed to be clarified.

*Constraints on teaching for higher-order thought.* Mr. Frank believed that restructuring the QCC was intended to reduce the conflict between the breadth of coverage versus depth issue;



however, the result was increased depth without a reduction in breadth. This created a conflict, because now he was expected to teach the breadth of the content and find time to go into depth with the students and practice higher-order thinking skills. Currently, he had to cover more material, often with fewer resources and a higher student-teacher ratio than in the past, so he recommended a reduction in the number of standards so there would be more time to go into greater depth. He also indicated that it would not be quite as difficult if students came to his class having mastered the science standards that students were supposed to reach in the 8<sup>th</sup> grade. He felt the pressure of dealing with students that may have retained very little science knowledge and then having to bring them up to a difficult standard. According to Mr. Frank, this pressure was more external. He would have been satisfied with seeing students improve from the level where they started the year to where they finished at the end of the year. He also noted:

There are some external forces that say despite whatever is going on with that student they have to reach this [GPS] standard by the end of the year, regardless of their prior knowledge, attendance and other issues that I have no control over.

This expectation from the state standards placed the burden entirely on the classroom teacher instead of it being a shared burden between students, parents and teachers. Mr. Frank ranked the state tests and guidelines and administration as the top two sources of this coverage pressure. For a complete and composite listing for all of the teachers, see Table 4.3 at the end of this chapter. He saw district policy as a reflection of the state requirements that were handed down. He did not feel pressure from self, department or department chair.

When Mr. Frank explained the factors that inhibit student thinking, he listed family as the most important. The example that parents set for the children about the importance of education is the biggest promoter or inhibitor of student thought. He stated, “It is rare for a student to be

successful in school without at least one parent in the home that has reinforced the importance of behavior, attendance and effort at school.” He believed that it is difficult for students to pull themselves up academically without some good support and encouragement at home. He also believed that peer pressure can inhibit student thinking. He taught 9<sup>th</sup> grade and felt that some students did not yet have the maturity to see the importance of education and value it. They interfered with each other’s education in terms of behavior in the classroom and apathy towards studying. A third factor he mentioned was the promotion of students to the high school level who were not academically prepared. Some of them were so far behind by the time they got to the high school that they had given up on putting forth a real effort.

*How to teach for student higher-order thinking.* In order to resolve some of the conflict between coverage and depth, Mr. Frank made sure that he gave some coverage to all of the standards and still went into as much detail as possible given the time limitations. Time and facilities did not allow him to do all of the investigative lab work that he would have like to do and he had already sacrificed some lab time in order to cover all of the standards. It was more efficient to cover some of the material with paper and pencil activities, but the quality of the thought process could be higher if he had more hands-on experiences available for his students. He stated, “There has been a decrease in terms of hands-on activities in order to cover more material, but the investigative lab work is the kind of activity that the GPS indicate that we should be doing more of.”

Mr. Frank’s conception of thinking that guided his teaching revolved around the constructivist approach. He believed that you have to build a framework of understanding for any real change to take place in the students’ thought process. In order for that to happen, the students must do some exploring in their thinking about what they believe, and he believed that

the goal of teachers was to provide them with experiences that would help them to do that. They needed “experiences that will change and alter misconceptions and build knowledge through a combination of experience, discussion and written work.”

In order to promote student thinking, Mr. Frank used class discussion. He enjoyed it when students asked questions and provided feedback about the topic they were discussing. He also liked to use investigative lab work. He preferred the labs where students worked with materials and then demonstrated their knowledge. He liked to use graphic organizers for the students to organize their thinking, ideas and notes. He also liked it when he could use something in the real world, like building a rocket to demonstrate the scientific principles of acceleration, force and momentum. He believed that knowledge gained through active participation stayed with the students longer. He, like the other teachers, felt that student engagement and student thinking are not the same thing. He thought that “students can be actively participating in something without thinking about it at a deep level.” The two often went hand in hand according to Mr. Frank, but he had also seen 9<sup>th</sup> graders busy working on something but their minds were elsewhere, and he constantly challenged them to think about the work that they were doing.

*Teacher self-assessment regarding classroom thoughtfulness.* We discussed Mr. Frank’s classroom practice based on Newmann’s (1990) minimal criteria of a thoughtful classroom. The questions are listed below as well as his responses. Composite listings of all case study teachers’ responses are located in a table at the end of the chapter. A complete version of the self-assessment handout is available in Appendix D.

1. How often do you require your students to provide reasons and explanations for their responses to questions?

2. How frequently do you give students extended (beyond 10-15 seconds) time to think about and respond to questions?
3. In my classroom there is sustained examination of a few topics rather than superficial coverage of many.
4. During the course of a week, how often will you structure challenging tasks or ask challenging questions?
5. Do your lessons display coherence and continuity?
6. How would you rate yourself as a model of thoughtfulness?

Depending on the nature of the question, Mr. Frank indicated that about half the time he asked students to provide reasons for their answers. If it were during a discussion or written assignment, students were asked for more detailed explanations. As far as extended time to respond, Mr. Frank was “torn” between occasionally and about half, but he decided on occasionally as being more accurate and indicated that was an area of instruction that he has tried to improve in recent years. He said that sometimes there was sustained examination of a few topics versus superficial coverage. He believed this to be connected to his frustration over depth versus coverage and indicated that he eliminated a few topics so that he could go into more depth on the ones that were more important. In response to the question about structuring challenging tasks during the week, he indicated about half the time. He said that some topics allowed him to do labs almost every day, but sometimes he had fewer hands-on activities available. He believed that his lessons displayed coherence and continuity always or nearly always. He rated himself as a model of thoughtfulness in the classroom most of the time. In general he was trying to increase the level of thoughtfulness in his classroom.

### *Technology Use and Classroom Thoughtfulness*

During a follow-up interview with Mr. Frank after the classroom observation, he indicated that technology became a hindrance during the class because it would not function well. The poor performance from the technology caused many students to lose focus. He indicated that technology dependence without a backup plan wasted classroom time.

*Research question 1 – How do teachers use technology to research and develop resources to use in the classroom for instructor or student use that promote thoughtfulness?* We discussed the use of technology in planning lessons. He indicated that the shift to GPS standards several years ago required rewriting many unit and lesson plans and that word processing made writing and reviewing much easier. Mr. Frank liked to think on paper and the computer made the process of incorporating new ideas and sharing information more effective. He also liked the ability to collaborate efficiently and quickly using email to share ideas. He used Microsoft Excel to manipulate student data about grades and academic strengths and weaknesses as well as computer test bank questions that promoted different types of test question options from simple recall to higher-order thinking skills. This allowed him to create tests that efficiently challenged students at different academic levels. Access to technology allowed teachers time to select the best materials instead of having to create everything on their own. He believed the delivery of the work to be more important than the product; therefore, everything did not need to be self-created. “We can borrow engaging activities from other teachers.” He also expressed that better teacher training in technology would result in better use of the tools. Integration of these tools into the lesson would result in better student achievement and better lessons, and that is where the effort and the training needed to be according to Mr. Frank.

*Research question 2 – How are teachers using technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking?* Mr. Frank believed that technology provided opportunities to engage students and promote thoughtfulness. The website he wanted to access during the class that was observed would have provided the students with sample equations that they could work on to solve. The technology would have removed the tedious process of copying equations by hand to allow more focus by the students on the assignment. “Technology can handle the routine procedures so that students could think deeper about an issue and practice the skill.” The “Elmo” technology would have shown students examples of several different ways to build their clay models (another part of the lesson) and would have challenged their thinking about having different ways to solve a problem. Mr. Frank also believed that because students were familiar with technology outside of the classroom, teachers should incorporate technology into the classroom, especially the mediums with which they are familiar. “There is a danger, however, when using technology that it not become a toy but should be used for engagement, not entertainment.”

*Research question 3 – How do teachers use technology to assess or evaluate student achievement and understanding of material?* We also discussed the use of technology for assessment and Mr. Frank mentioned the “clicker.” The “clicker” was a type of hand held remote control with which students entered a response and all of the responses were tabulated on the computer or projector screen. Each student was assigned a number so their names were not displayed, but the results were stored for later use. That technology would certainly be beneficial for immediate feedback and redirection and the results would be tabulated by the computer, but he also used more traditional pen and paper assessments.

*Attitudes, aspirations regarding technology and classroom thoughtfulness.* Mr. Frank indicated that technology has probably the best potential benefit when trying to provide differentiated instruction to students. Technology could be used to evaluate ability levels and the level of content knowledge that students have upon arrival to class and to quickly assess the level of understanding that they have. Teachers could then “adjust instruction to reinforce, re-teach or enrich.”

#### Case Study E – Bette Thomas

##### *Information about the Teacher*

Mrs. Thomas had 18 years total teaching experience and had spent the last 11 years at Mount Carmel. She earned degrees from Young Harris College and The University of Georgia and held a broad field certification for science in grades 7 to 12. She was selected as Department Chair and earned Teacher of the Year honors at Mount Carmel. She was selected High School Teacher of the Year for the National Chemical Association. She enjoyed teaching in the classroom, but was frustrated having to deal with all the non-classroom activities like meetings and administrative tasks that took away time from teaching in the classroom. She taught Chemistry at the ACP level to juniors and had an average of 22 students in her classroom.

##### *Classroom Setting*

*Physical setting.* Mrs. Thomas’s classroom was a laboratory classroom with 14 lab stations around the outside of the room on the left side and the back. The front of the room had a teacher lab station and a teacher desk with a computer. Her room also had a small storage room at the front of the room for materials that needed to be secured. The room contained all of the necessary safety equipment including glasses, medical equipment, and wash station. There were four rows of desks in the middle of the room where students sat for lectures and class work. Mrs.

Thomas selected a Chemistry lab as one of her more thoughtful lessons and the entire class period was observed. This lesson was a lab, similar to Mr. Frank's; however, the content was Chemistry instead of Physical Science.

*Social/instructional setting.* As the students entered the classroom, instructions were posted on the board for the students to turn in work from the day before and pick up instructions for the lab that day. Many students followed the instructions to read through the lab procedures before class began. Mrs. Thomas started class by discussing the lab and the procedures including safety issues. Students were instructed to transition to their lab groups and lab stations and begin the lab. The class moved smoothly to the stations and started work. Lab instructions included prompts to read all instructions, follow all directions, show all work, and answer all questions in complete sentences. Students completed the lab with some conversation about procedures and some questions directed at Mrs. Thomas about how to complete procedures, for example; "Am I doing this right?" On occasion, lab groups asked other lab groups to make sure they followed procedures correctly. As students made observations and measurements, they filled out their lab reports. Mrs. Thomas circulated throughout the lab stations to answer questions, which were mostly procedural – "How long do I wait for the reaction?" and "Do we measure in millimeters or inches?" and other related questions.

As students moved into the final stages of the lab activities, the questions became more complicated about how to complete equations and some questions stating "I do not understand how to do this?" There was some discussion among lab partners about how to complete the lab and whether or not their calculations looked correct. After the lab was completed, students moved back to their desks to finish the remainder of the report. There was some partner and small group discussion as they finished their reports. While the students moved back to their



seats, direct involvement with Mrs. Thomas increased in terms of questions about procedures, measurements, and what they were looking for during the experiment.

Mrs. Thomas encouraged students to be more thorough in their responses and asked them to recall previous knowledge from experiments conducted earlier in the week. As the labs were completed, Mrs. Thomas redirected students because conversations slipped into socializing and were not focused on completing the work. Mrs. Thomas asked questions of different groups to check their understanding of the experiment and to see if their lab reports were heading in the right direction. As students finished lab reports, they turned them in and picked up an outline that was to be completed using material from the textbook. Mrs. Thomas explained that all of the material should be completed for homework, if not in class, and that she would review the material in greater detail the next day. As the end of class approached, Mrs. Thomas reminded the students about what was due that day and what was to be completed before class the next day.

### *Perspective on Classroom Thoughtfulness*

*Priority of teaching for higher-order thought.* Mrs. Thomas's highest priority goal was content, but she also emphasized preparation for the future for her Advanced College Preparatory (ACP) level students. She elaborated to say that the understanding and the content were important for her students, but that she also wanted to hold them to high expectations so that they would be prepared to write lab reports and answer rigorous test questions in college. When asked about exposing students to content matter versus developing student thought, Mrs. Thomas indicated that it was more important for them to reason and think through process than memorize facts, because then they can "think and reason and processing is more important [than memorizing]." She said that developing student thought was more challenging because a teacher

can put information on paper and have students memorize it, but the “thought process to be able to transfer the knowledge from what they are doing to a real world application or real world situation is much more difficult.” Mrs. Thomas found great satisfaction when struggling students experienced that “ah-ha” moment and got something that the class has been working on and then took success from that situation and moved on to something else with continued success.

Mrs. Thomas paused when asked about her instructional goals and then stated that she wanted to take what the students came into her class knowing, including both experience and prior knowledge, and give them content specific experiences that pushed them to think beyond the box, to think beyond the obvious. The linear nature of Chemistry builds on previous knowledge, so her goal was to teach in baby steps, to master one bit of content and then move on to more information until they got to the major big idea contained in the Georgia Performance standard. To her, being able to use this information was more important than “memorizing a bunch of stuff to be able to spit back.” This was how she viewed the coverage versus depth conflict. Students could look up facts and content, but she believed that “knowing the theories and knowing what these things [cause] to happen, is more important.” She liked the new Georgia Performance Standards (GPS) because they emphasized depth instead of breadth of knowledge. “I am seeing with the GPS, there are certain avenues and ways as a teacher that I can teach with more depth in certain areas, rather than covering all of the facts.”

*Students and higher-order thought.* Students in her class resisted and struggled with lab work. It was not the process or following the steps of the procedures they resisted, but the analysis of the data. She stated:

They only want to do surface [work]; they only want to write one or two words to give it an answer, not to really put a whole lot of thought into what went on behind the scenes.

They do not want to take a whole lot of what they have learned and apply it to that particular lab situation.

This was true for all of her students, but her expectations for her ACP level students were higher and she required them to generate the process and thought skills based on what was discussed in class. The lab writing guided inquiry that went along with the writing of the report, but it was still a challenge for the students.

The best thinkers in her classes were the ones that could think outside the box more than other students. “They do not just write what is obvious and they express more depth in their conclusions and analysis.” She also believed that they had been allowed to be more creative. “Their creativity has not been stifled by the requirements of covering the curriculum.” When I asked her about her best thinkers and their ability to “think outside the box,” I wanted to know where she thought that came from and she said that it came from home training. She believed how students were taught from the very beginning influenced their ability to think creatively later. This was connected with increased expectations as the GPS were implemented in the lower grades. She also believed that some of this ability was connected to “how kids are wired.” This placed an additional emphasis on differentiation because teachers must work with how kids process information.

*Constraints on teaching for higher-order thought.* Mrs. Thomas felt pressure from the outside in regards to the coverage versus depth conflict. She believed the State Department of Education created a means to cover topics, but she wanted to make sure that students comprehended and understood the concepts instead of just memorizing for the moment. In courses that she taught that have an End-of-Course-Test (EOCT), she “definitely senses a greater push to get everything covered before the test.” She viewed the GPS as a shift toward focusing

on thinking about the content instead of memorizing the content. Students “ought to be able to interpret a graph regardless of the content, they ought to be able to interpret some of the information and be able to answer some questions.” But she did see the EOCT as a source of outside pressure “[W]e are definitely pushed because there is that looming sense that okay somebody is really testing me whether I have covered what I am supposed to as a teacher.”

When ranking sources of pressure to cover material, Mrs. Thomas listed state guidelines first, followed by administrative policy the pressure she put on herself, and the final source of pressure came from the department.

There are some factors that inhibit student thinking according to Mrs. Thomas, and she wanted to see a move from fact memorization to using knowledge. “That’s more thoughtful than memorization.” Being able to use the information on the periodic table was more important to her than being able to memorize the periodic table and recognize the symbols. Another factor she mentioned was the shortened length of time that existed in block scheduling. The block schedule was great for science labs, but the block limited the amount of time students were exposed to the material. “If we really want them to be better thinkers and if we really want them to use the knowledge, I think they are going to need more exposure to these concepts.” In order to deal with coverage pressure and the factors that inhibited thinking, Mrs. Thomas along with her department colleagues worked to unpack the GPS and develop a curriculum guide or road map. They tried to “prioritize the more important standards or more important things [they] thought necessary for EOCT success.”

Within the classroom, “I try to establish instruction.” She focused on student understanding, and if that meant pushing a unit back she did do that. “Some units are easier for

students to get, and if they have had some elementary, and middle school [science] instruction and physical science in the 9<sup>th</sup> grade, those are the ones I can give a little less time to.”

*How to teach for student higher-order thinking.* When asked about her conception of thinking that guided her teaching, Mrs. Thomas paused several times and then indicated that her conception of thinking “kind of comes inherent to me.” She recognized that all of her students were at different ability levels and that you “can’t just teach to the middle.” She mentioned the concept of differentiation as an instructional strategy to meet these needs. In an effort to build on this thinking or promote student thinking in the classroom, Mrs. Thomas used leading questions and open ended “what if. . .” type questions with her students. In order to evaluate thinking, she used written lab reports because they allowed for more thought and in-depth analysis from the students. She emphasized early on that students needed to write their thoughts down on paper. “If you think it, you need to put it on paper, because nobody can read your mind.”

Mrs. Thomas did not think that student engagement and student thinking were the same thing. “Students can be engaged or appear to be engaged by actively participating in discussion or lab work, but actual learning and thinking are more than just being present or being a warm body.” Sometimes it was really obvious when students were present and active, but some students were more sponge-like “gleaning” information more than actually participating in the labs. She changed the way she assigned lab partners based on this observation because she wanted students who work well together to have that opportunity. The groups that needed additional help could receive attention from her while her higher thinking groups could move faster in completing labs and answering questions.

*Teacher self-assessment regarding classroom thoughtfulness.* We discussed Mrs. Thomas’s classroom practice in terms of the minimal criteria established by Newman (1990),

and I have listed the questions here again as a reference. A composite table of all responses is available at the end of this chapter.

1. How often do you require your students to provide reasons and explanations for their responses to questions?
2. How frequently do you give students extended (beyond 10-15 seconds) time to think about and respond to questions?
3. In my classroom there is sustained examination of a few topics rather than superficial coverage of many.
4. During the course of a week, how often will you structure challenging tasks or ask challenging questions?
5. Do your lessons display coherence and continuity?
6. How would you rate yourself as a model of thoughtfulness?

She indicated that she usually required students to provide reasons for their answers and definitely with lab work. “There is never a time when they just do a lab and turn it in.” In terms of giving students extended time, Mrs. Thomas said that her wait time is pretty lengthy especially for her ACP classes. “Most of the time” was her response to the question of whether she conducted a sustained examination of few topics. There were some topics that she covered superficially, but frequently to most of the time she explored topics in depth. During the course of a week Mrs. Thomas believed that she structured challenging tasks about half the time. When she sat down to plan lessons, Mrs. Thomas wanted to have continuity and coherence so she rated herself as nearly always having lessons that display that characteristic. She wanted students to see the reasons that we go from point A to point B and why it has to be that way. She rated herself as a model of thoughtfulness most of the time. She told her students a story to start the

year about never learning her multiplication tables until 7<sup>th</sup> grade and yet she was still able to become a Chemistry teacher. She tried to model thoughtfulness in her classroom often.

### *Technology Use and Classroom Thoughtfulness*

Mrs. Thomas was interviewed again and during that time she discussed her classroom practice. This took place after a classroom observation of a full lesson and a written summary of the observation was completed. The discussion focused on her use of technology to assist her planning, implementation and evaluation of lessons in the classroom and any possible connections to classroom thoughtfulness.

*Research question 1 – How do teachers use technology to research and develop resources to use in the classroom for instructor or student use that promote thoughtfulness?* She used technology to find materials that were necessary to meet student needs. She used her online access to locate lessons; however, she indicated that most of the newer textbooks had technology materials included with them. Sometimes it was PowerPoint presentations or access to online materials generated by the publishing company. She organized her planning based on student need and accessed the Internet to find different methods to reinforce or re-teach materials. Because she was the only teacher in the building teaching Chemistry, she developed a network of other teachers with whom she communicated through email to exchange ideas and information. She indicated that technology was useful in planning, because the curriculum maps that were reevaluated annually could be amended quickly and the frameworks that other schools used could be evaluated as well. The computer technology was useful because information could be shared quickly and efficiently.

*Research question 2 – How do teachers use technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking?* When

asked if technology was helpful in developing lesson flow, Mrs. Thomas indicated that lesson planning and flow was something that she developed naturally and was sometimes influenced just by “instinct.” She did say that she did not use technology as much as she should to implement her lessons. “Students now are more technology literate, and they need technology in their lessons.” Students liked to receive notes on PowerPoint presentations as part of the discussion process. In her opinion, students were more engaged with PowerPoint than overheads and notes. She tried to use images in her PowerPoint presentations to enhance student engagement and included pictures in order to stimulate additional questions. Her use of PowerPoint was another area where technology aided in lesson development. She tried to get access to the computer lab at least two times per month to help students in preparation for testing (graduation tests for juniors, EOCTs for others) because the testing programs pinpointed areas of weakness for the students to work on. There were interactive websites for computer labs which the students liked because of the interactivity, and she liked the websites because there was less mess and they required less setup time. However, she admitted again that she did not use as much technology as she would like.

*Research question 3 – How do teachers use technology to assess or evaluate student achievement and understanding?* Her primary use of technology for assessment involved using the Internet to create assessment instruments like rubrics for performance assessments or using materials provided by the textbook companies to develop her own tests and quizzes. “Most of the newer textbooks,” she said, “come with electronic resources that I can pick and choose from.” She believed technology was a useful tool to help with differentiation in the classroom, but limited access to the computer lab hindered this opportunity. It was hard to incorporate use of



technology in the regular classroom without disrupting class instruction, but the computer offered some opportunities to get students more involved in the learning.

*Attitudes, aspirations regarding technology and classroom thoughtfulness.* There was a technology that Mrs. Thomas wanted to use called “Probware” that allowed for labs to interface with the computer to help students use data to generate graphs and charts, and she believed this would “enhance the analysis because of the diagrams.” The technology would also help students engage and write better labs because it would eliminate the graphing time and allow them to focus on the data and what it meant. Mrs. Thomas also looked forward to the time when students could take home CDs that would provide the one-on-one tutoring to supplement instruction that she provided in the classroom. She saw this happening with the newer textbooks. The shift to more technology driven instruction within her discipline was increasing.

### Summary Tables

The following tables provide composite and summary data for the teachers involved in the case study. These data were gained throughout the interview process. Table 4.1 lists teaching experience and education background. Table 4.2 identifies teaching responsibilities. Table 4.3 identifies the sources of coverage pressure faced by each teacher. Four out of the five teachers ranked state tests and guidelines as the number one source of pressure to cover the material, pushing them to cover material at a faster pace than they might have to do without the mandated End of Course Tests (EOCT). Mrs. Benson did not teach a course that had an EOCT so her number one source of pressure was herself. Table 4.4 was the composite of the self-assessment each teacher completed comparing the teacher’s classrooms to the six minimal criteria of a thoughtful classroom as identified by Newmann (1990). Remember that these five teachers were

Table 4.1

*Experience and Education*

Teacher	Experience	Subjects	Degrees
Colbert	22 years, 8 at Mount Carmel	AP History, Psychology, Sociology	Bachelors (University of Georgia), Masters (Piedmont College) Gifted and AP Certified
Clancy	21 Years, 13 at Mount Carmel	World History	Bachelors (North Carolina State) Masters (University of North Carolina Greensboro) Doctorate of Philosophy (University of Georgia) Gifted and Support Staff Certified
Frank	11 years at Mount Carmel	Physical Science	Associates Degree (Clayton State College and University) Bachelors (University of Georgia) Masters (Piedmont College)
Thomas	18 year, 11 at Mount Carmel	Chemistry	Associates Degree (Young Harris College) Bachelors and Masters (University of Georgia)
Benson	31 years, 29 at Mount Carmel	FACS I and FACS II	Associates Degree (Anderson College) Bachelors and Masters (University of Georgia)

Table 4.2

*Teaching Responsibilities*

Teacher	Courses	Class Size	Course Preparation
Colbert	AP History	21	1
	Sociology/ Psychology	25	2
Clancy	World History (ACP)	23	1
	World History Honors	20	1
Frank	Physical Science (ACP)	22	1
	Physical Science (Tech)	25	1
Thomas	Chemistry (ACP)	22	1
Benson	FACS 1	28	1
	FACS 2	28	1

Table 4.3

*Sources of Coverage Pressure*

Teacher/ Source of Pressure	Colbert	Frank	Thomas	Clancy	Benson
Self	2		3		1
Department Colleagues			4		2
Department Head					4
School Administration	4	2	2	2	5
District Policy	3	NA		2b	
State Test/ Guidelines	1	1	1	1	3 (Guidelines, No Test)
Other					

Table 4.4

*Evaluation of Classroom Thoughtfulness*

Questions	Seldom or Never	Occasionally	About half the time	Usually	Always or nearly always
1. How often do you require your students to provide reasons and explanations for their responses to questions?			<b>Frank</b>	<b>Colbert Benson Clancy Thomas (usually w/ labs)</b>	
2. How frequently do you give students extended (beyond 10-15 seconds) time to think about and respond to questions?			<b>Frank</b>	<b>Colbert Benson Thomas</b>	<b>Clancy</b>
3. In my classroom there is sustained examination of a few topics rather than superficial coverage of many.	Not an accurate description of my room	Sometimes accurate description of my room <b>Frank</b>	Frequently describes my room <b>Benson</b>	Most of the time describes my room <b>Colbert Thomas</b>	Daily description of my classroom <b>Clancy</b>
4. During the course of a week, how often will you structure challenging tasks or ask challenging questions.			<b>Colbert Benson Frank Thomas</b>	<b>Clancy</b>	
5. Do your lessons display coherence and continuity?				<b>Colbert</b>	<b>Benson Clancy Frank Thomas</b>
6. How would you rate yourself as a model of thoughtfulness?	Not an accurate description of my room	Sometimes describes my room	Frequently describes my room	Most of the time describes my room <b>Colbert Clancy Frank Thomas</b>	Daily description of my classroom <b>Colbert Benson</b>

selected by their peers as the most thoughtful educators at the school. A sample of the actual form used for the self-assessment is located in Appendix D.

### Themes and Findings

This research project produced significant data to answer the questions that were proposed at the beginning of the study. The purpose of the study was to examine the impact of technology on the planning, implementation and evaluation of thoughtful classroom instruction. Using the six minimal criteria for a thoughtful classroom established by Fred Newmann (1990b), I evaluated through interview and observation the level of technology use in five different classrooms at a rural north Georgia public high school.

After the five participants were interviewed about their understanding of Newmann's (1990b) perspective on classroom thoughtfulness, observations were done in each of their classrooms for a complete 90 minute lesson. Each lesson was self-selected by the teacher. A follow-up interview was conducted focusing on the use of computer technology. Presentation of results incorporated information from the case studies as well as data from classroom observations and will center on the research question: **To what extent and in what ways do teachers use technology in planning, implementing, and assessing the results of “thoughtful” lessons?** The following three research sub-questions guided the collection of data and the presentation of information. First, how do teachers use technology to research and develop resources for use in the classroom for instructor or student use that promote thoughtfulness? Second, how do teachers use technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking? Third, how do teachers use technology to assess or evaluate student achievement and understanding of material?

As the interview and observational data were reviewed, initial codes were developed based on the three research questions. Comments directed toward the use of technology for lesson preparation and development were given the PREPARATION code. The IMPLEMENTATION code was used when interview data related to the use of technology to adjust or improve instruction in the classroom. The ASSESS code was applied when technology was used to assess instruction or student activities. As data were further evaluated, additional themes and codes were developed.

One theme in particular that emerged quickly related to access to computer equipment and computer labs. All teachers mentioned the theme of ACCESS at some point during the research process, with an emphasis on access to computer labs and access to technology within the classroom. Teachers indicated that limited computer lab access hindered their opportunities to implement technology-based projects in which the students had the ability to interact with a technology rich environment to produce artifacts that are technology or computer based in order to display knowledge about a certain topic. In addition, these artifacts could be used by teachers to assess student knowledge and comprehension of instructional standards allowing technology to be more involved in the assessment process.

### *Preparation*

All of the research participants used computer technology at some level to conduct research and develop resources that were used either by the teacher or the students to promote a more thoughtful classroom. The **preparation** code was used whenever teachers made comments related to the use of technology to research and develop resources for instructor or student use that promoted thoughtfulness. Mrs. Colbert used the Internet to access a variety of primary sources for her students not available in the text which created more interest in the topic. She

also gathered images off the Internet to insert into classroom PowerPoint presentations. These images enhanced the lesson and were also used as part of her assessment process which will be discussed later. Similarly, Mr. Clancy used pictures as part of his lecture notes to enhance understanding of specific historical events. For example, he mentioned his use of pictures of the Holocaust to help students understand better the cruelty and horror of that event. However, he emphasized that technology “did not make the lesson,” that it was used for enhancement only. Other teachers like Mr. Frank and Mrs. Thomas used computer technology to share information through email with other teachers and they used word processing to develop curriculum maps and lesson plans. All of the teachers mentioned using the PowerPoint program either to create presentations for class instruction or to use and adapt presentations that were provided as part of the materials that came with the text book. Mrs. Benson accessed the Internet to find PowerPoint games that could be used in her classroom. Mr. Frank mentioned that current textbooks provided a large amount of material for teachers with access to the Internet. Teachers could be freed up to select the best materials possible for their classroom instead of taking the time to create all of the materials they wished to use. He believed that the delivery of instruction affected the degree of thoughtfulness, and the variety of materials available through computer technology allowed him to focus on this aspect of his instruction.

### *Implementation*

The **implement** code was used whenever teachers made comments related to the application of technology in the classroom environment or comments about using technology to present material and structure lessons to instruct, teach new concepts and challenge thinking. Almost all of the teachers involved in this project used PowerPoint technology for the presentation of materials in the classroom. The only exception being Mr. Frank whose discussion



format was based more on notes and fill-in-the-blank worksheets with teacher-directed discussion. Mrs. Colbert believed that the students responded well to the images and notes presented through PowerPoint as well as Mrs. Thomas. Mrs. Benson and Mrs. Thomas used PowerPoint technology to have students create slide shows for peer instruction. The students created the slide shows and then taught other students about what they learned either in whole class or small group format. Dr. Clancy used the Internet and other technology programs like PowerPoint; however, this was primarily for lesson enhancement. Mrs. Colbert used technology to gather primary source audio recordings from the past and allow students to hear firsthand the voices of history. This instructional technique not only created engagement but also gave students access to materials that would normally not be available, according to Mrs. Colbert.

### *Assessment*

During the initial and follow up interviews, as teachers discussed how they used technology to assess or evaluate student achievement and understanding of material, the **assess** code was applied. This is the area of technology implementation where all of the teachers admitted that they did not use technology very often. Technology, primarily word processing programs, was used to create and modify assessment instruments like rubrics and exams but was not an integral part of the assessment process. Mrs. Colbert took the PowerPoint notes that were used in class and removed some of the text or changed the text to create a fill in the blank question while leaving the graphic or image on the slide. She believed the visual stimulus helped solidify the content knowledge into the memory for later recall on standardized tests. She indicated that student feedback on this assessment technique was very positive.

Mr. Frank wanted to use a new technology that gave immediate in-class feedback that is interfaced with the computer and the projector which he described as the “clicker system.”

Students are given a small wireless keypad that allows them to respond to multiple-choice or true-false questions anonymously. The teacher can determine if all students have responded and display the correct answer as well as the percentage of students in the class who correctly answered the question. He believed that this type of technology, if it were to be integrated successfully into the classroom, would allow teachers to assess students quickly and redirect instruction based on the results. Dr. Clancy allowed students to use certain technology on projects in order to demonstrate their knowledge of information or to present information related to the project. For example, a student might create a slideshow about an important person in history to demonstrate his or her understanding of how that individual impacted history. However, Dr. Clancy mentioned that not all students have access to computers, the Internet or the software programs necessary to create slide shows or other technology driven projects. Access, not only for students but for teachers and families, was a recurring issue throughout the project and will be addressed and discussed as a separate theme.

### *Access*

As the interviews were transcribed and studied, certain common themes and topics emerged, in addition to main themes discussed above, these secondary themes will be explored at this time. During the discussions about technology one of the most common themes focused on the issue of **access**. Each teacher wanted to use more technology in classroom instruction, but they all admitted that access to sufficient technology was inadequate. Most of the projects that teachers wanted to implement required access to the computer lab where each student worked at his or her own computer to create materials or explore information. Both Mrs. Benson and Mrs. Thomas indicated that the computer lab was a good resource for projects and created

opportunities for differentiation, but gaining access to the lab was difficult because there was only one academic lab available for the entire school.

Another aspect related to the theme of **access** concerned the level of computer availability to students outside of the school setting. Dr. Clancy mentioned the lack of universal access to technology as a limitation to his application of technology in his classroom because some students do not have Internet connections or computers at home capable of the speed and connectivity necessary to complete assignments. Mrs. Colbert mentioned the socioeconomic levels in our community limit access to technology for many of our students. Dr. Clancy also mentioned that having SMART Boards<sup>2</sup> in the classroom would allow for more implementation of technology-driven lessons, but they were not available in all classrooms, and time constraints in the computer lab limited the opportunities for implementation of technology rich lessons. Like Mrs. Colbert, he also noted that not all students knew how to use the technology available to them in the school setting.

Mrs. Colbert, Mr. Frank and Mrs. Thomas all agreed that they needed to use more technology in their lessons because many students in their classrooms were very familiar with using technology. Using mediums of instruction that students were familiar with was important to Mr. Frank because he knew that students were accustomed to technology like cell phones and I Pods outside the classroom. Like Mrs. Benson, he believed that technology could be used for engagement, not just entertainment. Mrs. Colbert was concerned with how to teach students to use the available technology. She mentioned a concern about access outside of the classroom because of socioeconomic issues, but also observed that students needed to be taught that technology is a tool to be used and that cutting and pasting information is not appropriate.

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<sup>2</sup> SMART Board is an interactive whiteboard developed by SMART Technologies that is a large touch-sensitive whiteboard that uses touch technology to detect user input. For a more complete definition see footnote number 1.

Students needed to be taught to think about the material and to “connect the dots,” according to Mrs. Colbert. Because students had access to greater amounts of information because of the Internet and online searching, they needed to be taught how to think about the information and use it appropriately.

### *Aspiration/ Vision*

All of the teachers at least once expressed a desire to increase technology use or mentioned a specific technology that they would have liked to use as part of their instruction. For Mr. Frank, it was the “clicker” system that would aggregate student responses immediately and give feedback to the teacher and the class. For Mrs. Colbert and Mr. Clancy access to a SMART Board in their classroom would have allowed them to integrate more technology into their lessons. Mrs. Thomas mentioned the virtual labs and some of the software that was available to help students produce lab reports. Mrs. Colbert also advocated the use of discussion boards, blogs or programs like Google Docs as an aid in continuing lesson discussion after class. However, school technology safety and filter applications prohibited this access online. All five teachers shared the vision that greater access to the computer lab would be beneficial. However, as mentioned earlier, Mrs. Benson did not always see technology as an improvement. From her perspective, engaging in thoughtfulness was easier earlier in her career because students were expected to think.

### *Student Thinking*

Another theme that emerged dealt with teachers’ understanding of how technology can promote or impact **student thinking**. This theme was connected to several sub-themes including pedagogy skills, thinking resistance or inhibitors to thinking, and characteristics of best thinkers. First, thinking in general will be examined and then each sub theme will be explored. All of the

teachers involved in the research project agreed on the importance of technology to help promote thinking; however, they each had different perspectives on how this could be accomplished. Mrs. Colbert believed that technology helped to promote thinking and that there was a correlation between access to technology and how well children think. The more exposure a child had through technology, the more the child would develop mentally. Dr. Clancy felt that technology gave students greater access to outside materials and information that could help them defend answers and improve their thinking. However, he also knew that his students did not have universal access so he had to make sure that assignments did not eliminate certain students from success. Mrs. Thomas believed technology had the ability to promote thinking through the use of programs that interfaced the computer and lab data to help students create charts and graphs. The charts and graphs enhanced analysis because of the combination of visual data with the students' notes. This visual data could increase student engagement and help them write better lab reports because of the time-saving nature of the technology which would allow students to focus on the data.

### *Pedagogy Skills*

Another theme related to thinking that emerged from the data involved the teacher's **pedagogy skills** in the classroom. Some of these techniques involved technology, but some did not. Both Mrs. Thomas and Dr. Clancy used technology to engage students with images and PowerPoint presentations, but they believed the technology to be the stepping stone to further questions and further discussions. Mrs. Benson felt confident in her ability to promote thinking with or without technology because of the nature of the course that she taught and her long teaching experience and ability to engage students and promote thinking. Mrs. Colbert liked to use technology because it created alternative methods of delivering material which was

beneficial to promote thinking. Mr. Frank used classroom discussions and investigative lab work to promote thinking, neither of which involved a great deal of technology, although by his own admission he would have liked to use more technology in his classroom.

### *Resistance*

A second theme connected with efforts to promote thinking were the types of student **resistance** to thinking activities. In Mrs. Colbert's classroom, students resisted activities that required them to justify opinions and see the big picture. She used the phrase "connect the dots" when encouraging students to organize ideas and provide evidence for answers. This type of activity was also resisted in Mrs. Thomas's science class labs. Students did not resist the lab work, but they resisted analyzing data, and developing conclusions, according to Mrs. Thomas. Students wanted to do surface work, not deep level thinking. As mentioned earlier, she believed that technology could help by removing some of the routine lab activities and giving the students more time to think deeply about the topic. Increased time to think about material is one of the six minimal indicators of thoughtfulness indicated by Newmann (1990). In Mr. Frank's classroom, students resisted thinking about topics that they did not see as relevant to daily life, while Mrs. Benson's students often struggled with making their own decisions on assignments. The students wanted to know exactly what she was looking for so they could give that to her. In Dr. Clancy's classroom, students at the honors level resisted the challenge of evaluating primary sources and of writing essays at the ACP level.

### *Inhibitors*

When this theme was examined further through a second interview, each teacher indicated some additional factors that were **inhibitors** to student thinking in the classroom. The most common factor identified by all of the teachers was a connection with the home. Mrs.

Benson mentioned a connection between how students are encouraged at home to think, to take risks, and to make mistakes with their willingness to express ideas and what they think at school. Often students were afraid to fail in front of their peers because of their self-concepts. Both Dr. Clancy and Mr. Frank agreed with this, but added that the parent's example and emphasis on education was also a big factor. The parent's encouragement of thinking and a desire for education influenced the student's efforts to work through problems and think about difficult subject matter. Mrs. Colbert understood that the factors that inhibit student thinking included both a classroom climate that lacks trust as well as the home factors mentioned above. She believed that if students do not feel that their opinions are valued and if the instructor does not encourage an atmosphere of trust concerning student expression of ideas, then thinking and verbal expression will be inhibited. This also related to Mrs. Benson's ideas that students were afraid to fail before peers; however, Mrs. Colbert elaborated in her interviews that she made a strong effort early on to encourage participation and assure students that their ideas would be valued and respected.

### *Best Thinkers*

The final sub-theme connected with thinking relates to the characteristics teachers identified in their **best thinkers**. Three teachers, Mrs. Colbert, Mrs. Benson and Mrs. Thomas, identified some aspect of home training as a source of developing good thinkers. Mrs. Colbert felt that students who had been exposed to a variety of experiences and mediums (television, newspaper, radio, outside experiences) exhibited better thinking skills because of the different experiences as well as having parents who took an interest in their learning. Mrs. Thomas believed that students who thought well in her class had the ability to think outside the box and that skill came from both home training and how students were taught during the early stages of

their academic careers. She also believed that some “kids are just wired different,” and teachers needed to differentiate lessons to accommodate the different ways that students think. Mrs. Benson thought that her best thinkers were not always the smartest, but the ones who had a greater variety of experiences growing up and ones who had been encouraged to think independently at home. Like Mrs. Thomas, Mrs. Benson believed that her best thinkers were creative, not afraid to venture out of their boxes, and could express themselves well. Dr Clancy’s students who exhibited the best thinking did not give quick answers, but went back to the information (primary sources) and gave more detailed and thoughtful answers. Mr. Frank’s students that think well went beyond the base of knowledge and allowed their imaginations to expand beyond the facts. One of his favorite quotes to share with his students was Einstein’s comment that “imagination is more important than knowledge.”

### *Technology Impacting Classroom Thoughtfulness*

During the follow-up interview, each teacher was asked about technology and its ability to promote thoughtfulness in the classroom. This follow-up discussion took place after a classroom observation. It was interesting that although the teachers in this research group were selected as the most thoughtful teachers at their school, they did not use a significant amount of technology during the classes that I observed. However, as you will read below, they all agreed on the benefits of technology to promote thoughtfulness. First we will review the key elements of classroom thoughtfulness as developed by Newmann (1990a, 1990b), Stevenson (1990) and Onosko (1990, 1991). Newmann (1990a) identified the following six key components of thoughtful classrooms:



1. “There was **sustained examination of a few topics rather than superficial coverage of many**” (p. 51). (Bold text added) Newmann explained that in order to master higher-order challenges, in-depth study is required.
2. “The **lessons displayed substantive coherence and continuity.**” “Intelligent progress on higher-order challenges demands systematic inquiry” (p. 51). Lessons should work to integrate ideas instead of teaching material as unrelated bits of information.
3. “**Students were given an appropriate amount of time to think**, that is, to prepare responses to questions” (p. 51). Quality thinking takes time, but many classrooms rush this process and pressure students for responses before adequate time for reflection has taken place.
4. The **teacher asked challenging questions and/or structured challenging tasks** (given the ability level and preparation of the students). By the definition Newmann developed, students must be faced with challenging questions or tasks that “demand analysis, interpretations or manipulation of information” (p. 51).
5. “The **teacher was a model of thoughtfulness**” (p. 52). Teachers need to support student thinking by demonstration of their own efforts to deal with difficult material and developing an understanding of complex problems.
6. “**Students offered explanations and reasons for their conclusions**” (p. 52). Student’s answers should include the reasoning behind the answer and the information that supports the students’ conclusions.

Newmann (1990a) identified these six criteria as the minimal standard for a thoughtful classroom and these six criteria were used as the standard to identify the most thoughtful teachers at Mount

Carmel High School. Newmann (1990b) explained the reason for identifying the six criteria was to help teachers reflect on their own practice and to make the research process more manageable. After going through a complicated process of evaluation, the six criteria listed above distinguished themselves from the extended list of 17 criteria as critical elements of a thoughtful lesson or classroom.

Mrs. Colbert believed that technology could promote thoughtfulness by giving students access to large amounts of information from multiple sources. For example, a WebQuest requires that students visit various sites and then pull the information together as part of a summative assignment. This type of assignment fits with criterion four “asking students challenging questions that demand analysis and this also illustrated her effort to bring coherence and continuity, criterion two, to her lessons. She also used online testing as part of her psychology class which allowed students to either apply or reinforce concepts learned in the classroom. If she had enough space and resources, she would have liked to create “stations” in her classroom using technology where students could go and access information as part of a larger project. These stations would allow for differentiation as well as giving students time to think more deeply (criterion one, sustained examination) about each concept because the teacher would not be trying to move the whole class at a certain pace. Mr. Frank thought that technology could help promote thoughtfulness when it allowed the students to focus on the material instead of the tedious process of copying equations for science. His effort to maximize think time matches criterion three which focuses on giving students increased time to think in order to provide quality responses. He would have liked for the technology to handle the routine procedures so that students could think more deeply about the skills involved in balancing equations. He tried to demonstrate this type of technology during the classroom observation, but had difficulty

operating the technology. Fortunately, he had a back-up plan, and he mentioned in the interview that alternate plans are always needed because technology is not guaranteed to function as we would like it to all the time. Mrs. Thomas agreed with Mr. Frank in that technology can allow students extra time for thinking (criterion three) by eliminating some of the routine tasks. In her classroom, graphing took up a lot of time and technology that allows students to graph more easily could help keep track of the data enabling students to spend more time thinking about the information instead of copying it down. She desired that students be thinkers and not memorizers. Dr. Clancy liked to use technology to promote thoughtfulness to help create a starting point for more in-depth discussions using images and slides as well as using the technology to go beyond the classroom by giving students access to outside resources. These resources allowed students to think more deeply about issues at their own pace which was the goal of criteria one and three. Mrs. Benson provided an interesting contrast because of her longevity as an educator. She was around both “pre and post technology” to use her description. She saw students and technology change during her career and admitted that technology provided more bells and whistles which allowed teachers to entertain students more and engage them with fancy presentations. She believed that it was easier to engage students in thoughtful behavior earlier because students were expected to think and did not need the “entertainment” factor that technology provides. Nonetheless, the components of classroom thoughtfulness were implemented in her classroom.

What can be learned from these findings is that all of the teachers believed that technology can have an impact on student thinking, but that it must be embedded within the lesson to be effective. Because the technology was not universally available either because of home environment or lack of school facilities, it was difficult to accomplish this purpose for

implementing technology within lessons. However, all of the teachers took advantage personally of technology's affordances for the preparation of lessons designed to engage students and to promote classroom thoughtfulness. Finally, other than occasional use of online assessment instruments for test preparation purposes, very little technology was used for assessment, but technology was used for the preparation of assessment instruments. The following chapter will explore more fully the implications of these research findings.

## CHAPTER 5

### CONCLUSIONS AND SUMMARY

#### Introduction

This study examined how teachers employ technology to plan, implement and evaluate thoughtful instructional lessons. These teacher practices were explored through interview, classroom observation and follow-up discussion and were described in detail in the case studies included in this report. It was my belief that teachers who integrate technology in planning, presenting and assessing instruction will produce the most substantial levels of classroom thoughtfulness; however, after a careful examination of the cases, it was apparent that these teachers saw technology as an additional tool, not essential to the creation of a more thoughtful classroom. A qualitative research design was used to develop the case study examining teachers' efforts in applying technology to plan, implement and assess thoughtful classroom lessons.

#### Summary of Research Method

A qualitative case study research design was used to explore the actions of individual teachers in their classroom environments as they used technology to promote classroom thoughtfulness (Yin, 1993). The teachers were selected by their peers (see Appendix A) based on the teachers' ability to implement thoughtful classroom lessons using Newmann's (1990) six minimal criteria as a guide. These criteria were explained in detail in Chapters Two and Four, but are summarized here. The first criterion stated that "there was sustained examination of a few topics rather than superficial coverage of many" (Newmann, 1990, p. 51). Second, "the lessons displayed substantive coherence and continuity" (p. 51). Third, "students were given an

appropriate amount of time to think, that is, to prepare responses to questions” (p. 51). Fourth, the teacher asked challenging questions and/or structured challenging tasks (given the ability level and preparation of the students) (p. 51). The answers to complex problems that teachers propose in a thoughtful classroom (Indicator 4) are not always easy to determine and may require more than just looking at a page in a textbook. Fifth, the teacher was a model of thoughtfulness (p. 52), and the sixth criterion stated that students offered explanations and reasons for their conclusions (p. 52).

Each teacher participated in two semi-structured interviews with a classroom observation of 90 minutes in between. The first interview questions (see Appendix C) focused on general classroom information and the teacher’s perspectives on classroom thoughtfulness. Each participant received a typed copy of the transcript for the initial interview so he or she could verify and member check the information. Each teacher then self-selected a lesson that he or she believed would promote thoughtfulness and possibly use technology to implement or assess the lesson. Each lesson was observed and notes were taken by the researcher evaluating the class on the promotion of thoughtfulness and any examples of technology use. A second interview was scheduled to review the lesson and to discuss opportunities for technology to promote thoughtfulness in the classroom. A summary transcript of the final discussion was provided for each teacher to review. Each teacher also had the opportunity to review the completed rough draft of their entire case study. The entire process of member checking and review was part of the case study methodology design in order to increase validity and reliability (Merriam, 1988, p. 169; Yin, 1993, p. 41).

During the research process, I studied interviews, identified themes, and reviewed additional research. I developed case studies for each individual teacher examining his or her

perspectives on classroom thoughtfulness and the application of technology to develop, implement and assess lessons. The case studies laid the foundation for the research findings and analysis.

### Summary of Research Questions

This research project attempted to answer the question: “To what extent and in what way do teachers use technology to plan, implement, and assess the results of ‘thoughtful’ lessons?” The following questions helped to guide the research. First, how do teachers use technology to research and develop resources for use in the classroom for instructor or student use that promote thoughtfulness? Second, how do teachers use technology in the classroom to present material and structure lessons to instruct, teach new concepts and challenge thinking? Third, how do teachers use technology to assess or evaluate student achievement and understanding of material?

The first sub-question identified whether or not teachers used computer technology to access resources on the Internet to increase thoughtfulness. It was evident that teachers used the Internet to access material to use in their classrooms. The code of preparation illustrated that this area was the focus of most of the technology use. Teachers believed that accessing a wider variety of materials beyond the textbook increased their ability to promote thoughtfulness. Mrs. Colbert and Mr. Clancy located images to include in PowerPoint presentations that would enhance the material and engage the students by providing more depth to the material. Additionally, Mrs. Colbert and Mr. Frank utilized the computer to create materials that would be used in class, but could also be shared with other teachers and edited later to improve or modify the content. The ability to reproduce and collaborate provided by computers and the sharing of information through the Internet enhanced the teachers’ opportunities to have coherent lessons

that promoted systematic inquiry, which is one of Newmann's key characteristics of classroom thoughtfulness. The opportunity for these teachers to locate and share materials and resources developed by other teachers or textbook companies enabled them to make the classroom more challenging, another essential component of a thoughtful classroom. Both Mrs. Benson and Mrs. Thomas commented about the benefit of sharing information and materials with educators in other schools. In many ways, access to greater amounts of material enhanced the instructional opportunities for teachers; however, in an effort to avoid information overload, teachers had to accept a secondary role of gatekeeper to keep the focus on promoting classroom thoughtfulness instead of classroom entertainment (Zukas, 2000). Mr. Frank talked about the danger of using technology to entertain instead of engage.

The second sub-question addressed the implementation of technology in the classroom, which was a more direct connection to the promotion of thoughtfulness. Most of Newmann's minimum criteria for classroom thoughtfulness addressed classroom activities, and the second sub-question focused on classroom presentations that involved the use of technology. Because most of the teachers followed a curriculum whose breadth was determined by the state, they juggled requirements and made decisions about content coverage versus content depth. Technology access allowed them to bring more resources to the classroom and make students aware of this additional information, thus allowing them to increase coherence, continuity and depth within lessons. Teachers could draw on materials outside of the classroom that had already been created to assist in developing challenging tasks for the students. For example, Mrs. Benson used digital cameras to record and display student work and pulled PowerPoint games from the Internet to assist students in learning material. The two science teachers had the widest variety of technology available to them to implement in lessons. In addition to PowerPoint presentations,



there were many interactive websites available that assisted in presenting content. Mr. Frank used a site that helped students balance chemical equations, and Mrs. Thornton mentioned interactive computer lab activity sites. Both of these resources eliminated the tedious writing of equations and the time and equipment involved in setting up labs, and they promoted thoughtfulness by giving students additional time to think and provide reasons for the answers that they wrote down. Mrs. Benson's digital photographs and Mr. Frank's use of the "Elmo" projector to display student work helped model thoughtfulness by the teacher through their appreciation of student ideas and products. These displays of student work also promoted thoughtfulness by allowing other students to examine this work and compare it to their own, bringing continuity to the lesson and requiring students to provide explanations for differences or similarities. The variety of available technology hardware, software and resource materials increases each year. The challenge is to focus on classroom thoughtfulness and employ or access technology that enhances thoughtfulness through depth of coverage, thinking time or structuring challenging tasks and lessons. Further, these lessons need to be assessed, which is the third topic examined by this research.

The final sub-question focused on evaluating teachers' use of technology to assess student knowledge. This area was constrained more by the theme of access than any other. All of the teachers discussed accessing the computer lab to use online assessment programs to help students prepare for standardized testing. Mrs. Thomas mentioned that this tool was beneficial to help with differentiation because it identified student strengths and weaknesses. However, the school only had one academic computing lab; that limited access for each of these teachers. Students were given information to access test banks online at home; however, not all students had Internet access outside of the school environment. This lack of access also limited the type

of assessments that teachers could assign, consequently, teachers could not assign projects to demonstrate student mastery of the performance standards that required electronic collaboration, the creation of PowerPoint presentations, or any type of digital medium.

One of the primary means of assessment used by several teachers involved the use of rubrics. These rubrics, accessed electronically or created using Microsoft Word or Excel, helped students understand expectations and provided explanations for the scores students received as part of the evaluation. The flexibility of having digital rubrics allowed teachers to modify and adjust grading standards for different subjects or class ability levels. Mrs. Colbert also used PowerPoint presentations with the notes removed, but she kept the images visible to see if students could recall the material from the visual prompt. Mrs. Benson used a similar PowerPoint quiz technique.

Assessment was the least commented on and observed during this research project. More research into authentic assessment involving technology would be beneficial. There were many test preparation software programs available for the End of Course Test (EOCT), Scholastic Aptitude Test (SAT), and Georgia High School Graduation Test (GHS GT); however, these programs were structured as drill and practice with immediate feedback, not an assessment of higher-order thinking (Berson, 1996). The advantage of technology in the drill and practice category is the speed at which it provides results and analyzes strengths and weaknesses, not the measurement of understanding or promotion of thoughtfulness.

One advantage of conducting research in a familiar setting was that I could evaluate the participants over a longer period of time and compare a variety of experiences instead of just the one or two interview conversations normally available. Having personal knowledge of the participants in this project proved beneficial. In my opinion, the common emphasis on the large

impact of the home environment on student thinking was not an attempt to create a scapegoat for the lack of student success. It was recognition of the impact that the home environment has on the development of students and on encouragement of higher-order thinking.

### Discussion of Findings

Wenglinsky (2005) concluded that the best way for technology to have an impact on achievement was for teachers to assume that their students would access technology to complete learning tasks instead of focusing on how to use technology in the classroom. After socio-economic status, the greatest impact on the National Assessment of Educational Progress (NAEP) score achievement was the amount of time students used computers for school assignments outside of class time (Wenglinsky, 2005). There are no data available that directly connects greater classroom thoughtfulness with increased NAEP US History scores so far as I know. The current study presented a case study of five teachers who promoted thoughtfulness in the classroom. They expressed the desire to include more technology, but none of the teachers believed that technology by itself increased thinking. However, teachers that promote thoughtfulness will require students to complete challenging tasks that require some of the work to be done outside of the school setting. The focus should be to encourage and promote thoughtfulness while at the same time integrating technology into the instructional setting. One should not expect technology to produce gains in test scores, but use the technology to create a more thoughtful classroom environment.

The focus of the 2003 study completed by Bennett and Pye was the impact of integrating technology into middle school social studies, and their recommendations included future research to examine levels of classroom thinking when instructional technology is used. All but one of the teachers involved in this study expressed a desire to increase the amount of technology

use in their classrooms or to have greater access to technology in the school building.

Throughout the research process the participants stated that they believed that greater access to technology would allow them to create, implement and evaluate more thoughtful lessons. Mrs. Benson stated that she believed she could engage students better “pre-technology” because the students were not so used to being entertained and would focus on the lesson. Rice et al. (2001) investigated changes in a teacher’s attitude about using technology over a five year period. Similar to this researcher’s case study, teachers’ aspirations to increase technology required some pedagogical changes. Although access was not a hindering factor in their study as it was in the current study, student resistance to thinking was a common obstacle.

All of the teachers indicated that limited access to technology had an impact on their ability to integrate it fully into their instruction. However, none of the teachers mentioned this limitation as a hindrance to promoting thoughtfulness, only that thoughtfulness could be enhanced through the application of technology. Shaver (2001) cautioned against embracing technology without examining its benefits because technology has never been an “educational panacea” (p. 14). Both Wenglinsky (2006) and Shaver (2001) recognized good teaching is the key to increasing learning and that technology is a tool that can assist that process. As indicated by the case studies, the teachers expressed the desire to include more technology as part of classroom pedagogy, but the teachers also evaluated themselves as thoughtful instructors according to Newmann’s (1990b) minimal criteria as indicated during the interview and displayed on Table 4.4. Further, the observational data collected supported the idea that teachers can create thoughtful lessons without extensive use of technology as part of the presentation. It was evident from the interviews that they employed technology as part of the preparation process for their lessons, but they recognized thoughtful lessons can be delivered without technology.

Both of the science teachers involved in the case study chose a laboratory activity as a thoughtful lesson for the classroom observation portion of the data collection. Perhaps their choices indicated their perception of a connection between active learning, thoughtfulness and engagement. Greater access to technology would increase student opportunity for active engagement in the lesson using technology to promote thinking instead of passively watching computer-based presentations. Shaver (2001) indicated that intermittent access hinders the effectiveness of trying to integrate computers into instruction.

When the themes were developed and then evaluated for this study it became apparent that teachers were using technology to develop and implement lessons in the classroom, but that more access to technology would be required for teachers to use it for assessment. Using the Internet to find supplemental resources to enhance lessons was the primary reason that computer technology was used. More conversation was generated by the teachers when they discussed the theme of preparation than discussion about any other topic. This theme was connected to the secondary theme of access because each teacher had a computer at his or her desk connected to the Internet, thus allowing him or her access to a variety of resources. However, lack of access for the students during the school day prohibited increased integration of technology in the presentation and assessment of lessons. The entire theme of Aspirations was developed from comments made about desiring access to different types of technology or to greater amounts of technology.

As the themes about student thinking, inhibitors to thinking, and the characteristics of good thinkers emerged, it became evident that teachers did not view technology as an essential component related to student thinking. They agreed that certain aspects of thinking could be enhanced through the application of technology, but identified other factors that were common

among their best thinkers. The teachers saw home life and background experiences as key to developing the thinking abilities of their students. Both Dr. Clancy and Mr. Frank emphasized that technology is a tool that can be used to engage students. They agreed that delivery of instruction is more important in promoting thoughtfulness than using technology. Using technology to merely capture the students' attention did not mean that students will be actively thinking about the content. All of the teachers concurred that engagement and thinking are not the same thing which means that technology must be integrated into the instructional process in order for it to be effective in promoting classroom thoughtfulness.

#### Recommendations for Further Research

In 1996, Hannifin et al. began a conversation about technology designed to change research questions from “if” technology can have an impact on learning to “how” technology should be utilized. This research study supports that line of thinking by asking not simply what technologies are being utilized, but at how “thoughtful” teachers are using technology to promote thoughtfulness. This study revealed that teachers used technology primarily to plan and implement thoughtful lessons, but all of the participants indicated that greater access to technology would increase their ability to integrate such technologies into their pedagogy.

A follow up project at Mount Carmel or a replication of this study completed at a school with more technology resources available would increase understanding of how technology can assist in promoting classroom thoughtfulness. Large amounts of funding have been made available to school systems to expand the availability of technology; however, there are not enough data to indicate the impact or result of this spending. This project focused on thoughtfulness and technology by finding teachers who exemplified the characteristics of thoughtfulness and examining their use of technology. It became evident that technology

application, although helpful, could not be considered an essential or minimal characteristic of a thoughtful classroom. Therefore additional research that identifies technology rich environments to conduct similar studies using the characteristics of thoughtfulness would help expand our understanding of the impact of technology on teaching for thinking.

Further research on the amount and type of training that teachers have received on integrating technology into the classroom would provide valuable information for both university teacher training as well as in-service teacher training. Lack of teacher implementation of technology could be the result of a lack of access or a lack of training on how to use currently available technology. This project provided some case study data about what some teachers did or did not do in the classroom, but further research on the classroom thoughtfulness will continue to advance our understanding of how technology use could increase classroom thoughtfulness.

### Conclusions

It is evident from the research that the five teachers involved in this project employed technology to access resources and develop materials to enhance their instruction, but their use of technology within the classroom was limited. Part of this limited use reflected a lack of access which has been discussed at length. It was apparent that the teachers would not use technology just for the sake of using a new instructional tool. They employed technology or expressed a desire to employ new instructional methods when they perceived that it would enhance the classroom instructional environment for the students. These educators desired to increase the use of technology in their instructional practice in areas where they believed that it would work, not just because it was the latest innovation. In order to improve the effectiveness of teacher technology use at Mount Carmel, an investment in obtaining technology in the classroom and an

investment in the resources necessary for training teachers on how to integrate the technology into instruction would be required.

Are educators using technology to provide more thoughtful instruction? Wenglinsky (2005) raised the concern in his article that more technology might not produce better results and he advocated a focus on what teachers actually do in the classroom. This project focused on examining what teachers actually did in the classroom. It became evident that classroom thoughtfulness was a product more of teacher initiative and effort than access to technology. All of the teachers indicated that they would like to have greater access, but that was more for the students' benefit, not the teachers'. Their comments supported Wenglinsky's idea that teachers should plan lessons where students are expected to or required to access "technology based resources" to complete the work. All of the teachers involved in this case study agreed with that perspective, but also asserted that the school should be willing to assist these students with that access because of the economic conditions in the community.

The questions surrounding computers, technology, and how best to implement or integrate them into the academic setting will not be immediately resolved. However, research must continue to take full advantage of all the tools available to educators to impact students and promote better thinkers. In 1913, Edison promoted the idea of a radically different classroom as a result of the motion picture. Classrooms today are radically different from classrooms of 100 years ago, but the challenge still exists to integrate new and different technologies. The teacher is still the definitive force for instruction in the classroom. The tools have changed from chalk to dry eraser to SMART Board pens and from textbooks to movies to videos to DVDs, but the reality is that the interaction between the teacher and the student determines the focus and



outcome of classroom instruction. The medium contains the message and enhances the flexibility and transference of the message, but the medium of technology is still only a tool.

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APPENDIX A  
TEACHER NOMINATION FORM



Thank you for helping conduct research on higher-order thinking and classroom thoughtfulness. Based on the criteria listed below, please nominate two other teachers here at MCHS that you know promote classroom thoughtfulness on a consistent basis.

SIX INDICATORS OF CLASSROOM THOUGHTFULNESS.

1. Students are exposed to topics in-depth, not a superficial study or survey of information.
2. Classroom lessons are coherent and topics flow together, not a disjointed presentation of material, very few gaps, logical consistency.
3. Students are given time to think and prepare answers, the pace is not rushed.
4. Challenging questions are asked by the teacher on a consistent basis or challenging tasks are structured for the students.
5. In the classroom, the teacher models thoughtfulness by showing appreciation for student ideas, appreciation for alternative answers if based on sound reasoning and the teacher explains how he/she thought thorough a problem.
6. Students are required to offer explanations and reasons for their answers or conclusions.

Newmann, F. (1990b). Qualities of thoughtful social studies classes: An empirical profile. *Journal of Curriculum Studies*, 22(3), 253-275.

Please print your nominations on the space provided below and return the nomination to the box provided:

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If you have any questions, please contact:

Stephen Crouse

scrouse@madison.k12.ga.us

706-247-5304

Research Project for Stephen Crouse, under the direction of Dr. Ronald VanSickle, Elementary and Social Science Education, University of Georgia, Athens, Georgia.

APPENDIX B  
CONSENT FORM

I, \_\_\_\_\_, agree to participate in a research study titled " An examination of teacher perspectives on technology and classroom thoughtfulness in the secondary classroom " conducted by Stephen Crouse from the Department of Elementary and Social Science Education at the University of Georgia (247-5304) under the direction of Dr. Ron VanSickle, Department of Elementary and Social Science Education, University of Georgia (542-6486). I understand that my participation is voluntary. I can refuse to participate or stop taking part without giving any reason, and without penalty. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The reason for this study is to develop a case study of teacher's use of technology to promote thoughtfulness in high school classrooms. If I volunteer to take part in this study, I will be asked to do the following things:

- 1) Answer interview questions about my classroom teaching and how I promote higher-order thinking with my students. This will take approximately 45-60 minutes.
- 2) Have a follow-up interview based on my first answers to talk about how I use technology in my classroom.
- 3) Allow Mr. Crouse to visit my classroom at least one time to observe some of the practices we talked about.
- 4) If I am willing, Mr. Crouse can examine my lesson plans and other teacher created artifacts that assist in teaching.

The benefits for me are that the discussion of classroom practice may help me understand and improve my teaching. The researcher also hopes to learn more about how to improve classroom thoughtfulness through technology.

No risk is expected.

I will receive a gift certificate in the amount of \$10.00 to a local restaurant for participation in this study.

No individually-identifiable information about me, or provided by me during the research, will be shared with others without my written permission. I will be assigned a pseudonym which will be used in the research report.

The investigator will answer any further questions about the research, now or during the course of the project.

I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Stephen Crouse  
Name of Researcher

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Telephone: 706-247-5304

Email: scrouse@uga.edu or scrouse@madison.k12.ga.us

\_\_\_\_\_  
Name of Participant

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

## APPENDIX C

### INTERVIEW PROTOCOL FOR EXAMINING CLASSROOM THOUGHTFULNESS

### Background Information

1. How many years teaching experience do you have? How many years at this school?
2. What field(s) are you certified in and what degrees have you earned?
3. Are you enjoying your teaching experience?
4. What courses and subjects are you currently teaching?
5. How many course preparations does that involve?
6. What is your average class size?
7. Please describe your classroom composition? (Grade, Male, Female, etc)

### Information on Classroom Practice to Promote Thoughtfulness

1. What is your highest priority goal as a teacher?
2. Exposing students to subject matter content is in general “more, equally or less” interesting to them as is developing student thought and reasoning skills and processes? Please explain your answer.
3. Which of the two tasks is more challenging?
4. What gives you satisfaction as a teacher?
5. What kind of thinking tasks do students generally resist?
6. Is this true for all students or are some students less receptive to thinking?
7. What are your instructional goals?
8. How would you describe the conflict concerning the issue of depth vs. breadth in regards to content coverage? ( I am looking for internal versus external sources of conflict)
9. Please rank the following in order of importance as sources of coverage pressure:  
self – department colleagues – department head – school administration – district policy – state test or guidelines – other
10. What three factors most inhibit the promotion of student thinking?  
(Sample list to choose from if necessary– school organization, classroom organization, curriculum and instructional requirements and guidelines, students, administration)
11. Explain the nature of the coverage conflict and how you attempt to resolve it?
12. Do you have a conception of thinking that guides your teaching? If so, please summarize its main aspects.
13. Consider your best thinkers in the classroom, what distinguishes them from other students?
14. What methods of instruction do you use most often to promote student thinking? To evaluate student thinking?
15. Do you think that student engagement and student thinking are the same? Explain

Dr. Fred Newmann completed extensive research on classroom thoughtfulness during the late 1980's. He developed several criteria for classroom thoughtfulness. Would you please rate your most "thoughtful" class this semester on the following?

1. How often do you require your students to provide reasons and explanations for their responses to questions?
  - a. seldom or never
  - b. occasionally
  - c. about half the time
  - d. usually
  - e. always or nearly always
2. How frequently do you give students extended (beyond 10-15 seconds) time to think about and respond to questions?
  - a. seldom or never
  - b. occasionally
  - c. about half the time
  - d. usually
  - e. always or nearly always
3. In my classroom there is sustained examination of a few topics rather than superficial coverage of many. We explore topics in depth.
  - a. Not an accurate description of my class
  - b. Sometimes an accurate description of my class
  - c. Frequently could describe my classroom
  - d. Most of the time could describe my classroom
  - e. Daily description of my classroom
4. During the course of a week, how often will you structure challenging tasks or ask challenging questions. (As opposed to tasks that require rote memory or simple recall)
  - a. Seldom or never
  - b. Occasionally
  - c. About half the time
  - d. Usually
  - e. Always or almost always
5. Do your lessons display coherence and continuity? This means that you have almost no factual or conceptual errors, few gaps in the logic and reasoning and transitions are appropriate for the students.
  - a. Never or seldom
  - b. Occasionally
  - c. About half the time
  - d. Most of the time
  - e. Always or nearly always

6. How would you rate yourself as a model of thoughtfulness?  
Indicators are: the teacher shows appreciation for students ideas, and appreciation for alternative approaches or answers if based on sound reasoning; the teacher explains how he/she thought thorough a problem, the teacher acknowledges the difficulty of gaining a definitive understanding of the topic.
- a. Not an accurate description of my class
  - b. Sometimes an accurate description of my class
  - c. Frequently could describe my classroom
  - d. Most of the time could describe my classroom
  - e. Daily description of my classroom

APPENDIX D  
CLASSROOM OBSERVATION INSTRUMENT



Developed from: Newmann, F. (1990b). Qualities of thoughtful social studies classes: An empirical profile. *Journal of Curriculum Studies*, 22(3), 253-275.

### Criteria

1. In this class, there was sustained examination of a few topics rather than a superficial coverage of many.  

1	2	3	4	5
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2. In this class, the lesson displayed substantive coherence and continuity.  

1	2	3	4	5
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3. In this class, students were given an appropriate amount of time to think, that is, to prepare responses to questions.  

1	2	3	4	5
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4. In this class, the teacher asked challenging questions and/or structured challenging tasks (given the ability level and preparation of the students).  

1	2	3	4	5
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5. In this class, the teacher was a model of thoughtfulness.  
 Principal indications are: the teacher showed appreciation for students ideas, and appreciation for alternative approaches or answer if based on sound reasoning; the teacher explained how he/she thought thorough a problem, the teacher acknowledged the difficulty of gaining a definitive understanding of the topic.  

1	2	3	4	5
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6. In this class, students offered reasons and explanations for their conclusions  

1	2	3	4	5
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Comments/ Observations of Technology Use:

*Scale: 1 = very inaccurate description of class to 5 = very accurate description of class*

APPENDIX E  
FOLLOW-UP INTERVIEW QUESTIONS

Follow-up Interview Questions – These questions were generated primarily from comments made during the first Interview and were content specific questions based on observations made during the classroom visit. Questions were also asked similar to the following:

1. How do you use technology to plan thoughtful lessons?
2. How do you use technology to present or implement thoughtful lessons?
3. In what ways do you use technology to assess students?