Action Research:

The Development of Critical Thinking Skills

Tammy LaPoint-O'Brien

Franklin Pierce University

ED580: Action Research Seminar

Dr. Gale Cossette, Professor

February 17, 2013

Abstract

Critical thinking is the focal point missed in many students' educations. Students are taught memorization with little time left for the development of critical thinking skills which allows for a deeper understanding and a richer experience. Learning to ask appropriate questions and deduce information in order to build a deeper connection to the information is imperative. Ninth grade students at the end of history class composed a minute paper in essay format. The students described three different facts, ideas, concepts, or thoughts developed during the lesson and posed one insightful question. The minute paper afforded the students the opportunity to provide insight and reasoning into their comprehension, while cultivating their critical thinking skills.

Keywords: critical thinking, minute papers, writing prompts, world geography

The Development of Critical Thinking Skills

The lack of critical thinking skills utilized within the classroom greatly diminishes the students' chance for success (Irfaner, 2006). The purpose of this research was to identify gaps in the students' understanding of information, quantify their ability to compose their knowledge of the material, and for students to understand the material enough to create an insightful question showcasing their comprehension of the material. A secondary motivation of this research was to determine if their teacher changed her lessons or approach based upon the student's need for extra discussions or questions. Many researchers in various disciplines have investigated the study of critical thinking and it is far from a new concept within the educational system (Irfaner, 2006).

In ancient Greece over 2500 years ago, Socrates began teaching what is today known as critical thinking; he has been heralded as the first teacher of critical thinking (Irfaner, 2006; Rozgay-Miller, 2009). The method of teacher and student volleying information and questions back and forth in order to share dialogue and engage in an exchange of ideas has been dubbed the Socratic Method (Chapman, n. d.). This method brings the student's eagerness to learn alive by probing their beliefs and achieving a higher level of understanding rather than spewing memorized facts (Chapman, n. d.; Le & DeFilippo, 2008; Rozgay-Miller, 2009). Thus, critical thinking allows students to clear up misconceptions, discover half-truths, unravel derisory beliefs, investigate self-contradictory attitudes, and scrutinize inadequate evidence (Edmonds, Hull, Janik, & Rylance, 2005; Firey, 1999).

Using only one form of understanding, e.g., rote memorization, to produce knowledgeable students, the education system fails to generate a well-rounded student will the necessary critical thinking skills to survive the classroom and outside world. Without the ability to think on their own, students will only become puppets who regurgitate memorized

information. Memorizing facts fails to provide adequate understanding of the concept. Reeder (2011) stated that understanding concepts appears to be more of a point on a continuum rather than the final destination for the students' overall learning. Connecting to the material and fully grasping the meanings behind the actions of historical figures, the events which transpired for explorers to discover new worlds, the message from an author, or how figures in math are always the same allows the student to have a deeper understanding of the material and a richer experience. Savich (2009) takes it a step further and states that having different viewpoints on the same situation provides valuable critical thinking strategies to students. They are able to use those view points to decipher the plausible from the implausible.

Fully addressing the gaps in education, meaning rote memorization versus the facilitation of critical thinking skills, the goal of teaching needs to be concerned with encouraging students to become receptive, perceptive, reflective, critical, and question inconsistencies within the lessons presented (Edmonds, Hull, Janik, & Rylance, 2005; Irfaner, 2006; Sezer, 2008; Slavin, 2012; Webster, 1994). Students who are able to articulate their understandings through minute papers have a better chance of successfully developing their own set of critical thinking skills. Without fostering these skills in the classroom, students have little opportunity to develop their ability to think critically when sheer memorization is the expectation (Baildon & Baildon, 2008; Tiwari, Lai, So, & Yuen, 2006).

The research capitalized upon previous studies in which the students were surveyed, questioned, taught specialized skills, and/or was the main element of a control or test group. Other research has shown students prefer a more hands-on, inclusive, and inquiry approach to learning rather than a pure lecture with no interaction with their peers or teacher for dissecting information (Baildon & Baildon, 2008; Savich, 2009). Becoming part of the lesson versus a

vessel for memorizing facts, students have more at stake in their education. Accordingly, putting the responsibility back to the students when they compose their minute papers, teachers are making them part of the lesson. The students' input is a necessity for educators as they must craft creative ways in which to explore and discuss issues, ideas, and concepts in the classroom while facilitating real connections to the material (Chareka, Leyte, & Mills, 2010).

Statement of the Problem

Understanding and fostering the ability to help students think critically is essential to their educational success. Duron, Limback, and Waugh (2006) defined critical thinking as "…the ability to analyze and evaluate information" (p. 160). As students lack the motivation to use their current set of critical thinking skills, they, in turn, falter when it comes to fully developing those skills which befits their grade level or intellect. The development of critical thinking skills is vital to their educational success in their current and future grades as "…thinking is a way of learning content" (Carr, 1990, p. 2). The issue at hand deals with ninth grade students who fail to develop or lack motivation in utilizing critical thinking in the classroom during the school year.

Facilitating the development of critical thinking skills is crucial to address on a continual basis through various lessons, projects, group problems, and/or individual assignments. Through continual emphasis on the development of critical thinking skills, students have an opportunity to build upon their knowledge and experience to learn how to solve problems (Norris, 1985; Rozgay-Miller, 2009). As expansion of critical thinking continues students with skills which are more developed tend to work on strategy more than the problem, while the less developed students stick with the problem rather than the strategy (Norris, 1985; Sezer, 2008).

Critical thinking is a physical act by verbalizing or a thought process which is showcased through writing by displaying the ability to think through problems. Critical thinking skills and creative thinking skills are two sides of the same coin by challenging the brain to persistently

work through many factors in order to deduce a commonsensical conclusion. Slavin (2012) stated critical thinking skills are utilized for deductive reasoning and problem solving in order to uncover reasonable discrepancies and myths. Additionally, for critical thinking skills to develop and become highly effective, students must encompass patterns of behavior which parallel their skills throughout the day, not just in school (Sezer, 2008).

A positive way to distinguish the growth of critical thinking skills within the classroom is to empower students to take a more active role by writing a minute paper at the end of class or a particular lesson. Students will use the minute papers to discuss in essay format the three most important concepts, ideas, or perceptions and pose an insightful question which they need clarified or affirmed. Minute papers are defined as a synopsis of the lesson written from the student's point of view that allows for immediate feedback and correction (Bartlett & Morrow, 2001; Criswell & Criswell, 1995; Divoll & Browning, 2010; Hulsizer & Woolf, n. d.). However, for this research, minute papers are defined as a paper composed at the end of the lesson describing in essay format three facts, ideas, concepts, and/or thoughts learned during the lesson and to pose one insightful question for clarification or affirmation of a belief which is directed toward a specific question or prompt.

Critical thinking is important for students as it teaches them how to think rather than what to think about any subject or issue they deal with while they are able to effectively solve the issue (Snyder & Snyder, 2008; Scholastic, 2011). Memorization is useful in limited scopes within the classroom, i.e., vocabulary, while in other areas it is more of a temporary knowledge (Snyder & Snyder, 2008). Promoting independent thought through the students' own interpretation of the information presented allows them to draw conclusions which invoke their deduction, reasoning, and critical thinking skills.

By completing minute papers at the end of lessons, students will be aware of their understating of the concepts, ideas, and information presented which will allow issues or misconceptions to be addressed immediately (Lucas, 2010). The misunderstanding students experience will provide valuable information to amend the presentation of the lesson allowing students to become part of the lesson (Bressoud, n. d.). Instead of students becoming passive receptors to the information presented, they are given the opportunity to decipher and pillage the information into manageable bites by critically analyzing the information for accurate and logical sense (University of Illinois, 2011).

Critical Thinking versus Memorization

Critical thinking is a necessary skill all students need to develop in order to fully understand information presented in lessons (Lambert & Cuper, 2008). Students that fail to develop their critical thinking skills accordingly typically suffer with lower academic grades (Quitadamo, Faiola, Johnson, & Kurtz, 2008). Understanding the disconnection between the information presented and the students' ability to deduce the information is a vital component to change teaching methods and approaches in the classroom (Dewey & Bento, 2009; Lucariello, 2012).

Standardized testing attempts to extract the information students have acquired throughout the school year through memorization of material (Khan, 2011). Memorizing information is a needed component; however, it is considered the quantity of thinking while, on the other hand, critical thinking uses deductive reasoning and is considered the quality of thinking (Case & Daniels, n. d.)**.** The focus of this research was to examine the development of students' critical thinking skills through minute papers at the end of class that allows for assessment of their comprehension in order to gain insight into their reasoning through the

quality of thinking rather than the quantity of the information (Nobori, 2011). Therefore, standardized testing formally tests the students' current knowledge on subjects while minute papers are meant to be a pulse-check of what they understand. Minute papers are an important tool to incorporate in the classroom as they can directly affect how teachers present or change lesson plans.

The Variables and Limitations

Each school and school district will vary in one or more component and with each variable the dynamics within the classroom changes. Fully understanding the knowledge foundation of each student and their current level of critical thinking is essential to the way information is presented and laid out (Felder & Brent, 2005). The main limitations within the classroom are the students' level of knowledge, lack of critical thinking skills, and their understanding of what critical thinking is and how it is utilized. In addition, other limitations also have a factor in their development such as technology, e.g., computers, overhead projectors, having enough time during the school day to incorporate all of the required standards in the curriculum, and the students' overall attitude towards school and their education (Felder & Brent, 2005; Khan, 2011).

Gathering information to assess where students are in their development is crucial to beginning any skill building. Without knowing where the students are coming from, starting is fruitless as they could be beyond or behind where a teacher begins their lessons. Thus, with an assortment of variables which come into play within the classroom, the limitations provide an added disadvantage as well. The baseline of where students are in their critical thinking is paramount to understanding what they are capable of learning first before moving on to more complex lessons. Furthermore, ensuring each student receives the same instruction provides a

supplementary challenge in that they will either need to be brought up to speed in a lesser amount of time and/or rely upon their peer's notes, i.e., absenteeism. Students are at a disadvantage when they forgo the complete lesson and peer interaction, which would enhance their experience, when they miss class.

Literature Review

This paper discusses the definition of critical thinking as it relates to a classroom from several angles, instructional methods which work best to develop the skills, reasons why critical thinking skills are vital to the educational success of students, how critical thinking is measured, and why minute papers help solidify ideas and concepts. Addressing previous research studies in relation to their qualitative, quantitative, and action research in order to facilitate the design, purpose, and elements drawn upon which conducted my research in the development of critical thinking skills. The research relies upon previous studies conducive to the classroom; however, it is clear that the underlying factor in developing a single idea of what is critical thinking is the issue.

Qualitative Studies

Developing a consensus of what critical thinking is as it applies to the curriculum and standards set forth by the state and federal education departments, as well as how a teacher defines it per a set rubric, can be astronomically different. Krupat et al. (2011) wanted to understand how critical thinking is defined and utilized in students in medical school. They sought three defining goals; the first was to discover the parameters of how critical thinking was defined. In order to measure critical thinking, it is vital to have a common definition of what it is and how it will be defined per the task, assignment, or challenge prescribed. Even a rubric, which provides the students with expectations, can be open to interpretation if educators have varying

definitions of what critical thinking is or how it applies to their class. Without a full comprehension of what is expected and how it will be graded, there is no way to clearly develop, build, or increase critical thinking skills.

Krupat et al. (2011) wanted to discover how universal expectation varies widely among institutions as well as teachers. There were three main ways in which critical thinking was viewed. This inconsistency, of the different views, is detrimental to the students' ability to develop critical thinking skills as well as their overall academic ability. Assigning grades and pushing students through to the next level without fully enveloping the underlying expectations of critical thinking, the students suffer and their future teachers are left with little time to get them up to speed on their academic status. This study provided valuable insight into the lack of consistency and how definitions differ; however, they only looked at it from the educator's point of view through the use of surveys. By limiting the questions, they could narrow their focus; although, by doing so, they missed valuable points such as wording, which makes the understanding of critical thinking, appear different, but in reality is the same.

This research takes it a step further by having ninth grade world geography honors (WGH) students display their talents through minute papers to provide an insight into their realm of critical thinking. The students were provided a rubric which was used to grade their minute papers. In order for students to comprehend what is expected, they must know what is expected. As with any expectation, it must be understood before it can be accomplished. Another expectation which either diverts or expands upon critical thinking is the delivery of the instruction. A study conducted by Papinczak, Tunny, and Young (2009) delved further into this by exploring the role of a tutor to their student through a problem-based learning tutorial.

Interestingly, the Papinczak et al. (2009) study was from the vantage point of the student. The study stemmed from the delivery method adopted by the tutors and how it was received by the student. It was discovered that when the tutors failed to follow the preset guidelines, the learning stopped and in reality any attempt at developing critical thinking skills evaporated. This study discovered that when tutors reviewed their methods of delivery, as many were dominant, they were able to ratchet it back to the appropriate level required and allow critical thinking skills to flourish. Without consistency, learning expectations diminish while experiences build and lay the foundation for student's preconceived notions and expectation when working with educators.

The open-ended questions which were given to the students provided a plethora of information. The main problem with this study is that the interpretation of the students' comments by the researchers. While they do provide direct statements in the study, my concerns center around if the students were venting frustration or retaliating against a dominant tutor who provided an unsatisfactory experience or if the researchers took the comments out of context to their true message. Additionally, due to the students' and tutor's confusion over the tutor's role, it is clear some of the information provided in the open-ended questions as well as the analysis can be misconstrued on the part of the researchers.

Quantitative Studies

The theory of critical thinking provided Baez (2007) another level of comprehension in the pursuit of critical thinking by conducting a quantitative study on understanding the term critical and what it means to answer the critical questions. The term critical has morphed into meaning more than judging something. As with any research, it is open to interpretation and the research conducted by Baez (2007) showcases that truth on the difficulty of research. Without a clear definition of what is being researched or expected, it is almost impossible for a research

team to begin to even decipher what it means in general terms to a specific industry or academic field. Breaking the research down to a central term, e.g., critical thinking, and what is to be accurately measured, e.g., the development of critical thinking skills, gives into the understanding of the implications can begin; on the other hand, Stage (2007) states that answering the critical questions pushes the boundaries of what is custom.

These two studies are collectively analyzing how research is conducted and their focus on research questions is intriguing; however, without a full comprehension of what is being studied there is little hope a study will deliver accurate findings. Studies conducted which weigh heavily on the "what" of research versus the "how" can have inaccuracies and fail to epitomize the research questions, which were the key focus of the research or achieve the ultimate goal that prompted the study. The accuracy could be called into question, thus, voiding any results or interpretations of the findings.

Action Research

Stack, Watson, Hindley, Samson, and Devlin (2010) embarked upon an action research study to uncover how the term average was defined in the math classroom. As with the term critical, the definitions abounded based upon the classroom and context in which it was utilized. This provides a view into how critical thinking concepts are faulty by design when a term with many definitions is given and how the definition changes as the mathematical computations become more complex. The preconceived notions the students partake from previous experiences and the ideas in which the teachers are delivering can be a wide-range of sheer chaos.

The term critical has such a broad expansion of meanings it can be detrimental to the underlying goal of understanding. In research conducted by Stack et al. (2010) they determined that teachers believed using media resources was critical to uncovering the various differences of

the term average. While it can be seen as an enlightening experience to understand how the students define average, it fails to adequately justify why the term average is used in different modes throughout each grade. When higher-level cognitive thinking is expected and little has been done to shape expectations, confusion happens.

Critical thinking skills are a necessity in the classroom to bring about higher-level cognitive thinking; however, various studies have given birth to the realization that how critical thinking is defined varies so enormously that without setting a constant any learning towards this goal will be fruitless. Parker (2006) took confusion to a new level when his research discovered that teachers were unable to discern the difference between strategy and modification. The study goes on to capture the confusion so intently that it borders on the mistreatment of students in order to develop critical thinking skills that require modification to gain knowledge and students who depend upon the various strategies to obtain understanding. This study only had six teachers and while the findings are alarming, it is the number of subjects that is subjective. Had this study been conducted with ten or twenty times more teachers, the results would hold more weight as well as provide more insight into the lack of training received by teachers during their education and what the administration needs to focus on during meetings, conferences, and continuing education.

Definition of Critical Thinking

As previously mentioned, Carr's (1990) definition of critical thinking "…is a way of learning content" (para. 2). However, Duron, Limbach, and Waugh (2006) stated it is "...the ability to analyze and evaluate information (p. 160). On the other hand, Walker (2003) breaks down critical thinking into four different, yet equally similar definitions:

> (1) Purposeful thinking in which individuals systematically and habitually impose criteria and intellectual standards upon their thought. (2) A composition of skills and attitudes that involve the ability to recognize the existence of problems and to support the truthfulness of the problems. (3) The propensity and sill to engage in an activity with reflective skepticism. (4) The process of purposeful, self-regulatory judgment. (p. 264)

The list of definitions can go on and on; however, they all have a familiar theme which translates into actively analyzing information. The ability to analyze information is the foundation for this research. Therefore, the definition of critical thinking, which will be the focus of this study, is the capability to process, evaluate, analyze, rationalize, and scrutinize information presented which facilitates the development of critical thinking skills (Carr, 1990; Duron, Limbach, & Waugh, 2006; Walker, 2003; Slavin, 2012).

Instructional Methods

The foundation for facilitating the development of critical thinking skills is vital for lessons to create the ability to allow students to actively analyze information presented as well as uses those skills in other realms. Each lesson, according to Schneider (2002), needs to incorporate ways in which the students can solve the issue(s) presented by brainstorming, using compare and contrast, and encouraging creativity. While ensuring each lesson is a basis to encourage critical thinking, it also behooves the teacher to use such strategies throughout the day in general. Each time a student needs to stop and think about something, this helps to build their aptitude to think critically. Additionally, Potts (1994) stated that learning in groups, presenting questions, which are open-ended, providing adequate time for reflection, and teaching with an

emphasis on transference, are essential components in creating a learning environment in which thinking critically becomes part of the students' daily effort.

Just as writing, spelling, and math problems all become easier with practice, learning to think critically works the same way (Beyer, 2008). Providing students with lessons and an environment that entices them to use their skills provides the practice they need to build their proficiency. Furthermore, ensuring the classroom environment is a positive atmosphere will allow the students to feel comfortable to think out loud without fear of ridicule or mockery by their peers or their teacher. Also, by laying the foundation for encouraging "…the acceptance of divergent perspectives and free discussion" students learn more as their attention will be purely focused on the tasks at hand versus worrying about repercussions (Slavin, 2012).

Importance of Critical Thinking

Without the ability to think critically, students are ill-equipped to handle many situations in which those skills are required. Students are taught to memorize facts, dates, and told they will need this information for tests in order to advance to the next grade level (Case & Daniels, n. d.; Reeder, 2011). Yet, by teaching students to regurgitate information, we are sadly doing them a huge disservice which will later teach them to only accomplish enough to get by. Higher test scores are an accomplishment teachers seek, yet, those scores don't always mean students are copiously retaining the information presented (Mabe, n. d.); they do, unfortunately, show how well students are able to recite the information learned in the classroom.

Learning to become critical of information and forming an opinion is essential for students to insert a new dialectic while stating their unheard opinion (Rolling, 2008). While most students will form opinions and deductions which have been revealed by previous students, it is the art of deducing information which comes into play. As such, molding such skills by asking

open-ended questions and placing the thinking back on the students will, in turn, bolster their proficiency and confidence. Thinking and content are a marriage in which critical thinking takes shape, thereby, lessons which are devoid of thought only prime the students for test taking (Carr, 1990).

Measurability

In order for teachers to fully understand if their students are developing the necessary skills, it is imperative to have measurability. While "…textbook exercises are rarely accompanied by any theoretical or empirical evidence connecting these activities to tangible improvement in critical thinking skills….these techniques may have other benefits, such as improvement of writing skills…" (Cotter & Tally, 2009, p. 4). With such a critical endeavor, it is important to fully understand how measuring critical thinking success should take place. As time and planning are key requirements for creating lessons, it should equally be important to use time and planning in creating measurability for those lesson plans. Quantifying the results of critical thinking is complex since the process of development is a continuous process versus an identifiable conclusion (Askins, 2006). Using appropriate measuring guides and rubrics are essential to fully comprehending the student's abilities without under or over challenging their current level of thinking.

Student participation, explaining their reasoning, and teachers who use their time efficiently by cajoling information and listening rather than doing all of the talking are all ways in which critical thinking can be measured; however, using creative ways to teach requires creative ways to measure (Alpert, 2011). Understanding how to measure the end result is critical to creating the lesson in the first place. Without understanding what the intended final result should be, creating lessons is futile as it will lack a clear focus; thus, it will be lost in translation

during the presentation of the lesson. As a result, teachers need to ask questions which are pertinent, applicable, probing, and germane to the lesson. This allows students to answer using their critical thinking skills while challenging them; and it is one way to assess the student's development.

Minute Papers

Critical thinking skills are more than the ability to verbalize thoughts and opinions; they are also used when constructing thoughts and opinions on paper. Minute papers are an assessment technique done at the end of a lesson or school day in which the student relays the main concepts as they understand it. The minute paper can be tweaked by having the student finish a sentence such as "The main concept is" or "Three things I learned are" or by responding to a preset prompt which comes from the lessons. Lucas (2010) stated that this type of assessment has been acclaimed as an extremely valuable and successful tool for teachers and students. In addition, having students ask a question at the end demonstrates their ability to think critically while their comprehension comes full circle is a clear indication they are grasping the information on a deeper level. They understand a main concept, as well as versed enough to ask an insightful question.

Research Questions

The questions, which were used in this study, explore the depths of critical thinking within the classroom. They are meant to examine and understand the needs of the students in facilitating the development of critical thinking skills through the utilization of minute papers as well as how teachers approach and/or amend lessons. Composing thoughts on paper is more inclusive of expressing understanding of concepts and ideas as it allows the student time to arrange their thoughts before writing (University of Washington, 2011).

Questions

1. How will the composition of minute papers two or three times per week improve the development of critical thinking skills in students?
2. Will the incorporation of minute papers directly link to students overall willingness to embrace and develop critical thinking skills?
3. In what ways do minute papers amend the teacher's lessons, presentation, and approach to teaching new concepts?

The goal of each teacher is to ensure their students learn. Therefore, understanding how their students envelop and process the information presented in the lessons is crucial to their presentation of material and facilitation of critical thinking skills. Using the student's innate curiosity and the Socratic Method, connections through the incorporation of critical thinking can be made which will enhance the lesson (Rozgay-Miller, 2009).

Proposed Study

Assigning minute papers at the end of a lesson provides a view into the student's comprehension of concepts and ideas in order to assess their critical thinking level. Students completed the minute papers at the end of specifically chosen lessons in their WGH class in which both teacher and researcher agreed upon the crafted prompts based upon the lesson. The approach taken by the students to relay their comprehension in the minute papers will, also, include an insightful question in which they need clarification or affirmation of a belief. The teacher will incorporate an atmosphere of openness, safety, and positivity in which students will feel at ease in putting their best effort into the minute papers. The ability to embark upon the building of critical thinking skills by students requires them to broaden their horizon rather than camouflaging what they don't know with buzz words, shallow thoughts, or regurgitation of the lesson (Connerly, 2006).

The research will began with an instructional lesson (Appendix B) on how to complete the minute papers, which lasted approximately 15 minutes. On the first day of the study, the notebooks and rubrics were passed out and the students chose a word to complete their code for confidentiality purposes from a preset list (Appendix H). The students completed a minute paper during each class using the teacher's current curriculum to create a prompt. The study was conducted during the school year when only one federal holiday was expected. However, class was canceled one day due to weather. This bumped the research out by one day. Therefore, the study was conducted in totality with minimal interruption.

Participants

The study was conducted in a ninth grade classroom at a private high school located in the southeastern region of the United States. The entire class, 23 students, was part of the research that included a senior and a sophomore. The class was comprised of 57% males and 43% females with 96% of the class being Caucasian and 4% African-American. The senior and sophomore were assigned to the WGH's class due to scheduling conflicts with their other classes; thus, 91% of the students are freshman. No known special needs students were in the chosen WGH class. However, had any special needs students been part of the class they would have been able to take part in the study provided the Informed Consent Form was signed by them and their parent(s)/ guardian(s). They would have been able to contribute as outlined by their individual education plan.

Ninth grade honors students were chosen for several reasons. The main reason is their age and maturity level are conducive to expressing their comprehension through written communication. In writing their thoughts they are able to understand concepts beyond a shallow level. Many students already have critical thinking skills; however, they are under-utilized or underdeveloped. Another focus for choosing ninth grade students is the research was conducted

half-way through their freshman year and the ability to think critically is more of an expectation in all of their classes. Furthermore, the critical thinking skills they develop will be their foundation for problem solving and deducing information as they proceed through their high school years.

The administration of the a local high school was contacted for their permission to have the study conducted as well as ensuring a ninth grade teacher was on board for the tasks they were required to fulfill. The administration and teacher were in full support of the study. This support afforded true results to be recorded. The high school principal and teacher were given an overview of the study and shown a report which outlined each step of the research.

For confidentiality purposes, the teacher was assigned T-WGH while the class was assigned the code of WGH and each student was assigned either a M or F (male or female), followed by each student choosing a word from a predetermined list (Appendix H), and ending with the year the research was developed, i.e., WGHF-Word2012. The differentiation between the male and female students allows for added information to be gathered. The teacher, school administration, students, and their parents will be privy to the results as the teacher will be supplied a copy of the final paper. They were encouraged to ask questions throughout the study. The parents of each student read through the information and gave their consent and support of the research on the Informed Consent Form (Appendix D). Students, also, signed the Informed Consent Form as well to document their understanding of the study and what was expected of them.

Data Collection

Each student was given a notebook which was specifically assigned to them with a partial research number posted on the front. The students completed the code with their chosen word

which allowed for easy identification while keeping their identity confidential. The minute papers were completed in the notebook, with each date stated at the top of a new page, and the notebook turned in to the teacher before the student left the class. In the event a student was absent, they were instructed upon their return, to list the date and write "Absent". When a student was absent they were given a zero for the day. That score was not a reflection of their abilities; it was an indication that they were not in class that day. Also, the score was not included in their weekly average; otherwise, it would have misconstrued the results.

The notebooks, used for research purposes, only left school grounds under the control of the researcher and all other times were kept in a safe, locked, and confidential area of the teacher's classroom for control purposes. At the end of each week, each student's minute papers were read and scored per the rubric (Appendix E) and a weekly survey to document their progress (Appendix F) was completed by the researcher. The weekly survey consisted of two statements and two ratings based upon the minutes papers for a school week.

Graphing the results of each week provided a growing picture in order to begin analyzing the results. Gender separation results were, also, recorded which allowed another layer of information. By separating the genders, the emphasis became whether one gender would perform higher than the other. The weekly survey for the teacher was collected each week and consisted of two yes/no questions. At this point, the teacher was afforded an opportunity to provide comments as well. All of the information captured was analyzed as a whole and separately, e.g., weekly, gender, daily, for additional depths levels of comprehension.

The actual notebooks provided a plethora of information in understanding the progress, stagnation, or backward slides made by the students through their minute papers as well as the questions they posed. Additionally, they were instrumental in providing a firsthand look at each

student's thought process, comprehension of the material, and use of critical thinking skills in action.

Timeline

The timeline for the study was conducted in three phases and spanned eight calendar weeks. Phase one included the contacting the school administration and teacher two weeks prior to the beginning of the research for permission, background, understanding of the research, partial creation of participant numbers, and a full understanding of their part and cooperation in the study. The parents were contacted by a letter sent home and by an e-mail from the teacher. Phase two included the actual research timeline (Appendix A) which totaled three research weeks that equated to four calendar weeks. Weeks one and two consisted of three class days each and week three was four class days. The teacher turned in their weekly surveys of their questions each week. The minute papers were gathered weekly to score and record the results from the rubric and weekly survey. Phase three was the conclusion of the data collection and commenced the analyzing of the data. The duration of this phase was two weeks, which provided the information necessary to answer the research questions.

Conclusion

The consensus on the development of critical thinking skills is that it has become a prerequisite to education (Sezer, 2008; Tiwari et al., 2006). The skills are a necessity in and outside the classroom and without the facilitation and fostering of such skills within the classroom students are at a loss and lack the ability to develop to their capacity (Baildon & Baildon, 2008; Sezer, 2008). Minute papers supply the student and teacher with a wealth of information in regards to the student's comprehension as well as how effective the lessons and presentation are each day (Lucas, 2010). Integrating a daily ritual of students reflecting upon

their understandings through the composition of minute papers, they begin to view the information in a more abstract fashion, i.e., developing their critical thinking skills. According to Lucas (2010) students gain more overall understanding from the minute papers and the teacher's feedback.

Critically thinking about ideas, concepts, and information from a point of view in which questioning the accuracy of data allows students to develop the skills necessary to understand different points of view, analyze facts, scrutinize details, and challenge their own set of beliefs. Therefore, providing lessons which requires the development of critical thinking skills students will become better equipped to handle situations which involve inaccuracies, fallacies, inadequate evidence, derisory information, and to investigate self-contradictory beliefs. The following are the results broken down into categories, which help the comprehension of how minute papers assist in the development of critical thinking skills.

The Results of Week One

On the first day of the study, students were compliant with completing their confidential code and really thought about their response to the first prompt. Within six minutes, all students had completed day one of the study. The quickness of the responses composed can be attributed to being unsure of the task or nervousness. They were studious and projected seriousness in their composition of the minute paper. The students were quiet while composing and allowed their classmates to complete their minute papers before asking any making any unnecessary noise.

With the beginning of any new task, questions arise. The teacher e-mailed later in the day to obtain clarification on a question from the students. They wanted to know if they could discuss the prompts as a group once all of the minute papers were completed and turned in which would avoid any student changing their response. It was amazing to have such a reaction after

the first day as it highlighted the student's willingness to work on their critical thinking skills as they expanded their comprehension. They were given permission to discuss the prompt further on the premise all minute papers were completed and not in danger of being changed, which would void the research.

Daily prompts. The researcher approved each prompt discussed by both the teacher and researcher before assigning to the students. They were based upon a particular lesson of the day and chosen in order to allow students the maximum ability to display critical thinking skills. The following prompts were utilized during week one and are in order from day one to three.

1. Turkey has recently issued new rules, which govern the passage of ships through the Bosporus and Dardanelles Straits. Russian leaders have reacted in anger to these rules. What could be the significance of these bodies of water, which would cause Russia's anger?

2. Given the date of origin of the Dead Sea Scrolls (200 BC – 68 BC), and the date of discovery (1948), explain the climatic conditions that allowed the scrolls to survive for so long.

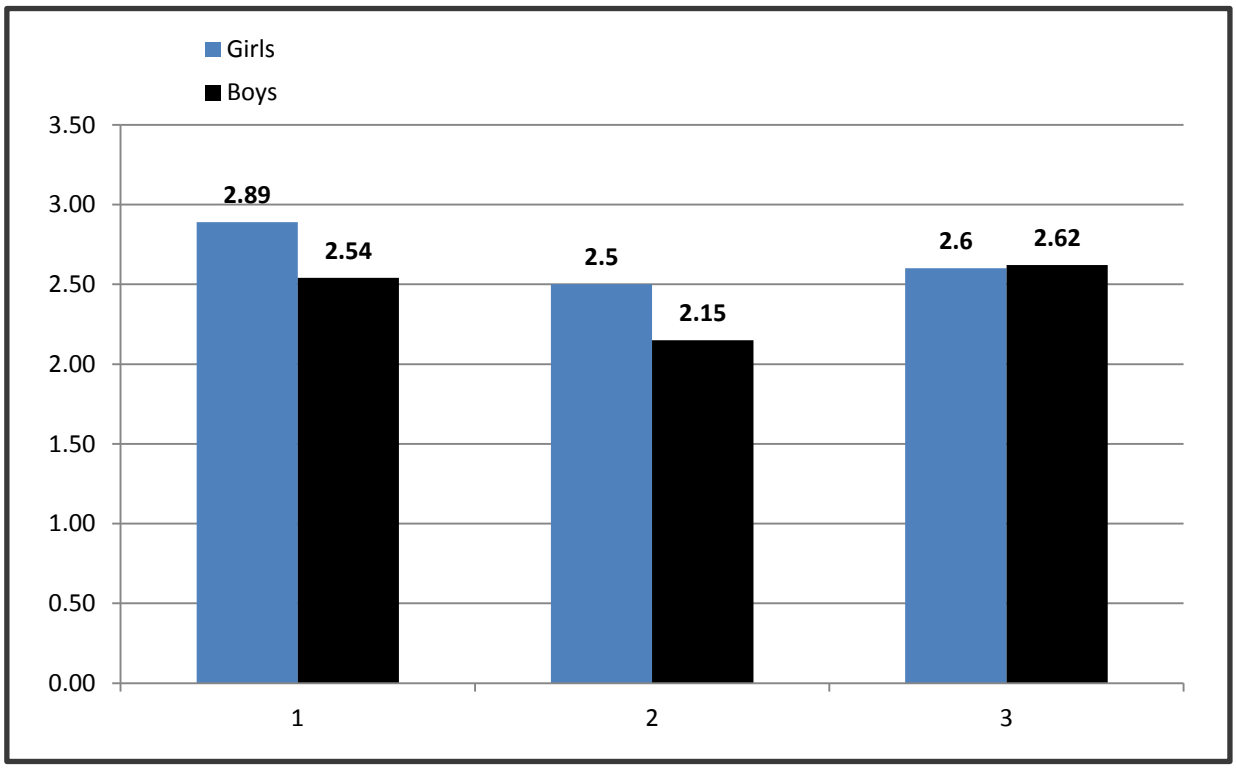
3. Determine which resource is more important to SW Asia, oil or water. Explain why you made the choice you did.

Results. As the students began to settle into the requirements of the study by composing a minute paper during each class, the first week's results were encouraging and demonstrated their ability to connect and truly decompose the information. The minute papers highlighted connections made by the students to the material which provided valuable insight into their thinking. The initial minute papers were insightful and interesting.

The following graph (Chart 1) displays the results broken down by gender for the first week as an overall daily average. The girls scored significantly higher by .35 points on days one and two while the boys barely edged out the girls on day three by .02 points. It needs to be stated, again, that the gender demographics of the classroom are 57% males and 43% females; this might have a slight impact upon the overall averages when compared side-by-side. The overall averages for week one was significantly higher for the girls by .34 points.

Chart 1

The chart compares Week One overall girl's and overall boy's averages.

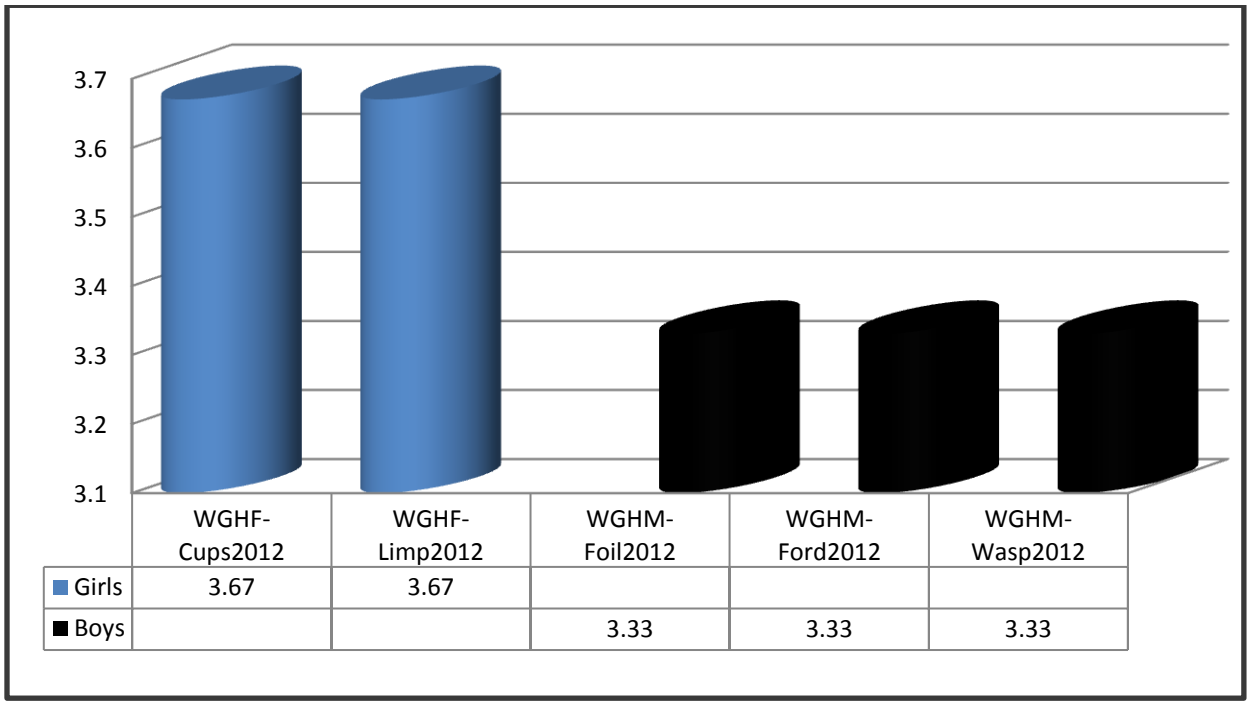


Two girls scored highest for the week with an average of 3.67, while three boys tied for the highest average score of 3.33. This, also, demonstrates a significant difference between the genders of .34 points. However, for the students to share the highest score with their peers was eye opening as no one student dominated the slot for either the boys or girls. It was interesting to have such similar scores and highlights a commonality among the students and their previous

classroom discussions. The graph (Chart 2) below shows the high scorers of the week, which represents the top 21% of the class.

Chart 2

The highest overall individual average for the girls and boys for Week One. Two girls had the same high score of 3.67, while three boys had the same high score of 3.33.



The minute papers. On day one, seven students or, 32% of the students scored a four; the highest score per the set rubric. The prompt for day one asked students about Russia's anger over Turkey governing two straits. The students' used their minute paper to demonstrate their critical thinking of the prompt by discussing how the economy of Russia could be affected as well as the economies of other countries that trade with Russia. On top of this insight, they mentioned other issues such as needing to transport food or Turkey wanting to ensure that illegal goods, such as firearms, do not pass through the straits and end up in the wrong hands.

WGHM-Glee2012 (2013) stated "...these two straits are of strategic value...just as the Strait of Hormuz is to Iran" (p. 1). This is a great example of how this student is using his critical thinking skills by making comparisons to other straits that, in their opinion, have strategic value.

Another point of view, made by WGHM-Wasp2012 (2013), is how Russia's bottom line could be affected by the interruption of moving goods through the two straits, which would weaken or even decimate their economy. WGHF-Limp2012 (2013) took it a step further by realizing that if Russia suffers from a slow or weak economy it could have a direct impact on "...many other countries that are...allies and depend on Russia...". It is clear from these few examples critical thinking skills are apparent and in use as they are able to articulate their responses.

The flipside of these responses demonstrate students' inability to think beyond the obvious or could be unsure what exactly is expected. However, all students were supplied with the Scoring Rubric and encouraged to review it. Yet, WGHM-Main2012 (2013) took this prompt and focused on one sentiment in that "Russia would maybe like to export materials to different countries without being governed by someone else" (p. 1). Many countries that would like to transport goods without answering to another country; however, this response fails to demonstrate a true comprehension of the prompt and an appropriate answer using critical thinking skills.

This same student asked "[W]hy would Russia be upset about that? It's not like they can't export thing [sp] out. They still can" (WGHM-Main-2012, 2013, p. 1). This is a shallow question and highlights a lack of deep understanding to the issue. By week three, this student improved; therefore, it can be theorized that this student was having an off day, failed to take his responsibility in the study seriously, or was unsure how the two straits were of importance to Russia. Another student, WGHM-Upon2012 (2013) took a slightly different, yet equally ineffective in critical thinking, approach by using their minute paper to state that if Turkey blocks the two straits "Russia will have to find other ways to ship their goods" (p.1). It makes

sense this would happen; however, the lack of understanding "why" it would happen is what is lacking in this response. This student, also, improves as the study progresses.

By day two, 43% of the students scored one point lower on their minute papers with only 8% scoring a four. However, WGHF-Post2012 increased two points. As many students mentioned the urns, only a couple added the information that salt is a natural preservative. WGHF-Post2012 (21013) responded thoroughly and provided a great explanation of why the Dead Sea Scrolls were so well preserved.

> The conditions inside a cave are usually cold and damp...and given that the scrolls were found in urns they survived longer...by keeping out of water. The coldness of the cave, also helped preserve the Scrolls by not letting warm air to touch the scrolls which would melt the ink on the paper. Also, the salt from the Dead Sea helped. Salt is a natural preservative.... (p. 2)

The overall average score for day two was significantly lower than the first day of the study. The lower score can be attributed to the prompt as well as the material. The prompt was succinct and without a frame of reference for storing documents in a cave students might have been lost as to what else could have been done to protect scroll's integrity. In addition to the response from WGHF-Post2012's response, one of the best questions asked on this day of the study, from WGHM-Upon2012 and WGHM-Able2012, was in relation to how the scrolls ended up in the cave. It is a mystery and to ask such a question highlights the higher-level thinking needed to build and exercise critical thinking skills. This prompt asks about the scrolls survival and many students composed a question in that direction; however, to go in the opposite direction and wonder how they arrived in the cave is a clear indication they were tapping into their critical thinking skills.

The last prompt of week one required the students to choose between water and oil in regards to which resource, they believed, was more important to Southwest Asia as well as why they deemed it more important than the other resource. One student scored the highest with a four while 57% of the class scored a three. WGHF-Limp2012 took this prompt to the next level when she discussed a project of the 1970s. The project was to bring an iceberg from Antarctica to the region and allow it to melt supplying fresh water to the area. This was the only student to think beyond the borders and introduce outside assistance as part of her thought process. This demonstrated a higher-level thinking of the prompt by providing more detail than just that a person requires water to survive.

Several students took the opposite approach and decided that oil was the more important resource. The consensus was that by selling the oil they could purchase bottled water or other means in which to ensure fresh water was available. This highlights a way of thinking which embodies critical thinking. The students saw the impetus for taking a valuable resource, i.e., oil, and using it to ensure a steady supply of fresh drinking water.

It is clear that many of them were trying to decide which resource outweighed the other and in the end decided to use one as payment for the other. This was an indication that while many of the students stated the need for oil overrode the need for water, they failed to fully articulate what this means to Southwest Asia as well as the countries which import their oil, e.g., increased consumer prices, economic implications (ripple effect), or how the everyday people (non-wealthy) would benefit, if at all. The students were on a path which was driven by their critical thinking skills; however, they failed to take their thoughts the distance needed to fully envelope or demonstrate those skills.

The Results of Week Two

The results from week two were disappointing. The number of students scoring in higher ranges decreased and they seemed to lose focus on how to use their critical thinking skills in writing; while they, also, seemed to write less compared to the previous week. Many of the minute papers were a few short sentences in relation to the prompt and failed to really decompose the "why" of their minute papers. As a whole they understood the prompt; however, the steam and excitement from week one had worn off and this task was just another thing they had to do to get through. They were going through the motions of writing without putting any of themselves or their critical thinking abilities into their writing.

Daily prompts. The researcher approved each prompt discussed by both the teacher and researcher before assigning to the students. They were based upon a particular lesson of the day and chosen in order to allow students the maximum ability to display critical thinking skills. The following prompts were utilized during week two and are in order from day four to six.

4. With your knowledge and understanding of strategic value, identify a location, outside of SW Asia, which has strategic value. Defend your choice.

5. Why is the relative location of SW Asia important to world oil trade?

6. Why might houses of worship located in different regions of the world look radically different?

Results. After such a great start to the study, week two provided weak responses and questions to each prompt with an overall weekly average of 2.41. This is a decrease of .10 points from week one. The majority of students ranged in the 2.00-2.99 as an overall average for the week. The students whose overall average fell into the 2.00-2.99 range increased 17% from the week prior. The fifth day of the study produced the lowest scores as an overall of 1.96, the girls

overall score was 2.15, and the boys overall score was 1.85. For the exact middle of the study to generate such low scores, it demonstrates restlessness among the students in that they were tiring of the daily task as a whole, a rebellion of sorts. It is clear that by this day of the research, their enthusiasm had waned and they just wanted to get through the task of composing their minute papers. It was shocking to see such a drop in critical thinking levels compared to week one.

However, while the consensus of the week was poor compared to the previous week, one student, 4%, scored a perfect four for the week. This means they received a four for each day of week two. No student scored perfectly in week one; which means it was a 100% improvement in the 4.00 category. Additionally, the 1.00-1.99 category decreased by 4% which shows that one student was better able to make the necessary connections or was better able to articulate what they wanted to say through their writings. By contrast the 3.00-3.99 category decreased by 18% or almost half. Therefore, while there were some encouraging results, the week overall was enlightening in that it provided a look into students understanding that this task was expected of them (per the Informed Consent Form) and they needed to get used to become accustomed to the daily task, at least for another week.

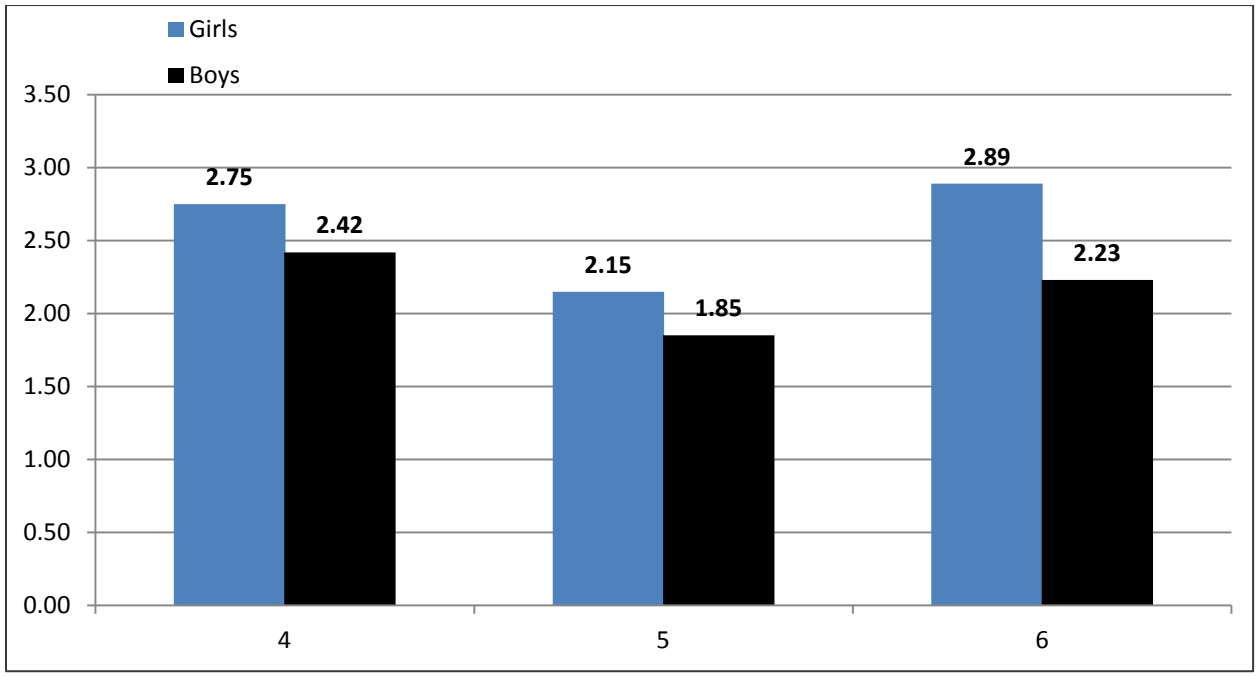
During week two the girls scored significantly higher than the boys for all three days. The biggest difference came on day six of the study and the final day of week two with the girls averaging .67 points above the boys while day four was .33 and day five was .30 points above. That is a huge difference compare to week one when the boys averaged .34 points behind and even edged out the girls on day three. The notable differences demonstrate the boredom felt as it appeared to be a consensus among the students and due to this it led to overall lower scores.

Since this was the second week of the study, the lower scores fail to support any student being certain of what is expected of them on composing minute papers. It is difficult to pinpoint

the exact reason, beyond boredom or an unspoken mini-rebellion in having to keep up the daily task of writing, because they were able to write about the prompt supplied articulating a general comprehension of the material. However, a good portion of the students failed to utilize their critical thinking skills while composing their minute papers in order to backup their general comprehension. Furthermore, many of the questions posed were equally lacking in critical thinking. The graph (Chart 3) below shows the breakdown.

Chart 3

The chart compares Week Two overall girl's and overall boy's averages.

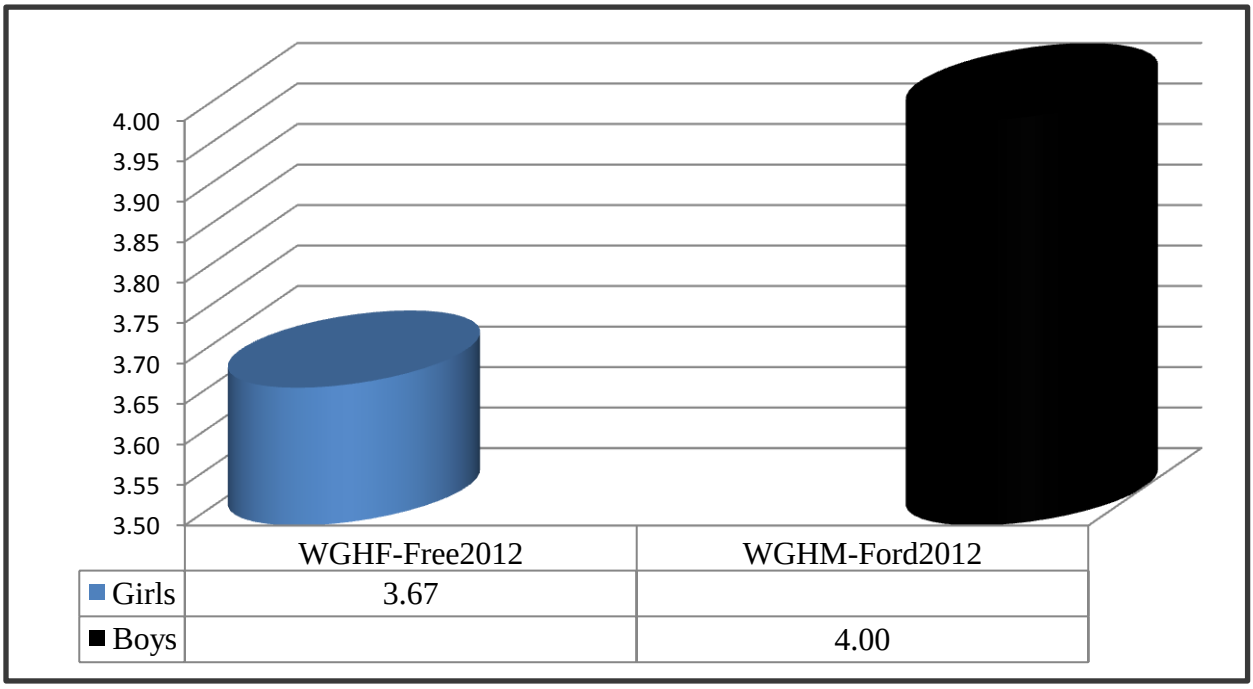


Compared to week one there were no ties for the highest overall weekly score. However, this week one student, 4%, did, in contrast to the overwhelming majority faring poorly compared to the week prior, achieve a perfect score, 4.00. WGHM-Ford2012 went above and beyond on each minute paper to decipher the prompt and decompose their responses. These high scores are an increase over week one's high scores which is in stark contrast to the majority of the other students' performance. At this point, it was expected that multiple students would dominate the

weekly high scores, which would mirror the prior week. Nonetheless, with the poor performance, it was equally unexpected to have a perfect score. The stark contrasts to the perfect score paired with the poor performance were puzzling. It can be deduced that the higher scoring students were serious about their responses and in fact were exercising their critical thinking skills at a higher-level. The chart (Chart 4) below represents the top 9% of the class, which, because of no ties of the score, is a decrease of 12%.

Chart 4

The highest overall individual average for the girls and boys for Week Two.



The minute papers. The first prompt of the week asked students to identify a place of strategic value outside Southwest Asia and defend their reason for choosing that place. The majority of students chose the Panama Canal and the second most chosen was the Mississippi River. There was one about the St. Lawrence Seaway in Canada, Florida, and a couple students chose the Strait of Gibraltar. Of all of the minute papers, the one that stood out the most, throughout the study, was composed by WGHM-Ford2012 in week two on the fourth day of the

study. The place he chose was Area 51 in Nevada in the middle of the Mojave Desert. Choosing such an obscure location which is never mentioned during a WGH's class is risky to defend as a place of strategic value; however, this student took it to the next level of critical thinking. The minute paper about Area 51 from WGHM-Ford2012 (2013) below demonstrates great critical thought.

> In the Nevadan desert (Mojave) lies a secret base. Inside that base are countless prototype items, such as planes, submarines, weapons, and ¹AI. This place is top secret to the military, and is known as Area 51. Countless enemy countries have dreamed of the day they can storm into Area 51 and claim all the military loot for their own. If an enemy country actually manages to get ahold [sp] of our defense technology that was in Area 51, the world would never be the same. The enemy countries would use the technology inside that air force base for evil, causing wars all over the entire world. Others would sell it on the black market + [*sic*] gain blood money from those technologies. No good can come out of this scenario.
>
> How would countries react/think if a neighboring country took a location with major strategic value in their vacinity [sp]? (WGHM-Ford2012, 2013, p. 4)

Regardless if Area 51 does actually hold these items, it has been under speculation and scrutiny for years while becoming a place which breeds conspiracies. WGHM-Ford2012 (2013) took the initiative to discuss why it is a place of strategic value, i.e., prototypes, and what could happen if the items it holds ever lands in enemy hands, i.e., wars. Had the student only mentioned Area 51 and never backed up the "why", it would have fallen far short of critical thinking and been more of an unusual place to choose rather than one that holds strategic value.

The minute paper as a whole facilitated a new way of thinking for this student as he was the one who scored a 4.00 average for week two.

Some of the questions in relation to the Panama Canal simply lacked any thought by seeking mundane and simplistic answers such as how many ships pass through in a day, how long the canal is from end to end, or how big of a ship can go through the canal. Those types of questions demonstrate a total lack of critical thought and can be attributed to boredom, uncertainty of the information, or unsure how to frame an insightful question based upon the prompt. Again, by week two is was clear through the student's minute papers that something had changed in their ability or eagerness to showcase their critical thinking skills. Also, several students either forgot or chose not to include a question. Therefore, due to the lower scores, the lack of critical thought in some of the questions is definitive of boredom with the task as their enthusiasm waned.

The fifth day of the study was highly disappointing in regards to the results produced. The overwhelming majority of the minute papers lacked the basic tenets of critical thinking and appeared to the hastily slapped onto the page with little thought for the prompt or what it meant. Many of the students wrote that Southwest Asia was in the middle of all of the continents or at a crossing point. While these points are valid, their ability to defend or explain why they chose these statements was poorly constructed if they offered any at all. The conclusion is that this day of the study falls right in the middle and students were rebelling against the daily writing task. They had grown tired and as a collective whole took this prompt less seriously than any of the others.

The final day of week two begins an increase in scores. While the previous day's rebellion was behind them, a new day dawned allowing them to stretch their critical thinking

skills in new directions. They had dipped in their scoring and were beginning to rebound. From this point forward scores steadily increased and the minute papers improve considerably by highlighting the higher-level thinking this study wanted to discover. The last prompt asked about places of worship and why they are dramatically different around the world. The students flew all over this prompt and began breaking out new arenas of thought. They brought about ideas in relation to the physical location such as the land formation and climate; when the religion began in regards to expectations, architecture, and customs; materials available in the region, whom was being worshipped, i.e., sun, moon, gods; and the traditions which may dictate items and their relative location in or outside the place of worship.

Additionally, WGHF-Free2012 (2013) spoke about how ancient Mexico's temples were outfitted to worship the sun while places of worship in Africa have open spaces. She even mentions the intricate detail of Europe's places of worship compared to the simplistic church steeples which can found throughout America. Her question truly nails the understanding as she wonders if "...people are affected by the style of the building that they worship in" (WGHF-Free2012, 2013, p. 6). That question sets the stage for a whole new discussion and debate. With her ability to decipher the prompt and provide examples as well as explanations, her question moves her to higher-level thinking. On the other hand, WGHF-Held2012 (2013) wrote about the differences stemming from the meanings to each particular group or staking one group's individuality over another. The question she posed speaks to the heart of the differences by wondering how people would "...react to making a drastic change to their place of worship if necessary" (WGHF-Held2012, 2013, p. 6). This can marry into WGHF-Free2012's (2013) question about the style of a building having an effect upon the people. Moving the ancient

Mexican's place of worship to an intricately detailed church, such as those found in Europe, would be unsettling, at the very least, but would ultimately influence their practices.

The Results of Week Three

The final week of the study lasted four days which was a day longer than weeks one and two. The students already had two study weeks' worth of experience in what was expected of them in composing their minute paper as they fell into a regular routine. They knew once a pre-determined lesson concluded, they would be expected to compose their minute paper. By this time in the study, the students had developed a routine. The minute papers showed more depth in the students' thinking while their questions were keenly insightful.

Daily prompts. The researcher approved each prompt discussed by both the teacher and researcher before assigning to the students. They were based upon a particular lesson of the day and chosen in order to allow students the maximum ability to display critical thinking skills. The following prompts were utilized during week three and are in order from day seven to ten.

7. As the Arab countries continue to develop and improve methods of providing freshwater to their populations, why might the types of materials used to convey water, such as brick tunnels or metal pipes, be important?

8. As rapid changes and modernization, as well as Western influence, take place in SW Asia, will the Muslim traditions and influences on that region be affected? Why/why not?

9. What problems could be the result of the millions of refugees, from a variety of regions, in SW Asia?

10. Religious conflicts play a major role in the Middle East. Can you think of conflicts between religious groups in the US. Explain your answer.

Results. The final week of the study provided valuable insight. The main point was that the majority of all students, 70%, increased their overall weekly scores from week one to the

final week. A handful of students, 26%, had lower overall weekly scores and one student, 4%, remained the same. The substantial increase demonstrates that students were able to build upon their critical thinking skills. Another encouraging trend, which supports the growth of critical thinking skills, was the overall weekly breakdown of scores. During week two there was an increase of students scoring 2.00-2.99 and a decrease in scoring 3.00-3.99. However, during week three there was a 40% increase to 57% of the students scoring 3.00-3.99 compared to week two, a decrease of 26% in scoring 2.00-2.99, and a 13% decrease in scoring 1.00-1.99, which means no student scored this weekly average. However, the score of 4.00 remained the same at one student, 4%.

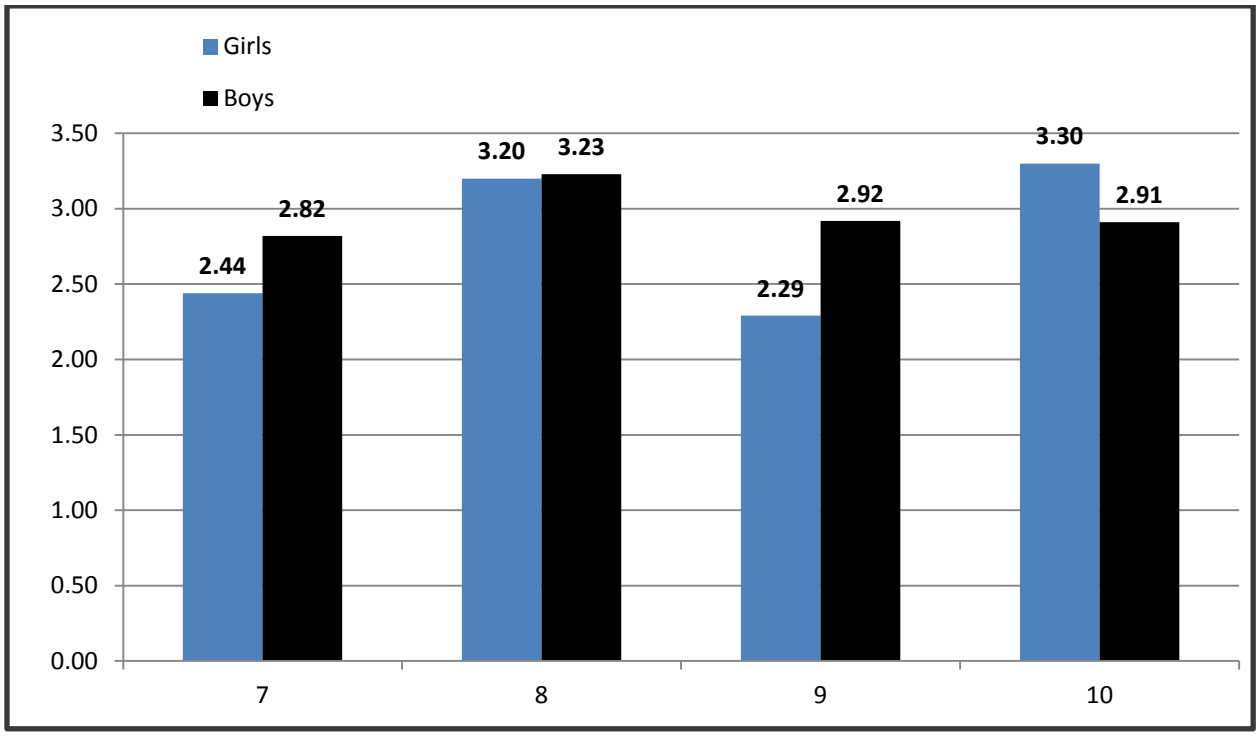
Week two provided some shaky and questionable statistics; yet, the final week's numbers dictate a rebound from the rebellion students succumbed to in week two. They wrote longer minute papers with enhanced substance rather than a few lines of fluff, which seemed to dominate the prior week. The students appeared to understand the task of composing the minute papers and questions with more comprehension than the previous two weeks. This understanding was proven through the higher scores achieved.

In the first two weeks of the study, the girls primarily dominated the boys with higher scores. However, during the last week, the boys scored higher for three out of the four days. The boys clearly demonstrated the use of their critical thinking skills in order to garner scores which outpaced themselves in the previous weeks. The majority of their minute papers were more than the four to six sentence expectations and truly grasped the essence of the prompts through their writings. It was encouraging to see such a dramatic increase in comprehension which demonstrated that through the use of minute papers, the students were working, diligently, towards capitalizing upon their responses.

The graph (Chart 5) below shows that on day nine the boys were significantly higher, overall, by .63 points. This is a considerable difference between the two genders. While on day seven they were .38 points higher, and on day eight they barely edged above the girls. By the final day of the study, the girls outscored the boys by .38 points.

Chart 5

The chart compares Week Three overall girl's and overall boy's averages.



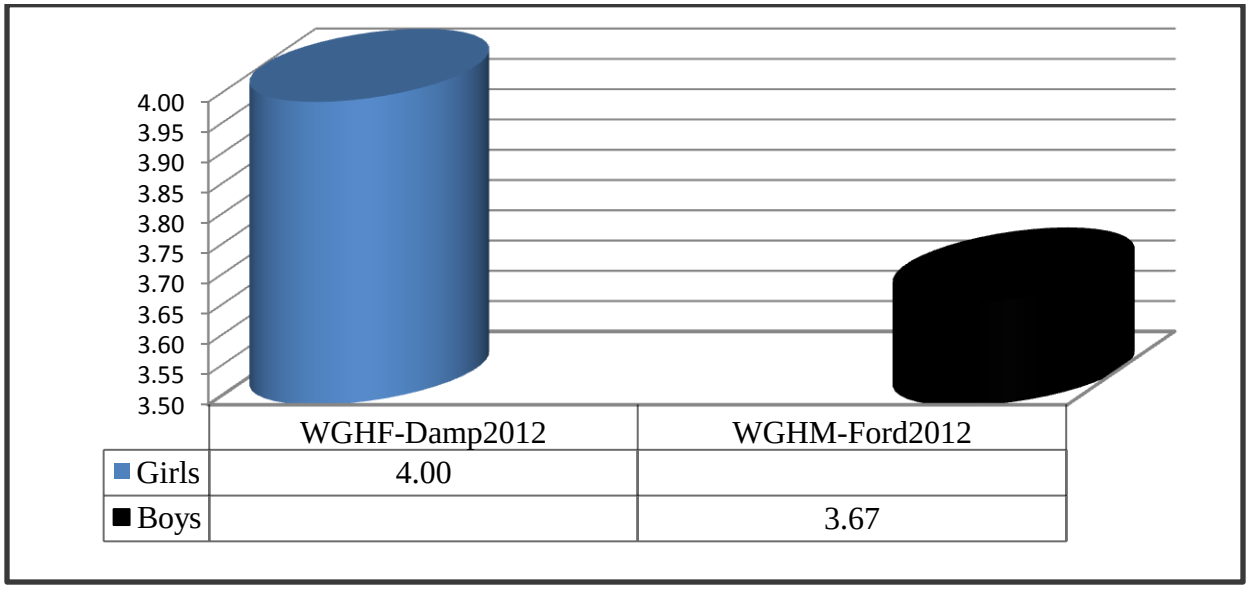
The overall highest scores for week three were the same as last week. The only twist is that a girl achieved a perfect score while the boy was very close at 3.67. The top 9% of the class is represented with these two students, which is no change from the prior week.

Another pattern which has emerged is that WGHM-Ford2012 was the high scorer to conquer each week, even tying with two other boys during week one. This student also wrote one of the most memorable minute papers in regards to a place of strategic value outside Southwest Asia. He has been fairly consistent through the whole study in exhibiting his critical thinking

skills. The following graph (Chart 6) provides a visual of the two highest scores ending week three.

Chart 6

The highest overall individual average for the girls and boys for Week Three.



The minute papers. As the students really increased their scores, their minute papers became much more substantial in the way of content and explanations or reasoning. For example on day seven, a couple of students really took their critical thinking skills to a higher-level. They outdid their previous week's scores by really thinking critically about the prompt. WGHM-Loud2012 (2013) listed four ways to convey water and really drilled down on the reasons as to why drip irrigation was the best. On the other hand, WGHF-With2012 (2013) was the only student to mention that conveying water through pipes was faster than using trucks to haul the water to the varying regions.

Furthermore, WGHM-East2012 (2013) went in a new direction for material to convey water from one place to another. The prompt mentions brick and metal as a way to convey water; however, WGHM-East2012 (2013) was the only student to mention the use of brass pipes and why their use would be better than either brick or metal. Moreover, on day nine he was the only

student to mention how the environment and wild life would be impacted by an influx of refugees from neighboring countries.

Another breakout student was WGHM-Vase2012. While he maintained lower averages through most of the study on day eight he really nailed the essence of critical thinking. The prompt asked about how the Muslim religion would change, if at all, with western influences. He began his minute paper with the following sentence, "I believe that the Muslim religion will change, because it will have to to [*sic*] survive" (WGHM-Vase2012, 2013, p. 8). Now, that is an amazingly put insight. While other students mentioned that it would or would not change based upon their reasoning, he was the only student to mention the religion's survival or that the traditions would begin to die away if changes failed to come about.

On the other hand, WGHF-Gulp2012 (2013) took it in another direction by comparing the changes the Muslims would face just as the influences of other countries changed America only a few decades ago. The people who move to America arrive with their culture and traditions intact will influence and have an impact upon the people and regions they inhabit, western influences would do the same. Her question "Could the Western Influence [*sic*] on Muslin Traditions [*sic*] change relations between the US and Muslim Arab Nations?" was intriguing, simple, and yet the complexities which emerge could be debated for decades (WGHF-Gulp2012, 2013, p. 8).

Some of the minute papers produced amazingly insightful questions throughout the last week such as WGHM-Raid2012's (2013) question poised on the final day of the study, "Why are many countries theocracies and/or have official religions if that can cause conflict?" (p. 10). This question speaks to heart of critical thinking and why do countries invoke a specific religion if conflicts reign; again, such a simple, yet complex question to post. A different question view

from the same prompt was from WGHF-Coat2012 (2013), "Do you think Christians find it easier to get along w/ [*sic*] other religions even if they don't agree with them?" (p. 10). One religious group may feel that they do get along better or another group may refuse to acknowledge or accept a religion which is radically different what they believe.

Many of the questions posed are rather intuitive. The following list of questions from day eight in relation to western influences were notable in their insight and justifiably bring the student to a higher-level of thinking . This list is far from inclusive, however, it is a well-rounded representation of the thought process.

WGHF-Pens2012 (2013) - "How do Muslims keep their old traditions even though there is [*sic*] rapid changes?" (p. 8).

WGHM-Foil2012 (213) - "Will Islam still be a Major [*sic*] religion in 100 yrs with Technology's [*sic*] advancements?" (p. 8).

WGHF-Cups2012 (2013) - "Would modernization help with the government issues, such a theocracy?" (p. 8).

WGHM-Able2012 (2013) - "Will muslims [sp] resist modernization to keep Islam + [*sic*] its traditions alive?" (p. 8)

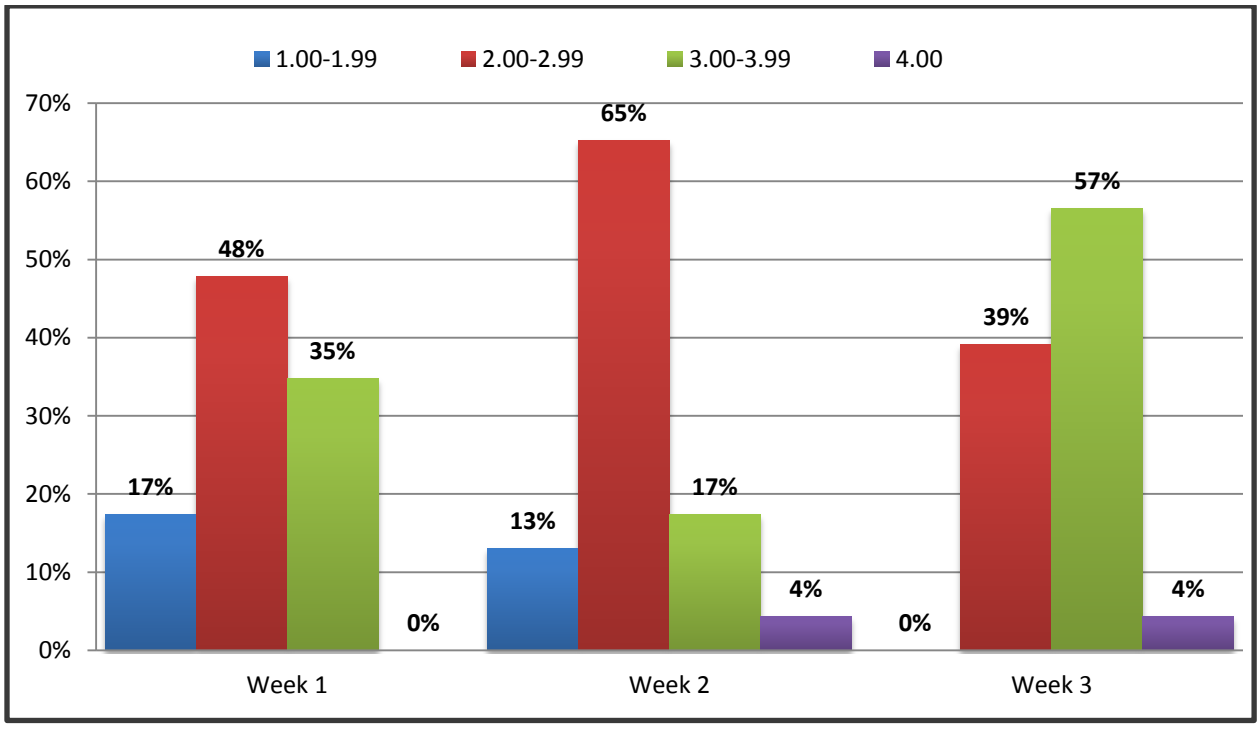
Culmination of Results

Each week's breakdown of scoring was mentioned throughout the weekly results sections and it shows a steady increase of critical thinking skills over the whole study. Week two presented issues in that the students appeared to lose enthusiasm of the daily task which is representative of their overall scores. Although, by the final week of the study the students far surpassed the previous two week's scores while the depth of their minute papers reflected a higher-level of critical thinking and the questions they posed, also, took on a new level of

understanding. The following graph (Chart 7) is a breakdown of each week's scoring. It provides a visual representation of how the scoring as an overall percentage in each Rubric category. The increase of higher scores is indicative of the growth of critical thinking skills as 57% of the students averaged 3.00-3.99 in week three which is a 22% increase over week one.

Chart 7

Overall scoring percentages broken down by week.



It is important to note that there were three, or 14%, more boys in the class. This can have an effect upon the overall scoring; however, as a whole the boys scored well, especially during the final week by dominating three of the four days. The following graphs (Chart 8) represents the weekly averages broken down by boys, girls, and overall of the whole class compared to graph (Chart 9) which breaks down the overall averages along with the boys and girls averages on a daily basis. Each graph is important as it provides a visual understanding of how the students fared in their composition of minute papers on a daily and weekly basis.

Chart 8

Weekly averages broken down by girls, boys, and overall (the whole class).

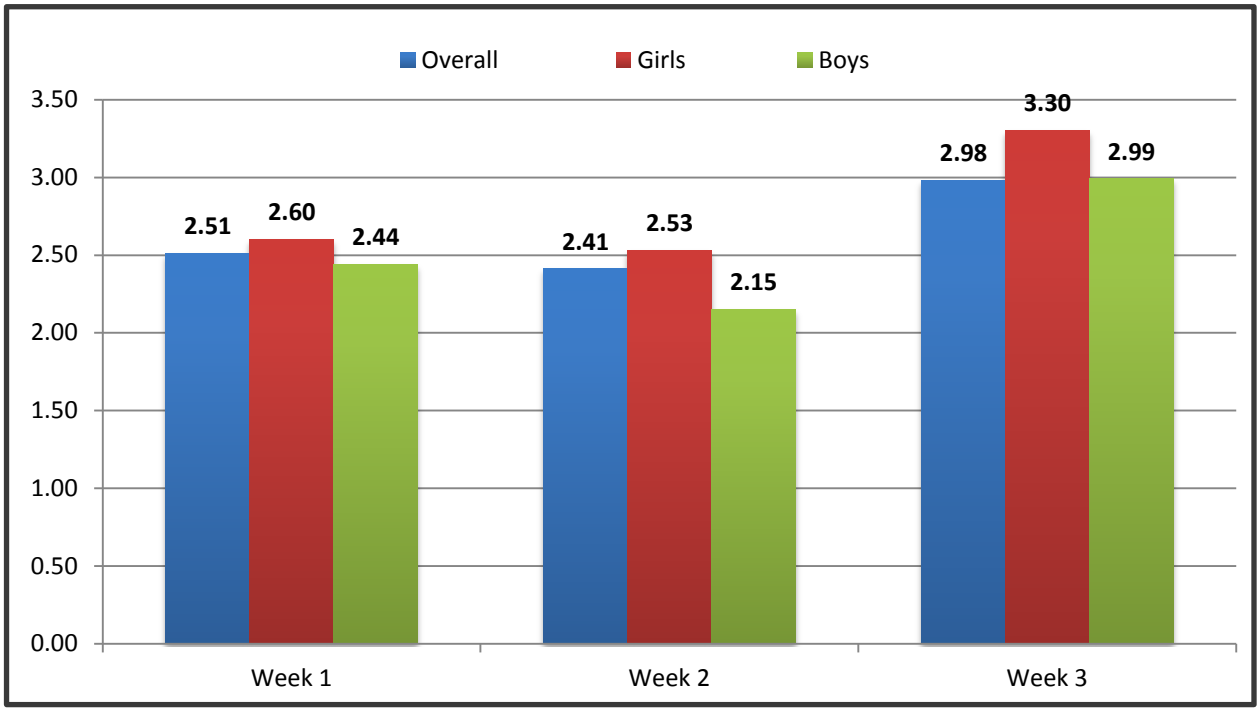
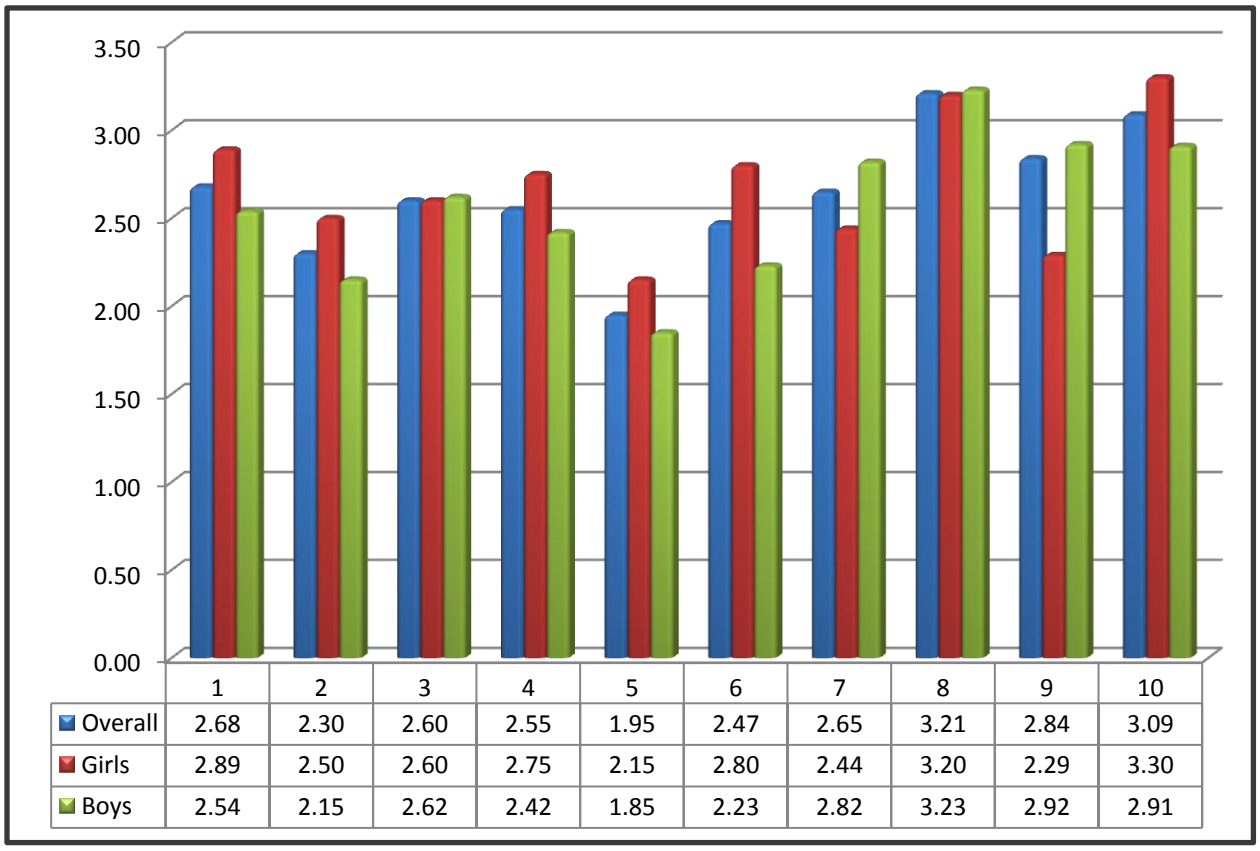


Chart 9

Daily averages broken down by girls, boys, and overall (the whole class).



	1	2	3	4	5	6	7	8	9	10
Overall	2.68	2.30	2.60	2.55	1.95	2.47	2.65	3.21	2.84	3.09
Girls	2.89	2.50	2.60	2.75	2.15	2.80	2.44	3.20	2.29	3.30
Boys	2.54	2.15	2.62	2.42	1.85	2.23	2.82	3.23	2.92	2.91

The girls scored higher each week (Chart 8) and 60% of the time on the daily average (chart 9), yet they only represented 43% of the total class. Therefore, without an equal amount of students to compare this can cause a curve in the analysis which would favor the girls. Nonetheless, with a 14%, or three students, difference it is a small enough distinction to provide an insight into how the students would ultimately perform had there been an exact ratio of girls to boys. It demonstrates that regardless of gender the students accepted the task, i.e., compose minute papers, and succeeded in building their critical thinking skills each time they wrote with the final week in veritably highlighting their critical thinking skill set.

Answering the research questions. The main focus, and first question, of this research was to determine how the minute papers could improve the development of critical thinking skills. This question was answered through the scoring of the minute papers which examines the depth and breadth of the content. Based upon the scores as a whole, the minute papers did facilitate improvement in critical thinking skills. This is demonstrated by the fact that at the end of the study, the scores increased for 70% of the students between weeks one and three. Slightly more students, 74%, increased their comprehension from week two to three.

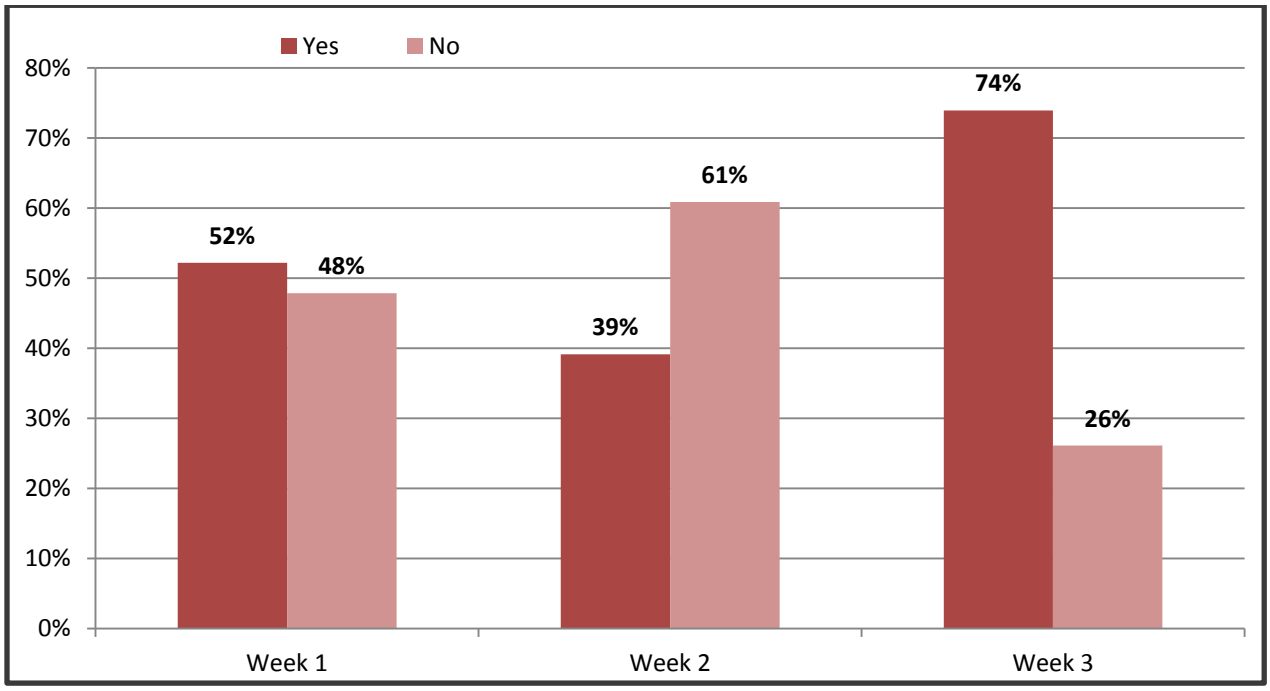
The students used the minute papers to decompose their knowledge beyond the four to six sentences, which was given as an expectation. Their ability to think critically grew over the length of the study while the majority of the minute papers became a full page long. In addition to their increase in critically thought out minute papers the questions posed by the students, also, increased in profundity. Therefore, minute papers do aid in the development of critical thinking skills.

The second question posed sought to understand the correlation between minute papers and whether students would be willing to embrace and develop critical thinking skills. At the end

of each week, two survey questions were answered based upon the scoring of the minute papers. The first survey question was to determine if the minute papers demonstrated improvement and the second was to establish if the questions posed demonstrated improvement. The composing of the minute papers and questions allowed students to fully express their understanding and reasoning; thus, by the end of the study, the majority of students did increase in both realms. The following graph (Chart 10) is the breakdown of the survey question pertaining to the improvement of the minute papers at the end of each week.

Chart 10

The breakdown of weekly survey question: The student's minute papers demonstrate improvement in their critical thinking over the week.



It is clear from the above graph (Chart 10) that 35% of the students' demonstrated improvement between week two and three while there was a 13% decrease between weeks one and two. This can be attributed to the lack of enthusiasm; or rather the excitement began to wane, once they had been participating in the study for a week. In the same sphere it correlates with the

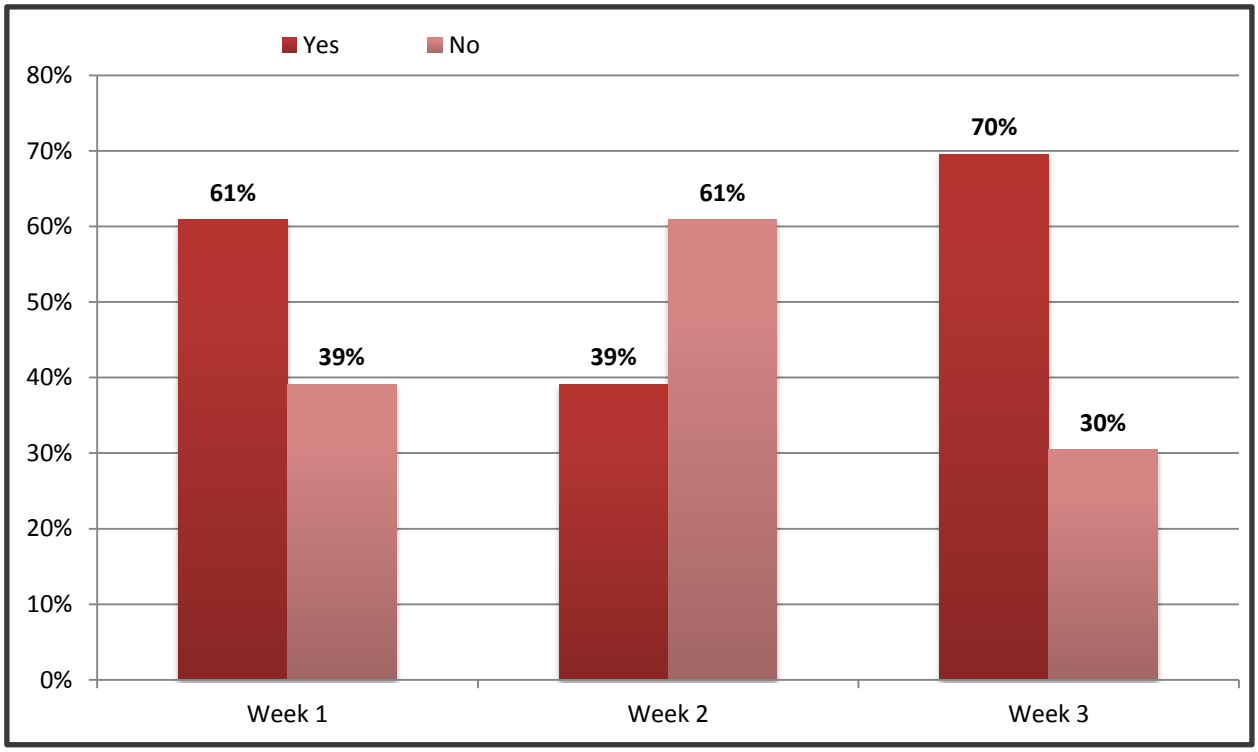
scoring of the minute papers and mirrors those results as week two yielded poorer results than either week one or three.

The other survey question sought to gain understanding on the improvement of the questions posed by the students. During the first week, a handful of students, 22%, failed to ask a question. This can be attributed to forgetting that it was required because of that handful almost all of those were on day one of the study. In the following weeks, 13% failed to add a question in week two and 4% in week three. Again, that is attributed to forgetfulness on the part of the student because the following weeks of the study students should have been consciously aware of the requirement to pose an insightful question.

The following graph (Chart 11) provides a visual representation of the improvement of the questions posed.

Chart 11

The breakdown of weekly survey question: The student's minute papers demonstrate improvement in the questions posed over the week.



There was a 41% increase between weeks two and three, while there was a slight increase of 9% between weeks one and three. Overall, 70% of the students improved their questions during the final week of the study. This is a large percentage and highlights the students' willingness to embrace the challenge of formulating an insightful question as a tool to be utilized for the development of critical thinking skills. The questions were a means to capture the full command of the students' comprehension. For students to ask a question about a prompt which goes beyond the scope of the question, they are really getting to the essence of the prompt without rewording the it and they are using higher-level thinking. Many of the questions were very insightful and took it to another level. Also, while some of the minute papers may have lacked substance, the questions were right on target and vice versa. There was no pattern which developed through the analysis of the information to determine if any particular common denominator was the basis for such an anomaly.

The final question which helped to shape this research was to understand the teacher and her point of view in relation to the students' comprehension of the material from the previous class. Overall, T-WGH (2013) rarely had to backtrack since this was a honors class; except she noted in week three that due to the nature of the material she did cover a portion of the same ground. One of the most profound comments made by T-WGH (2013) was during week one in which the teacher stated that due to the minute papers she needed to accelerate her critical thinking questions as well as this study was a learning experience for her too. T-WGH (2013) relayed at the end of the study "...you have influenced me" (personal communication, February 5, 2013).

Therefore, minute papers do have a significant impact on the teacher as much as they do the students. They afford the student an opportunity to grow and develop their critical thinking

skills while the teacher did notice her lessons being impacted in a positive way. She did state during the study that she began using some of the prompts in her other world geography class, which is non-honors, as well as began approaching her international issues class with questions that facilitate more critical thinking discussions (T-WGH, 2013). Furthermore, T-WGH (2013) assured her students that just because the study has concluded, they will need to keep these skills fresh because she will be using other avenues to cultivate them. She is most likely not going to continue using the minute papers in the same fashion as this study; however, she has stated she will use them as group discussion prompts and/or test questions.

Regardless of how the teacher implements critical thinking skills in her lessons, the students now understand what is meant by developing these skills. They are able to take the understanding to other classes and continue to build them. The teacher will, also, ensure the precedent set during this study remains vigilant as she has seen a difference in classroom discussions from these students which is highly beneficial as lessons are prepared and projects are chosen.

Overall Analysis

This study afforded real insight into the development of critical thinking skills. Minute papers are a vital tool to this development. They can be shaped to fit any classroom as well as tailored to a specific lesson. The research shows that minute papers did make a difference and do lead to increased critical thinking skills. Giving students the opportunity to write based upon a predetermined prompt they are able to develop critical thinking skills almost immediately as suggested by the scores of week three, which were the top ranking of the entire study.

Taking the time to think about a prompt allows students the opportunity to gather their thoughts and really think about what they want to accomplish in their response. Just as the

minute papers provide an outlet for the students to hone their skills, the prompts constructed provide the teacher with an insight into what the ultimate goal is to accomplish. The teacher, in this study, saw an immediate difference and had to adjust her approach in keeping up with the question which requires critical thinking skills. Once those skills are sharpened, it is vital to keep them that way through daily or weekly minute papers as well as varying other tasks, i.e., group discussions, essays, and test questions.

References

Alpert, E. (2011, May). A tale of two schools thinking deeper. Retrieved from http://www.voiceofsandiego.org/education/schooled/article_d1722842-76bc-11e0-9546-001cc4c002e0.html

Askins, D. (Ed.). (2006). Measuring critical thinking. *Toolkit: The Nuts and Bolts Newsletter from Assessment Services, 4*(4), 1-7. Retrieved from http://www.niu.edu/assessment/Toolkit/vol4_ish4.pdf

Baez. B. (2007). Thinking critically about the "critical": Qualitative research as social critique. New Directions for Institutional Research, 133. doi: 10.1002/ir.201

Baildon, R., & Baildon, M. (2008, May). Guiding independence: Developing a research tool to support student decision making in selecting online information sources. *The Reading Teacher*, *61*(8), 636-647. doi:10.1598/RT.61.8.5

Bartlett, M. G., & Morrow, K. A. (2001). Method for assessing course knowledge in a large classroom environment: An improved version of the minute paper. *American Journal of Pharmaceutical Education, 65*, 264-267. Retrieved from http://archive.ajpe.org/legacy/pdfs/aj650311.pdf

Beyer, B. K. (2008). What research tells us about teaching thinking skills. *The Social Studies*, *99*(5), 223-232. Retrieved from ERIC database. (EJ812510)

Bressoud, D. M. (n.d.). The one-minute paper. Retrieved from http://www.maa.org/saum/maanotes49/87.html

Carr, K. (1990). *How can we teach critical thinking?* Retrieved from ERIC database. (ED326304)

Case, R. & Daniels, L. (n. d.). Introduction to the TC2 conception of critical thinking. Retrieved from http://www.tc2.ca/pdf/profresources/IntroductionTC2Conception.pdf

Chapman, S. (n. d.). Fostering critical thinking using the Socratic Method. Retrieved from http://tilt.colostate.edu/tips/pdf/tip53.pdf

Chareka, O., Leyte, G. & Mills, A. (2010). Let us walk the talk: Successes and struggles in implement global education as a regular course at university level. *Policy & Practice: A Development Education Review, 10*, 120-126. Retrieved from http://www.developmenteducationreview.com/issue10-perspectives4

Connerly, D. (2006). *Teaching critical thinking skills to fourth grade students identified as gifted and talented* (Unpublished master's thesis). Graceland University, Cedar Rapids, IA.

Cotter, E. M. & Tally, C. S. (2009). Do critical thinking exercises improve critical thinking skills? *Educational Research Quarterly*, *33*(2), 3-14. Retrieved from EBSCO*host*

Criswell, J. R., & Criswell, S. J. (1995). Modeling alternative classroom assessment practices in teacher education coursework. *Journal of Instructional Psychology, 22*(2), 190-194. Retrieved from EBSCO*host*

Edmonds, M., Hull, J. A., Janik, E. L., & Rylance, K. (2005). History & critical thinking: A handbook for using historical documents to improve student's critical thinking skills in the secondary grades. Wisconsin Historical Society: Library-Archives Division. Retrieved from http://www.wisconsinhistory.org/turningpoints/pdfs/workshophandbook.pdf

Dewey, J., & Bento, J. (2009). Activating children's thinking skills (ACTS): The effects of an infusion approach to teaching thinking in primary schools. *British Journal of Educational Psychology, 79*(2), 329-51. doi: 10.1348/000709908X344754

Divoll, K., & Browning, S. (2010). The "classroom ticket" to concept retention. *International Journal for the Scholarship of Teaching and Learning, 4*(2), 1-14. Retrieved from http://academics.georgiasouthern.edu/ijsotl/v4n2/articles/PDFs/_DivollBrowning.pdf

Duron, R., Limbach, B., & Waugh, W. (2006). Critical thinking framework for any discipline. *International Journal of Teaching and Learning in Higher Education, 17*(2), 160-166. Retrieved from http://www.isetl.org/ijtlhe/pdf/IJTLHE55.pdf

Facione, P. A., & Facione, N. C. (1994). Holistic critical thinking scoring rubric. Retrieved from http://www.calstatela.edu/academic/aa/assessment/assessment_tools_resources/rubrics/scoringrubric.pdf

Felder, R. M., & Brent, R. (2005). Understanding student differences. *Journal of Engineering Education, 94*(1). 57-72. Retrieved from http://eprints.me.psu.ac.th/ILS/info/Understanding_Differences.pdf

Firey, T. A. (1999). *Socrates' conception of knowledge and the priority of definition* (Unpublished master's thesis). Virginia Polytechnic Institute, Blacksburg, VA.

Hulsizer, M. R., & Woolf, L. M. (n. d.). A guide to teaching to statistics: Innovations and best practices. Retrieved from http://www.webster.edu/teachstats/chapter4.htm#minute

Irfaner, S. (2006). Enhancing thinking skills in the classroom. *Humanity & Social Sciences Journal, 1*(1), 28-36.

Khan, A. S. (2011). Existing level of understanding concepts in the subject of chemistry among class ix students. *International Journal of Academic Research, 3*(1), 317-321.

Kupat, E., Sprague, J. M., Wolpaw, D., Haidet, P., Hatem, D., & O'Brien, B., (2011). Thinking critically about critical thinking: Ability, disposition or both?. *Medical Education, 45,* 625-635. doi:10.1111/j.1365-2923.2010.03910.x

Lambert, J., & Cuper, P. (2008). Multimedia technologies and familiar spaces: 21st-century teaching for 21st-century learners. *Contemporary Issues in Technology and Teacher Education, 8*(3), 26-276.

LaPoint-O'Brien, T. (2013). [Development of critical thinking skills]. Unpublished raw data.

Le, K. G., & DeFilippo, C. L. (2008). Little philosophers. *Educational Leadership, 66*(2), 66-69. Retrieved from http://www.ascd.org/publications/educational-leadership/oct08/vol66/num02/Little-Philosophers.aspx

Lucariello, J. (2012). How my students think: Diagnosing student thinking. Retrieved from http://www.apa.org/education/k12/student-thinking.aspx

Lucas, G. M. (2010). Initiating student-teacher contact via personalized responses to one-minute papers. *College Teaching*, *58*(2), 39-42. doi: 10.1080/87567550903245631

Mabe, L. (n. d.). The importance of applying critical thinking to children's learning. Retrieved from http://www.surry.edu/about/critical_thinking/mabe_importance.pdf

Nobori, M. (2011). Ten takeaway tips for teaching critical thinking. Retrieved from http://www.edutopia.org/stw-kipp-critical-thinking-10-tips-for-teaching

Norris, S. P. (1985). Synthesis of research on critical thinking. *Educational Leadership, 42*(8), 40-45. EBSCO*host.*

Papinczak, T., Tunny, T., & Young, L., (2009). Conducting the symphony: A qualitative study of facilitation in problem-based learning tutorials. *Medical Education, 43*, 377-383. doi:10.1111/j.1365-2923.2009.03293.x

Parker, B. (2006). Instructional adaptations for students with learning disabilities: An action research project. *Intervention in School and Clinic, 42*(1), 56-58. EBSCO*host*

Potts, B. (1994). Strategies for teaching critical thinking. *Practical Assessment, Research & Evaluation, 4*(3), Retrieved from http://PAREonline.net/getvn.asp?v=4&n=3

Quitadamo, I. J., Faiola, C. L., Johnson, J. E., & Kurtz, M. J. (2008). Community-based inquiry improves critical thinking in general education biology. *CBE Life Science Education, 7*(3), 327-337.

Reeder. E. (2011). Measuring what counts: Memorization versus understanding. Retrieved from http://www.edutopia.org/measuring-what-counts-memorization-versus-understanding

Rolling, J. H. (2008). Sites of contention and critical thinking in the elementary art classroom: A political cartooning project. *International Journal of Education & the Arts, 9*(4), 1-28

Rozgay-Miller, J. M. (2009). *Critical thinking and using modern information and communication technology* (Unpublished master's thesis). Sierra Nevada College, Incline Village, Nevada.

Savich, C. (2009). Improving critical thinking skills in history. *Networks: An online journal for teacher research, 11*(2). 1-12.

Schneider, V. (2002). Critical thinking in the elementary classroom: Problems and solutions. Retrieved from http://eps.schoolspecialty.com/downloads/articles/critical_thinking-schneider.pdf

Scholastic. (2011). Think about it: Critical thinking. Retrieved from http://www.scholastic.com/resources/article/think-about-it-critical-thinking

Sezer. R. (2008). Integration of critical thinking skills into elementary school teacher education courses in mathematics. *Education, 128*(3), 349-362

Slavin, R. E. (2012). *Educational psychology: Theory and practice* (10th ed.). Boston, MA: Pearson

Stack, S., Watson, J., Hindley, S., Samson, P., & Devlin, R. (2010). What's average? *Australian Mathematics Teacher*, *66*(3), 7-15. EBSCO*host*

Stage, F. K. (2007). Answering critical questions using qualitative data. New Directions for Institutional Research, 133. DOI: 10.1002/ir.200

Snyder, L. G., & Snyder, M. J. (2008). Teaching critical thinking and problem solving skills. *The Delta Pi Epsilon Journal*, *50*(2). 90-99.

Tiwari, A., Lai, P., So, M., & Yuen, K. (2006). A comparison of the effects of problem-based learning and lecturing on the development of students' critical thinking. *Medical Education*, *40*(6), 547-554. doi:10.1111/j.1365-2929.2006.02481.x

University of Illinois. (2011). LAS teaching academy: Teaching critical thinking. Retrieved from http://www.las.illinois.edu/faculty/services/academy/resources/criticalthinking/

University of Washington. (2011). Using online discussion boards to enhance learning in your class. Retrieved from http://depts.washington.edu/swedtech/2011/04/21/using-online-discussion-boards-to-enhance-learning-in-your-class/

Walker, S. (2003). Active learning strategies to promote critical thinking. *Journal of Athletic Training*. *38*(8). 263-267.

Webster, A. (1994). *The consequences of the lack of critical thinking-based education in the African-American community.* Retrieved from ERIC database (ED384100)

Appendix A

Timeline of Events for the Study

Event	Phase	Timeframe
Contact local high school, meet with school administration and teacher, provide the teacher with the expectations (Appendix B), and prepare notebooks for each student. Send letter home with students (Appendix D), collect all Informed Consent Forms	1	2 weeks
Students will complete minute papers two or three times per week depending upon their block schedule and the researcher will complete a rubric (Appendix E) for each minute paper and a weekly survey (Appendix F) for each student. Additionally, for each week the teacher will complete a weekly survey (Appendix G).	2	4 weeks
Researcher will analyze and graph all compiled information	3	2 weeks

Appendix B

Instructions for students

An instructional lesson will be presented to the students before they begin the study. This lesson provides students with expectations and the difference between comprehension and critical thinking. Additionally, the students will choose a word to complete their code which is specific to them throughout the study.

1. Brief introduction and give an overview of the study, i.e., what is the goal of the researcher and define the difference between comprehension and critical thinking as it pertains to the study.

2. Hand out notebooks already labeled with WGHM- or WGHF- depending upon the student's gender.

3. Pass around a hat/bowl with words from Appendix H and have students write this word in black ink after the dash on the label in the top right hand corner of their notebook followed by the year, 2012. Students will be told to keep this word confidential and may only share with their parent(s)/guardian(s).

4. Students will be told to refrain from making any identifying marks or write their name on or in the notebook as their confidentiality may become compromised and could result in their automatic removal from the study.

5. Pass out a copy of the Rubric which will be used to score the minute papers (Appendix C).

5. Any questions/concerns will be addressed.

Instructions (for Teachers)

1. Teachers will be given instruction as to how to complete their weekly survey.

2. Teachers will be instructed to keep all minute paper notebooks in their room in a locked cabinet and that the notebooks are to never leave their classroom during the study and only the researcher may remove them.

Appendix C

Scoring Rubric

The rubric used to score the student's minute papers will be given to each student in order for them to fully understand what is expected. The researcher will complete a survey form for each student's minute paper.

Consistently does all or almost all of the following: Accurately interprets evidence, statements, and questions. Identified the arguments, thoroughly analyzes and evaluates major alternative points of view. Draws warranted conclusions. Justifies key procedures and explains assumptions and reasons. Fair-mindedly follows where evidence and reasons lead	4
Does most or many of the following: Accurately interprets evidence, statements, and questions. Identified the arguments, thoroughly analyzes and evaluates major alternative points of view. Draws warranted conclusions. Justifies some procedures and explains reasons. Fair-mindedly follows where evidence and reasons lead	3
Does most or many of the following: Misinterprets evidence, statements, and questions. Fails to identify strong, relevant, counter-arguments Draws unwarranted conclusions. Justifies few procedures and seldom explains reasons. Regardless of evident or reasons, maintains or defends views based upon self-interest or preconceptions	2
Consistently does all or almost all of the following: Offers biased interpretations of evidence, statements, questions, information, or the points of view of others. Fails to identify or hastily dismissed strong, relevant counter-arguments. Ignores or superficially evaluates obvious alternative points of view. Argues using irrelevant reasons and unwarranted reasons. Regardless of evidence or reasons, maintains or defends views based on self-interest or preconceptions. Exhibits close-mindedness or hostility to reason	1

(Facione & Facione, 1994)

Appendix D

The Development of Critical Thinking Study
Letter to Parents

Dear Parents:

A 4-week study will be conducted in your child's world geography honors class on the development of critical thinking skills through the use of minute papers. Minute papers are defined as a paper composed at the end of the lesson describing in essay format three facts, ideas, concepts, and/or thoughts learned during the lesson and to pose one insightful question clarification or affirmation of a belief which is directed toward a specific question. The minute papers will be completed during class time. The researcher will complete a rubric for each minute paper and a weekly survey for each student based upon their minute papers. At no time will your child be subjected to any other questioning, surveys, or any other form of testing for the purposes of this study.

The study will be conducted by a Master's of Education student, Tammy LaPoint-O'Brien, at Franklin Pierce University, Rindge, NH, as part of her final thesis for part of her graduation requirement. She has done extensive research in the development of critical thinking. She believes critical thinking skills are a necessity and wants to determine if students' understanding of facts, ideas, concepts, or thoughts beyond a surface level build these necessary skills.

The study will begin on January 4, 2013. The student's identity will be anonymous to me and Mrs. LaPoint-O'Brien as a code will be partially assigned and your child will complete the code from a preset list of words. The code will begin with WGH and then followed by the gender, each student will choose a word from a predetermined list, and insert the year, i.e., WGHF-Word2012. The only person who will ever know which student is assigned to which number is the student. Students will be informed to keep the information confidential to protect their own identity.

Please return the accompanying Informed Consent Form provided you and your child agree to be a part of the study.

The Development of Critical Thinking Study conducted at Friendship Christian School
Informed Consent Form

Date: _____

I give my permission as the parent(s)/guardian(s) of _____ (please print student's name) to be included in the Development of Critical Thinking Study to be conducted at FC School in _____ class.

Parent's Understanding:

- I understand I may ask questions related to this study as they arise to Tammy LaPoint-O'Brien, researcher at LaPointT11@live.FranklinPierce.edu.
- I may remove my child from the research at any time with written notice to my child's history teacher and my child will experience no repercussions from leaving the study. I further understand that my child will participate in the lesson plan, however, will complete a related activity other than the minute papers.
- My child's notebook/minute papers will become property of the researcher, however, my child's teacher and/or I can request copies to be made before the end of the study.

Please return this Informed Consent Forms no later than December 18, 2012. Students who return Informed Consent Forms after this date will not be included in the study due to control purposes.

_____ _____
Parent/Guardian Date

_____ _____
Parent/Guardian Date

Student's Understanding:

- I understand my name will never be used in the research and I will be choosing part of my code only I will know and will keep confidential.
- I may speak with my parent(s)/guardian(s) and be removed from the study by having them send written notice to my teacher and I understand no repercussions will arise from leaving the study. I understand that I will be given a related, but different activity to complete during the time of minute papers.
- I understand I may not make any identifying marks or write my real name in the minute paper notebook as my confidentiality may become compromised and could result in my automatic removal from the study.

_____ _____
Student Date

Appendix E

Daily Scoring Rubric

Date: _____ Participant Number: _____

Read the Scoring Rubric Statement and circle the number in the box based upon the daily minute paper.

Consistently does all or almost all of the following: Accurately interprets evidence, statements, and questions. Identified the arguments, thoroughly analyzes and evaluates major alternative points of view. Draws warranted conclusions. Justifies key procedures and explains assumptions and reasons. Fair-mindedly follows where evidence and reasons lead	4
Does most or many of the following: Accurately interprets evidence, statements, and questions. Identified the arguments, thoroughly analyzes and evaluates major alternative points of view. Draws warranted conclusions. Justifies some procedures and explains reasons. Fair-mindedly follows where evidence and reasons lead	3
Does most or many of the following: Misinterprets evidence, statements, and questions. Fails to identify strong, relevant, counter-arguments Draws unwarranted conclusions. Justifies few procedures and seldom explains reasons. Regardless of evident or reasons, maintains or defends views based upon self-interest or preconceptions	2
Consistently does all or almost all of the following: Offers biased interpretations of evidence, statements, questions, information, or the points of view of others. Fails to identify or hastily dismissed strong, relevant counter-arguments. Ignores or superficially evaluates obvious alternative points of view. Argues using irrelevant reasons and unwarranted reasons. Regardless of evidence or reasons, maintains or defends views based on self-interest or preconceptions. Exhibits close-mindedness or hostility to reason	1

(Facione & Facione, 1994)

Appendix F

Supplemental Questions: These questions are meant to determine the growth of the student's critical thinking skills through the week.

The student’s minute papers demonstrate improvement in their critical thinking over the week.	Yes	No
The student’s minute papers demonstrate improvement in the questions posed over the week.	Yes	No

Appendix G

Teacher Weekly Survey

Week Ending: _____

Answer the following questions in regards to your experience

I spent more than 15 minutes for two or more days covering, explaining, and backtracking the previous day's lessons.	Yes	No
I felt the need based upon my students' comprehension to amend, tweak, discard, and/or eliminate two or more lesson plans.	Yes	No

Comments (optional):

Appendix H

The students will chose a word (e.g., pull from a hat) to be part of the code assigned to each to protect their identity in the study.

rock	east	wasp	your
book	vase	damp	time
loud	limp	tier	iota
raid	ford	main	dill
cups	deer	post	with
pens	glee	upon	able
wore	bent	will	held
read	foil	base	done
free	gulp	toad	coat