AN ASSESSMENT OF THE COMMAND AND GENERAL STAFF OFFICER CORE
COURSE EFFECTIVENESS IN DEVELOPING STUDENT CRITICAL THINKING

by

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B.S., Pennsylvania State University, 1984
M.S., Central Michigan University, 1998
M.S., Kansas State University, 2008

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF EDUCATION

Department of Educational Leadership

College of Education

KANSAS STATE UNIVERSITY
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Abstract

There is a need for critical thinking skills in our society. This research study examines graduate student's growth in critical thinking after experiencing a specifically designed curriculum. This study evaluated the effectiveness of the U.S. Army Command and General Staff Officer Common Core Course to change student critical thinking skills and habits of the mind attributes, and further examined instructor perceptions of the curriculum, instructional methods, and instructor skills and behaviors that impact student critical thinking development within the Core Course.

This study used an explanatory sequential mixed method research design in order to answer the four research questions and test their respective hypotheses. Eight student staff groups (n=120) were selected from the Command and General Staff Officer Common Core Course Class 15 population, and the quantitative data used to conduct the analyses was derived from a pretest and posttest using the Military and Defense Critical Thinking Inventory (MDCTI), a nationally recognized instrument designed specifically for individuals in the defense and military profession. The qualitative component of the study consisted of focus group interviews conducted with instructors from the eight selected staff groups (n=24) to examine their perceptions on the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking. The data collected from these interviews were analyzed and presented using a collective case study approach.

Analysis of the student pretest and posttest score change results indicated statistically significant changes in analysis, induction, deduction, and overall critical thinking skills, and in the communicative confidence, professional confidence, expression, and directness habits of the mind attributes. Further analysis indicated that there was no statistically significant change

differences in critical thinking skills or habits of the mind attributes between the teaching team groups.

Analysis of the qualitative data revealed nine themes that were categorized within the theoretical framework of curriculum, instructional methods, and instructor skills and behaviors. Four additional themes emerged which did not address the role of curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking. These themes included: lack of contact time, the importance of the physical classroom configuration, the military/school culture, and student attributes.

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Dedication

To my mother and father who provided me everything I needed to achieve success in my life. Sorry about those teenage years, thanks for putting me back on the right path. To my father who modeled and instilled a work ethic in me to keep going in the face of adversity. To my mother who put her dreams of becoming a nurse on hold to raise a family. After almost 20 years and plenty of adversity, she went back to school and graduated at the top of her nursing class. Her persistence and love of learning inspired me to continue my education and to take advantage of every possible learning opportunity. Thank you both for your continuous love and support!

Chapter 1 - Introduction

Introduction

The Army Learning Concept for 2015 (ALC 2015) emphasized that the Army will continue to operate in an uncertain environment and must maintain the competitive advantage to "learn faster and adapt more quickly than its adversaries" (Department of the Army [DA], 2011b, p.5). *The Army Leader Development Strategy 2013* emphasized that education must focus on the leader's ability to "improve judgment and reasoning and hone the habits of the mind" (DA, 2013, p.11). This study investigated the effectiveness of the Command and General Staff Officer Common Core Course in developing student critical thinking skills and habits of the mind attributes. Further, this study examined instructor perceptions on the role of the curriculum, instruction methods, and instructor skills and behaviors in developing student critical thinking skills within the Command and General Staff Officer Common Core Course. This chapter will provide an overview of the study, including background of the issues, the problem and purpose of the study, and the research questions to be answered. Next, this chapter will briefly describe the research methodology, the sample, and the proposed instrumentation. Finally the chapter will discuss the significance and limitations/assumptions of the study, and define key terms used throughout the study.

Background

Critical Thinking

Liu, Frankel and Roohr (2013) asserted that "critical thinking is one of the most important skills deemed necessary for college graduates to become effective contributors in the global workforce" (p.1). Higher education institutions acknowledge the need to develop critical thinkers, however, students continue to graduate "unprepared to think critically once in the

workforce" (Flores, Matkin, Burbach, Quinn and Harding, 2012, p.213). Drennan (2010),

McMullen and McMullen (2009), and Seldomridge and Walsh (2006) acknowledged that the

preponderance of student critical thinking skill evaluation has been at the undergraduate level.

Drennan (2010) added that despite the growth in Master's degree programs that emphasize

critical thinking as a central outcome, "there is little evidence of critical thinking evaluation to

measure achievement of this outcome" (p.423).

Tiruneh, Verburgh, and Elen (2014) asserted that "evidence on the effectiveness of critical

thinking interventions has been inconsistent" (p.2). Drennan (2010) emphasized that "developing

and delivering teaching and assessment strategies that emphasize the development of higher

order thinking skills are complex and multifaceted" (p.429). Research on critical thinking

instructional intervention indicated that effectiveness is influenced by the instructional approach,

teaching strategy, student-related variables, and the measurement method (Tiruneh et al., 2014)

Behar-Horenstein and Niu (2011) argued that other factors impact instructional effectiveness

such as: the learning environment, instructor experience, training, and preparation, as well as

both student to instructor and student to student interactions.

Over the past decade, the health care field has noticeably increased their emphasis on a

workforce with the ability to think critically. Brudvig, Dirkes, Dutta, and Rane (2013) noted that

critical thinking is essential for health care professionals in order to "make life-changing

decisions in the most challenging of situations that affect an individual's physical, psychological,

and social well-being" (p.12). Subsequently, educational programs designed for students

pursuing these fields have been at the forefront of critical thinking research.

Over the past several years, the U.S. military, particularly the U.S. Army, has promoted

critical thinking as a necessary skill within its planning, problem-solving and decision-making

processes. Operations in Iraq and Afghanistan over the past decade have caused the U.S. military to adapt its planning, problem solving and decision-making processes to account for the significant changes within the strategic environment. In addition to adapting these processes, the army recognized the need to develop leaders that can think critically. Numerous army publications (DA, 2011; DA, 2012b; DA, 2012c) emphasized the need for leaders to apply critical and creative thinking skills in order to understand and solve complex, ill-structured problems, enabling commanders to make better decisions throughout the operations process. While army doctrine considers critical and creative thinking as disparate skills, Combs, Cennamo, and Newbill (2009) consider critical and creative thinking as an "integrated process that involves the generation and refinement of ideas around a core of knowledge" (p.4). ADRP 5-0, *The Operations Process* described critical thinking (or thinkers) as "purposeful and reflective judgment (or thinking) about what to believe or what to do in response to observations, experience, verbal or written expressions, or arguments" (DA, 2012b, p.2-7, 2-8).

Training and Doctrine Command (TRADOC) Pamphlet 525-3-1, *The United States Army Operating Concept* stated that "the Army must place renewed emphasis on education and leader development to produce a new generation of leaders to succeed in the face of uncertainty" (DA, 2010, p.34). The pamphlet further stated that "by taking explicit steps to promote the value of education, the army assures its leaders possess the ability to think critically, operate in uncertainty, and adapt as needed" (DA, 2010, p.36).

Leader Development

The United States military is one institution that values and promotes critical thinking skills. Military leaders must make decisions in "complex and stressful situations where knowledge is incomplete or uncertain" (Fischer, Spiker & Riedel, 2009, p.2). *The Army Strategic Planning*

Guidance stated that developing leaders comfortable making decisions in dangerous environments is paramount in ensuring that the army can adapt to an uncertain future (DA, 2012a). According to *The Army Learning Concept for 2015 (ALC 2015),* the army requires leaders "who are creative and critical thinkers with highly refined problem solving skills" (DA, 2011, p.59).

The Army Leader Development Strategy 2013 noted that development consists of training, experience, and education and occurs within the three domains of operational, self, and institutional development (DA, 2013). A key component within the institutional development domain is the professional military education system. Dempsey (2012) believed that professional military education must develop leaders with critical thinking skills and the ability to deal with surprise and uncertainty. Day, Harrison, and Halpin (2009) noted that leader cognitive demands in solving ill-structured problems require epistemic cognition, reflective judgment, and well developed critical thinking skills, and further, should be included as part of long term leader development.

For military officers, the professional military education system provides a progressive and sequential education and training process for officers from pre commissioning until the end of their military career (DA, 2008a). The officer professional development model is depicted in Figure 1.1. As officers transition from direct to organizational leadership responsibilities at the midpoint of their career, they are provided the opportunity to attend the Command and General Staff Officer Course (CGSOC) in residence or through distance learning to enhance their critical thinking and problem solving abilities (DA, 2011).

Figure 1.1 Officer Professional Development Model
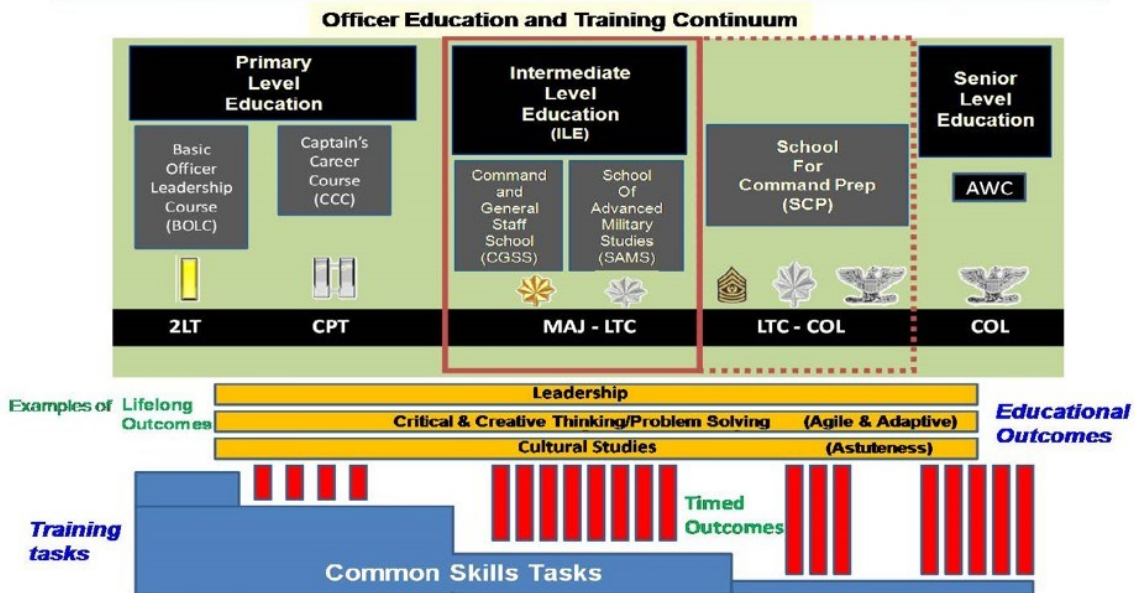
Figure 1.1. Officer Professional Development Model. Adapted from "Educating for a Lifetime: The LD&E Role in Professional Military Education." By W.C. King and J.D. Martin, 2010, unpublished manuscript. Reprinted with permission.

Command and General Staff Officer Course (CGSOC)

The U.S. Army Command and General Staff College provides professional military education through four different schools, one of which is the Command and General Staff School. The college is accredited at the masters-level by the Higher Learning Commission of the North Central Association of Colleges and Schools (U.S. Army Command and General Staff College [USACGSC], 2014b). The Command and General Staff School mission is to educate and train students to solve problems in a complex and uncertain environment.

The Command and General Staff Officer Course serves mid-career officers from the five U.S. uniformed services, civilian government agencies, and militaries of over 70 countries around the world (USACGSC, 2005). CGSOC is equivalent to a specialized graduate program. The Command and General Staff School conducts resident instruction at Fort Leavenworth, KS and

its four satellite campuses at Fort Belvoir, VA; Fort Lee, VA; Fort Gordon, GA; and Redstone Arsenal, AL (U.S. Army Combined Arms Center [USACAC], 2014). Students attending the 10 month resident course at Fort Leavenworth also have the option of completing a Master of Military Art and Science Degree by completing an oral comprehensive examination and the submission and defense of an acceptable thesis (USACGSC, 2005).

The Fort Leavenworth campus can accommodate up to 1450 students selected to participate in the 10 month resident program. The four satellite campuses can accommodate up to 960 students selected to participate in the CGSOC Common Core Course per year. In addition to resident instruction, the Command and General Staff Officer Common Core Course instruction is also provided through The Army School System at numerous sites worldwide (approximately students 2500 annually) and through Distributed Learning (approximately 5000 students annually) (U.S. Army Command and General Staff School [USACGSS], 2014b). The Command and General Staff Officer Course consists of two distinct courses, the Common Core and the Advanced Operations Course. Fort Leavenworth campus faculty teach both courses, while the satellite campuses' faculty teach only the Common Core.

CGSOC Faculty

The Command and General Staff School faculty consists of both military officers and civilian educators (USACGSC, 2013a). As of October 2014, the military faculty consisted of 147 officers from both the U.S. military services and international allied nations. Military faculty assignments to the school range from one to three years. The school employed 221 civilian faculty members consisting of both Department of Defense and Department of State employees (USACGSC, 2014a). According to Davis and Martin (2012), the military and civilian faculty mix combined both enhanced classroom facilitation and current operational experience. Further, they noted that

a more stable faculty benefits the development of critical thinking skills for the Command and General Staff Officer Course students. Cardon (2009) indicated that the "civilian faculty provides a core of professional educators who are critical to achieving graduate level education within an adult learning environment" (p.10).

Faculty members are assigned (military) or hired (civilians) as a member of one of the five teaching departments based on their background, education, experience, and qualifications. Each new faculty member must complete Faculty Development Phase I prior to teaching. Faculty Development Phase I is a 40 hour course designed to provide the foundations of the Command and General Staff College educational philosophy and teach new faculty members how to manage an adult learning environment (U.S. Army Combined Arms Center Leader Development and Education [USACACLDE], 2013). Upon completion of the course, each faculty member is assigned to an interdepartmental teaching team responsible for providing Common Core Course instruction for a student section, consisting of approximately 64 students (Warner & Willbanks, 2006).

The teaching team, guided by a teaching team leader, "functions as a relatively autonomous teaching faculty that assumes responsibility for presenting the entire common core" (USACGSC, 2005, p.111). The teaching team consists of 12 faculty members composed of four representatives from the Department of Joint, Interagency and Multinational Operations, four representatives from the Department of Army Tactics, two representatives from the Department of Logistics and Resource Operations and one representative each from the Department of Command and Leadership and the Department of Military History (USACGSC, 2005).

Although team teaching, the delivery of instruction by two or more faculty member together with a single group of students, occurs only intermittently – such as during staff

exercises – the organization into teams generally enhances collaboration, curriculum integration, and a shared sense of purpose among the faculty. (USACGSC, 2005, p.23) According to Warner and Willbanks (2006), teaching teams "achieve curriculum integration through collaboration by dissolving the sometimes artificial barriers among departments focusing on defined subject areas" (p.109).

CGSOC Students

Command and General Staff Officer Course Army students are chosen by a centralized U.S. Army board based on merit to attend either the resident or distance learning venue. Those selected for the resident Common Core Course are further screened to attend the Common Core Course at Fort Leavenworth or one of the four satellite campuses. The majority of Army reserve component officers attend the course through Distributed Learning or The Army School System (Secretary of the Army, 2012).

Army officers comprise approximately 80% of the Fort Leavenworth CGSOC student body, with the remainder from the other U.S. military services, U.S. government agencies, and international military students from allied nations. Non-Army students are selected by criteria established by their particular service, agency, or nation. The typical student holds the rank of Major, has served as a commissioned officer for 10 to 12 years, and is approximately 35 years of age. All students have earned a bachelor's degree, while approximately 34% have completed a master's degree before arrival (USACGSS, 2014a).

The Common Core Course

The curriculum consisted of 289 classroom (contact) hours and 18 credit hours. The Common Core consisted of nine different courses. These courses consisted of:

- C100 Foundations (8 lessons, 19 hours)

- C200 Strategic Context of Operational Art (7 lessons, 32 hours)

- C300 Unified Action Within Operational Art (11 lessons, 26 hours)

- C400 Army Doctrine and Planning (15 lessons, 72 hours)

- C500 Joint Doctrine and Planning (11 lessons, 64 hours)

- L100 Developing Organizations and Leaders (11 lessons, 26 hours)

- F100 Force Management (7 lessons, 18 hours)

- H100 Rise of the Western Way of War (12 lessons, 24 hours)

- E100 Ethics of the Combat Leader (4 lessons, 8 hours)

The Common Core is designed to provide seven different learning outcomes through the use of 13 terminal learning objectives. Of the seven outcomes, the outcome most applicable to this study is students "are critical and creative thinkers who can adapt and thrive in ambiguous and ever-changing environments" (U. S. Army Command and General Staff School, 2013, p.1). Eight of the 13 terminal learning objectives support this learning outcome and are embedded within seven of the nine courses. To support terminal learning objective 2, Develop critical and creative thinking skills, the C100 Foundations course includes 10 classroom hours dedicated specifically to critical and creative thinking skills instruction.

The school consists of five different teaching departments. First, the Department of Joint, Interagency, and Multinational Operations is responsible for lessons within the C200, C300 and C400 courses. Second, the Department of Command and Leadership is responsible for lessons within the C100, E100, and L100 courses. Third, the Department of Army Tactics is responsible for lessons within the C500 course. Fourth, the Department of Logistics and Resource Operations is responsible for lessons within the F100 course. Finally, the Department of Military History is responsible for lessons within the H100 course.

Each lesson within the Common Core Course has a standard lesson plan developed by a lesson author selected by the teaching department responsible for each of the nine courses. Upon Command and General Staff School approval, the lesson plans are distributed to each venue that instructs the Common Core Course. Each lesson author must complete the five-day Faculty Development Phase III (Lesson Author) Course to serve as a lesson author (USACACLDE, 2010). Each lesson plan is developed using Kolb's (1984) Experiential Learning Model as a common format with authors "making every effort to design lessons that are complete, internally logical, and amply supported by carefully chosen student readings and published notes available to all faculty members" (USACGSC, 2005, p.101).

Prior to lesson instruction, each faculty member responsible to teach the lesson will attend Faculty Development Phase II instruction conducted by the teaching department responsible for the lesson content (USACACLDE, 2013). Although faculty members are provided a common lesson plan, instructors "enjoy broad latitude to adopt distinctive approaches in the classroom or reconstruct lessons on their own" (USACGSC, 2005, p.101)

Critical Thinking Skill Instruction and Learning Effectiveness

Day et al. (2009) emphasized that military leaders require "mature epistemic cognition, reflective judgment, and well developed critical thinking skills" (p.102) as they confront novel and ill-structured problems. They further added that these aspects must be developed over the long term through training, experience and education. Fischer et al. (2009) noted that in 2003 the Command and General Staff School developed a new curriculum to better meet the educational needs of the students. Further, this transformed curriculum emphasized the need to develop student critical thinking skills. Since the inception of this transformed curriculum in

2003, various assessments and reports on the effectiveness of the Common Core Course in developing student critical thinking skills have provided mixed results.

Internal indirect assessments of the critical thinking learning objective indicated that the course is meeting the desired outcome. The results of the U.S. Army Command and General Staff Officers Course Class 2014-01 Common Core Resident Student Survey Analyses indicated that 82% of the students surveyed believe that the course improved their critical thinking abilities (USACGSC, 2014c). The results of the U.S. Army Command and General Staff Officers Course Common Core Graduate Survey for Academic Years 2008 and 2012 indicated that 83% of graduates surveyed believe that the course improved their critical thinking abilities (USACGSC, 2013b). An external assessment conducted by the Process for Accreditation of Joint Education Team indicated that the Command and General Staff Officer Common Core Course achieved the goal of developing critical thinking skills (USACGSC, 2005).

Two objective assessments conducted in 2007 and 2012 proved inconclusive. In 2007, the College conducted an assessment of instructional effectiveness using the Cornell Critical Thinking Test (CCTT) instrument with a quasi-experimental pretest-posttest design. The researcher concluded that "a frequency analysis of the data from the paired comparison test indicate that 29 (or 32%) of the 87 individuals who took both tests scored worse on Test B, 2 (2%) scored the same, and 57 (66%) scored better. Accordingly, it would be difficult to claim the effect that produced the change in the test scores was uniformly successful" (USACGSC, 2007, p.6). In 2012, the college incorporated Moore's (1989) Learning Environment Preference (LEP) Inventory within the C100 Foundations Course. The purpose of the inventory was for student self-awareness, and instructors were prohibited from conducting further analysis on the student

scores (USACGSC, 2012). The assessment was subsequently removed from the CGSOC curriculum based on faculty feedback that questioned the utility of the instrument.

A number of published reports questioned the ability of professional military education graduates to think critically. The 2010 Center for Army Leadership Annual Survey of Army Leadership (CASAL) on Army education indicated that recent graduates lack the appropriate critical thinking and problem solving skills, specifically noting that "graduates lack the ability to quickly develop creative solutions to complex problems in a time-constrained environment" (Hatfield, Steele, Riley, Keller-Glaze, & Fallesen, 2011, p.3). A 2010 U.S. House of Representatives report asserted that graduates from all service professional military education courses serving in joint and service staff assignments demonstrate a deficiency in the ability to think critically (*Another Crossroads?*, 2010).

Terenzini, Springer, Pascarella, and Nora (1995) indicated that critical thinking instruction effectiveness depends upon the curriculum approach, appropriate instructional methods, and instructor skills and behaviors. *The Army Learning Concept for 2015* noted that, "while critical thinking is frequently a course objective, instruction primarily delivers only concepts and knowledge" (DA, 2011, p.7). Williams (2013) asserted that current professional military education devotes a significant amount of classroom time to the acquisition of knowledge, producing officers proficient in understanding Army doctrine, but lacking the appropriate critical thinking skills to become comfortable with ambiguity and the ability to solve ill-defined problems. Fischer et al. (2009) indicated that instructors within the military education system continue to have a difference of opinion as to the appropriate methods of conducting critical thinking instruction. They also asserted that the Army culture itself tends to discourage critical thinking due to the hierarchical nature of the institution, and the development of standardized

procedures to conduct planning and decision-making, both resulting in decreased acceptance of critical thinking instruction.

Theoretical Framework

As proposed by Bensley and Murtaugh (2012), this study viewed critical thinking as a multidimensional construct consisting of skills, dispositions (habits of the mind attributes), and cognition. They further stated that effective assessment must include multiple measures to capture these components. The two components of critical thinking chosen for this study are critical thinking skills and critical thinking habits of the mind attributes. The framework for the critical thinking skill and habits of the mind attributes is based on the work of Facione (1990) as a result of his participation in the American Philosophical Association Delphi Project's expert consensus on the role of critical thinking in educational instruction. He concluded that a good critical thinker must not only be able to effectively apply critical thinking skills, but must also possess the appropriate dispositional attributes to use these skills. This study also considered that critical thinking instruction effectiveness must consider the curriculum approach, instructional methods, and instructor skills and behaviors as proposed by Terenzini et al. (1995). The instructor focus group interviews examined the Command and General Staff Officer Common Core Course curriculum approach, instructional methods, and instructor skills and behaviors as the factors which impact critical thinking instruction effectiveness.

Problem Statement

The U.S. Army requires leaders with the capability to critically think to enhance military planning, to solve ill-structured problems, and to make quality decisions. Professional military education institutions such as the Army Command and General Staff School play a significant role in ensuring that graduates attain these skills and further, can apply them in future duty

assignments. Command and General Staff School student and graduate surveys indicated that their ability to critically think improves as a result of the Common Core Course instruction. However, several reports of graduate performance in subsequent duty assignments revealed a deficiency in the application of critical thinking skills. Previous Command and General Staff School administered critical thinking objective assessments of student critical thinking skill development have been inconclusive.

Dike (2006) asserted the following:

There has been little research in this area among any of the Department of Defense military education institutions. Research studies providing comparisons with other joint professional military education schools in the area of critical thinking would be beneficial and would provide excellent opportunities for benchmarking. (p.176)

Purpose of the Study

The purpose of this study was to determine if student critical thinking skills and habits of the mind attributes change as a result of their participation in the Command and General Staff Officer Common Core Course, and further to ascertain instructor perceptions of factors that facilitate critical thinking development within the Command and General Staff Officer Common Core Course. This research used the Military and Defense Critical Thinking Inventory (MDCTI) to quantitatively assess student critical thinking skills and habits of the mind attributes, and a case study approach to qualitatively assess instructor perceptions of the curriculum, instructional methods, and instructor skills and behaviors that impact instruction effectiveness.

Research Questions

The following research questions guided this study:

Research Question 1: Which student critical thinking skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

1a. How do student overall critical thinking skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1b. How do student analysis skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1c. How do student inference skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1d. How do student evaluation skills change as a result of participate in the U.S. Army Command and General Staff Officer Core Course?

1e. How do student induction skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1f. How do student deduction skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 2: Which student critical thinking habits of the mind attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

2a. How do student communicative confidence attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2b. How do student professional confidence attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2c. How do student teamwork attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2d. How do student expression attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2e. How do student directness attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2f. How do student intellectual integrity attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2g. How do student mental focus attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2h. How do student mental rigor attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2i. How do student foresight attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2j. How do student cognitive maturity attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 3: Is there a difference between staff group scores of critical thinking skills or habits of the mind attributes for students participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

3a. Is there a difference between staff group overall critical thinking skill scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3b. Is there a difference between staff group analysis scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3c. Is there a difference between staff group inference scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3d. Is there a difference between staff group evaluation scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3e. Is there a difference between staff group induction scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3f. Is there a difference between staff group deduction scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3g. Is there a difference between staff group communicative confidence scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3h. Is there a difference between staff group professional confidence scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3i. Is there a difference between staff group teamwork scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3j. Is there a difference between staff group expression scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3k. Is there a difference between staff group directness scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3l. Is there a difference between staff group intellectual integrity scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3m. Is there a difference between staff group mental focus scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3n. Is there a difference between staff group mental rigor scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3o. Is there a difference between staff group foresight scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3p. Is there a difference between staff group cognitive maturity scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 4: How do these staff group instructors perceive the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking at the Command and General Staff Officer Core Course?

Brief Description of the Methodology

This was a mixed methods study using both quantitative and qualitative research methods to answer the four primary research questions. To answer the first three primary research questions and their subsequent sub-questions, this study used a Quasi-Experimental One-Group Pretest-Posttest Design to first determine if the Command and General Staff Officer Core Course changed student critical thinking skills and habits of the mind attributes, and second, to determine if there is a difference between the staff group scores (Gliner, Leech, & Morgan, 2009). In order to answer the fourth primary research question, this study used a qualitative case

study approach by conducting focus group interviews with instructors from the eight student staff groups participating in the research. Creswell (2007) contended that this approach is appropriate when the researcher has clearly identifiable cases and seeks to provide understanding by comparing the cases. The study population consisted of students attending the Command and General Staff Officer Course program from August 2014 to June 2015.

Two teaching teams were selected to participate in the study by the Command and General Staff School using cluster random sampling. The sample (n=120) consisted of students purposefully clustered into eight student staff groups as authorized by the college administration. Staff groups were configured by the college in an attempt to obtain equal representation of military branch or service, race and ethnicity, gender, and military experience (USACGSC, 2005). All students within the selected staff groups were asked complete the MDCTI instrument in August 2014 at the beginning of the Command and General Staff Officer Course Core (pretest) and then again in November 2014 at the end of the Core Course (posttest). The pretest and posttest scores were compared for each student to determine the effectiveness of the instruction to change critical thinking skills and habits of the mind attributes, and further, to determine if there is a difference between staff group scores. Upon completion of the quantitative data analysis, the researcher conducted staff group instructor focus group interviews to better understand and interpret the findings from the quantitative data (Johnson & Turner, 2003).

The Instrument

The Military and Defense Critical Thinking Inventory (MDCTI) is a two-part copyrighted instrument used to measure the core cognitive skills and personal attributes required in reflective problem solving and decision-making. The MDCTI is a form of the California Critical Thinking

Skills Test (CCTST) developed by Facione, Facione and Gittens in 2010. The instrument scenarios are designed to provide a military context to participants that work within the U.S. military. The instrument was administered on-line in a timed mode. Part one measured 10 habits of the mind attributes and consisted of 90 items in an agree-disagree likert scale. Individual scores can range from 50-100. The communicative confidence, professional confidence, intellectual integrity, mental rigor, mental focus, foresight, and cognitive maturity attributes are further classified within one of three performance assessment categories: Strongly Manifested (scores from 85-100), Inconsistently Manifested (scores from 65-84), or Not Manifested (scores from 50-64) (Insight Assessment, 2014). The expression, teamwork, and directness attributes are considered styles, and each style has distinct performance assessment categories. Expression scores are classified into: Expressive Performer (scores from 85-100), Situational Observer or Performer (scores from 65-84), or Quiet Observer (scores from 50-64). Teamwork scores are classified into: Lone Competitor (scores from 85-100), Situational Competitor or Collaborator (scores from 65-84), or Consistent Collaborator (scores from 50-64). Directness scores are classified into: Situationally Direct (scores from 85-100), Inconsistently Manifested (scores from 65-84), or Approval Seeker (scores from 50-64) (Insight Assessment, 2014). Part two measured five critical thinking skills and consisted of 35 items in a multiple choice format. Individual scale scores are reported on a continuum of 50-100 with scores between 50-64 considered no skill manifestation, scores between 65-74 considered moderate skill manifestation, scores between 75-84 considered strong skill manifestation, and scores between 85-100 considered superior skill manifestation. In addition to the five skills, part two also provided a total score, which is the most widely used measure in critical thinking research (Insight Assessment, 2014). The MDCTI is a reliable instrument with reported Cronbach's Alpha reliabilities for part one ranging from .69

to .90, and Kuder Richardson coefficient reliabilities for part two ranging from .72 to .89. The instrument scales have consistently displayed content, construct, and criterion validity in studies conducted with "active duty military personnel, military trainees, and college level students in military and defense educational programs" (Insight Assessment, 2014, p.52).

Student Study Population

The Command and General Staff Officer Class 2015 consisted of 1094 students, with an average age of 35. Of these students, approximately 80% were Army officers, 6% were Air Force officers, 4% were Navy/Coast Guard officers, 3% were Marine Corps officers, 6% were International officers, and less than 1% were from various interagency organizations. The gender mix was approximately 88% male and 12% female. Approximately 76% of the students were Caucasian with 24% considered minorities. All students earned a Bachelor's Degree, with 34% possessing a Master's degree or higher (USACGSS, 2014a).

Faculty Study Population

Seventeen teaching teams taught by Teams 7 through 20, and Teams 22 through 24 conducted instruction for the Class 15 Command and General Staff Officer Common Core Course. A teaching team consisted of 12 instructors and four staff groups of students with 16 students assigned to each staff group. One teaching team had five staff groups, with additional instructors assigned to accommodate the additional group. Each staff group is identified by its team designation and a corresponding letter designation, A through D. The Teaching Team Leader has overall responsibility for the administration, advising, and instruction for all students assigned to the teaching team. Additionally, the Team Leader conducts departmental instruction to students within the staff group (s) based on his or her department affiliation. The teaching departments assign the remaining 11 instructors to the Teaching Team Leader. The Teaching Team Leader is

responsible to further assign these instructors to the four staff groups, ensuring that all five teaching departments are represented within each staff group (USACGSC, 2005).

The Class 15 Command and General Staff Officer Common Core Course consisted of 69 staff groups. Each staff group had five instructors responsible to provide all departmental instruction throughout the program. Each Staff Group had one instructor from the Department of Joint, Interagency and Multinational Operations and one instructor from the Department of Army Tactics. The two assigned instructors from the Department of Logistics and Resource Operations provided instruction to two different staff groups. The instructor from the Department of Command and Leadership and the instructor from the Department of Military History provided instruction to all four staff groups. The Teaching Team Leader selects one of the assigned staff group instructors to perform the additional duty of Staff Group Advisor, responsible for the administration and advising of all 16 students within the staff group (USACGSC, 2005).

Significance of the Study

The U.S. military believes that leaders must possess critical thinking skills in order to solve the complex problems they will face in an uncertain future environment. The Command and General Staff Officer Common Core Course emphasizes the development of student critical thinking skills, but several attempts to objectively measure the program's effectiveness in achieving these skills have proved inconclusive. Further, both external and internal curriculum evaluations provided contradictory evidence on the effectiveness of critical thinking skill development. This study evaluated the effectiveness of the Command and General Staff Officer Common Core Course to improve student critical thinking skills and habits of the mind attributes, and further examined instructor perceptions of the curriculum, instructional methods,

and instructor skills and behaviors that impact student critical thinking development within the Command and General Staff Officer Common Core Course.

This study adds to the adult education literature on critical thinking development and instruction at the graduate level. First, this study assessed student critical thinking skills and habits of the mind (dispositions) development concurrently. Bensley and Murtagh (2012) acknowledged that few studies consider both critical thinking skills and dispositions simultaneously. Second, this study examined instructor perceptions on the impact of the curriculum approach, instructional methods, and instructor skills and behaviors to foster critical thinking development within each staff group. Terenzini et al. (1995) indicated that curriculum and instructional approaches are typically studied separately from instructor skills and abilities. Finally, this research examined the critical thinking development of a unique student population, as a result of their professional military education experience.

Limitations of the Study

There are several limitations with this study:

1. The study sample size was limited to eight staff groups of volunteer students (n=120) at the direction of the Command and General Staff College, which comprised approximately 11% of the Class 15 population.

2. The study was conducted only at the Fort Leavenworth campus.

3. The study did not include international military students due to their potential lack of English proficiency in completing the MDCTI instrument.

4. The study results evaluated the effectiveness of the Command and General Staff Officer Common Core Course, but do not include the effectiveness of the Advanced Operations Course.

5. There may have been different dynamics in each focus group which may have created an unequal discussion between groups.

6. This design used cluster random sampling which limits the ability to generalize the results to the study population.

7. This design was subject to a maturation threat, with student change due to factors other than the educational intervention.

8. This design was subject to a testing threat due to the pretest-posttest use of the same instrument.

9. This design was subject to a mortality threat due to student disenrollment from the Common Core Course prior to completing the posttest or instructor reassignment prior to Common Core Course completion.

10. To meet the criteria set by the Command and General Staff College (CGSC) IRB, the researcher was not allowed to pair the demographic information with the participant's identity which did not allow for a true description of the survey participants.

Assumptions of the Study

1. The study results assumed that student responses to the MDCTI instrument questions and instructor group responses within the focus group interviews are both accurate and truthful.

2. The student instructor group remained constant throughout the Common Core Course.

Definition of Terms

Analysis: "enables people to identify assumptions, reasons and claims, and to examine how they interact in the formation of arguments" (Insight Assessment, 2014, p.20).

Cognitive maturity: "relates to cognitive developmental level" (Insight Assessment, 2014, p.19).

Command and General Staff College (CGSC): An Army organization located at Fort Leavenworth, KS. designated to provide educational and training programs for mid-career and senior military officers.

Command and General Staff School (CGSS): The largest school within CGSC which functions as the venue for mid-career, graduate-level education (USACGSC, 2005).

Command and General Staff Officer Course (CGSOC): The course administered by CGSS that provides a graduate-level education for mid-career military officers.

Communicative confidence: "confidence in oral and written communication" (Insight Assessment, 2014, p.18).

Common Core Course: The component of the Command and General Staff Officer Course that all Army mid-career officers must attend. The Common Core consists of nine different courses and is similar to a certificate program in higher education.

Creative thinking: A cognitive process that supports the development of new ideas and concepts (Allen & Gerras, 2009).

Critical thinking: "The process of purposeful, reflective judgment to decide in a thoughtful, truth-seeking and fair-minded way what to believe or what to do" (Insight Assessment, 2014, p.13). The MDCTI measures critical thinking by assessing both core critical thinking skills and habits of the mind attributes.

Deduction: enables "decision-making in precisely defined contexts where rules, operating conditions, core beliefs, values, policies, principles, procedures and terminology completely determine the outcome" (Insight Assessment, 2014, p.20).

Directness: "describes a style of behaving and speaking in relationship to questions or pressure from peers or superiors aimed at seeking their approval, or forthrightly declaring one's views, or a mix of both depending on the situation" (Insight Assessment, 2014, p.18).

Epistemic cognition: The process an individual uses to understand the nature of problems and the limits of knowing (King & Kitchener, 1994).

Evaluation: "enables us to assessing the credibility of sources of information and the claims they make" (Insight Assessment, 2014, p.20).

Expression: "describes a style of interacting with peers that may be quietly observational, expressively performing, or a mix of both depending on context" (Insight Assessment, 2014, p.18).

Foresight: "the habit of approaching problems in an analytical and orderly way, with a view toward anticipating consequences and outcomes" (Insight Assessment, 2014, p.19).

Habits of the mind attributes: "ten attributes relevant to the exercise and expression of reasoned judgment and to successful professional interaction in decision-making contexts" (Insight Assessment, 2014, p.16).

Ill-structured problem: a problem which contains opposing or contradictory evidence for which there is no single, correct solution that can be determined by any specific decision-making process (Kitchener, 1983).

Induction: "enables us to draw inferences about what we think must be true based on analogies, case studies, prior experience, statistical analyses, simulations, hypotheticals, and familiar circumstances and patterns of behavior" (Insight Assessment, 2014, p.20).

Inference: "enables us to draw conclusions from reasons and evidence" (Insight Assessment, 2014, p.20).

Intellectual integrity: "the discipline of striving to be thorough and honest when evaluating differing viewpoints in order to learn the truth or reach the best decision possible in a given situation" (Insight Assessment, 2014, p.19).

Mental focus: "the discipline or habit of being diligent, systematic, task-oriented, organized, and clear-headed" (Insight Assessment, 2014, p.19).

Mental rigor: "the discipline to work hard in an effort to analyze, interpret and achieve a deep understanding of complex material" (Insight Assessment, 2014, p.19).

Practical exercise: a classroom activity in which students apply a planning or decision-making process to solve a complex problem.

Professional confidence: "self-assurance felt by newly assigned, enrolled, hired, or newly promoted individuals regarding their readiness to handle the stress, competitiveness, vocabulary, workload, instructional or orientation methods, and related complexities associated with their new role" (Insight Assessment, 2014, p.18).

Professional Military Education: A progressive education system that prepares leaders for increased responsibilities at the next higher level by developing key knowledge, skills, and attributes required to operate at that level (DA, 2009).

Staff group: A cohort of 16 students purposefully constructed by CGSS to ensure a diverse mix of students.

Staff Group Advisor: An instructor selected by the teaching team leader that is responsible for the administration and advising of all 16 students within a staff group (USACGSC, 2005).

Student instructor group: The interdisciplinary group of five CGSOC instructors that represent each of the college departments in conducting all Common Core instruction for the student staff group.

Teaching team: The interdisciplinary group of 12 CGSOC instructors that represent each of the college departments in conducting all Common Core instruction for four student staff groups.

Teamwork: "describes a style of interacting that may be collaborative, competitive or a mix of both depending on what is called for in a given situation" (Insight Assessment, 2014, p.18).

Summary

The U.S. military, and in particular the U.S. Army, believes that its leaders must demonstrate critical thinking skills in order to plan, solve problems, and make decisions in an increasingly complex environment. The Army Leader Development Program provides both training and education to assist in the development of these skills. As a component of professional military education, the Command and General Staff Officer Common Core Course plays a key role in developing these skills for mid-career military officers. Determining the effectiveness of the Command and General Staff Officer Common Core Course in developing both critical thinking skills and habits of the mind attributes will assist the college in the assessment of meeting its learning objectives, and possibly provide insights for curriculum and faculty development improvement. This research will provide a both a quantitative and qualitative analysis of Common Core Course effectiveness to supplement previous measures of effectiveness in the development of critical thinking. The next chapter will provide an overview of the existing critical thinking literature.

Chapter 2 - Literature Review

Introduction

This study investigated the effectiveness of the Command and General Staff Officer Common Core Course in developing student critical thinking skills and habits of the mind attributes, and further, examined instructor perceptions on the role of the curriculum, instructional methods, and instructor skills and behavior in fostering the development of student critical thinking. ALC 2015 asserted that Army leaders must be operationally adaptable by thinking critically, developing comfort with ambiguity, and becoming adept at framing ill-defined problems (DA, 2011). In essence, the Army education system must develop leaders in the area of critical thinking. This chapter will review the literature on critical thinking.

Critical Thinking

The concept of critical thinking was conceived by Edward Glaser and Goodwin Watson in the early 1940s (Fischer et al., 2009). When defining critical thinking, several prominent researchers used the term reflective thinking within the definition. Dewey (1910) first introduced the term reflective thinking, believing that this type of thinking involves two essential elements; uncertainty, and the need to investigate for additional facts to verify or refute the initial belief. Ennis (1985) defined critical thinking as "reflective and reasonable thinking that is focused on deciding what to believe or to do" (p.45). Facione (2013) described critical thinking as purposeful, reflective judgment which manifests itself in reasoned consideration of evidence, context, methods, standards and conceptualizations in deciding what to believe or what to do. Rudd (2007) defined critical thinking as "reasoned, purposive and reflective thinking used to make decisions, solve problems, and master concepts" (p.47). Geertsen (2003) noted that the indiscriminate use of these two terms tends to create confusion, believing that they are different,

yet complementary forms of thinking. King and Kitchener (1994) acknowledged that the terms

critical thinking and reflective thinking are often used interchangeably, but clarify that the two

terms differ based on the individual's epistemological assumptions and the structure of the

problem. ADRP 5-0, *The Operations Process* described critical thinking (or thinkers) as

"purposeful and reflective judgment (or thinking) about what to believe or what to do in response

to observations, experience, verbal or written expressions, or arguments" (DA, 2012b, p. 2-7, 2-

8). Since this Army doctrinal description of critical thinking is closely related to the definition

provided by Facione (2013), this study is based on the theoretical framework of Facione's work,

developed as a result of the American Philosophical Association Delphi Project.

The American Philosophical Association Delphi Report

In December 1987, the American Philosophical Association formed a panel of 46 experts led

by Dr. Peter Facione to develop a common framework for the purposes of educational instruction

and assessment. Known as the "Delphi Project" based on the panel's use of the Delphi

qualitative research methodology, these experts met throughout the period of February 1988 to

November 1989 to gain a consensus on what constituted the core skills required for critical

thinking (Facione, 1990). The panel's consensus definition of critical thinking was stated as

"purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and

inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or

contextual considerations upon which that judgment is based" (Facione, 1990, p.2). Further, they

concluded that critical thinking contained two dimensions: cognitive skills and dispositions. The

experts recognized six core critical thinking skills defined below:

Interpretation - to comprehend and express the meaning or significance of a wide variety of

experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or

criteria.

Analysis - to identify the intended and actual inferential relationships among statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or opinions.

Inference - to identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.

Evaluation – to assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions or other forms of representation.

Explanation – to state and to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological, and contextual considerations upon which one's results were based; and to present one's reasoning in the form of cogent arguments.

Self-Regulation – self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis, and evaluation to one's own inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results. (Facione, 2013, p.5-7)

Facione (2013) noted that self-regulation is critical in enabling individuals to improve their own thinking through self-examination of all the critical thinking dimensions. He also remarked that some equate this skill to the term metacognition. The panel recognized that an individual proficient in these six skills must also have the disposition to use these skills, noting that

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"persons who have developed these affective dispositions are much more likely to apply their critical thinking skills appropriately" (Facione, 1990, p.26). The panel developed a consensus on what they determined to be the affective dispositions of critical thinking and characterized these dispositions as approaches to life and living in general, as well as approaches to specific issues questions or problems. In addition to developing a consensus of critical thinking skills and dispositions, the experts concluded that critical thinking assessment should occur frequently, employing different types of instruments that specifically target the skills taught within the student's stage of learning (Facione, 1990).

Critical Thinking Diversity

While the importance of critical thinking within educational institutions and society at-large receives little disagreement, research over the past 70 years has failed to gain consensus on an overarching theory or model of critical thinking, which tends to convolute rather than clarify the concept. The diversity of critical thinking research can be attributed to its importance within the three disciplines of philosophy, psychology, and education. Sternberg (1986) indicated that critical thinking differences result from the convergence of these three traditions and how they view the concept from their own unique perspective. Lewis and Smith (1993) noted that the philosophical perspective has been developed primarily through discourse and argumentation in an effort to promote disciplined thinking in order to "guard against the propensities of humans to accept fallacious arguments and draw inappropriate conclusions" (p.131).

On the other hand, the psychological perspective tends to emphasize the role of critical thinking in terms of solving problems and has "evolved from a tradition of experimentation and research" (Lewis & Smith, 1993, p.131). Sternberg (1986) believed that the education field draws heavily from classroom observation and tends to be a mixture of both the philosophical

and psychological perspectives. Kuhn (1999) explained that the education theorists have not fully pursued the developmental dimension and the role of epistemological beliefs, which she claims to be fundamental to critical thinking. Moseley, Elliot, Gregson, and Higgins (2005) explained that the differences among the disciplines are a matter of emphasis, with education focusing on instructional design, psychology focusing on mental activity and development, and philosophy focusing on critical thought. In their view, each has contributed to the development of critical thinking "assessment, pedagogy, and curriculum evaluation" (Moseley et al., 2005, p.373).

Purpose of Critical Thinking

Another controversial aspect is the overarching purpose of critical thinking. Sternberg (1986) proposed a framework that considers critical thinking in terms of individual thought, context, and the nature of the task. First, Paul and Elder (2006) viewed critical thinking as a method to improve the quality of individual thought by continuously applying a set of universal intellectual standards to guide the thinking process. Brookfield (2012) believed that critical thinking occurs when the individual deliberately attempts to uncover the assumptions that guide his or her actions.

Second, critical thinking application must consider context. Norris (1985) indicated that critical thinking performance is particularly sensitive to contexts that relate to personal experience, and those that involve threats and promises. Willingham (2007) stated "there is not a set of critical thinking skills that can be deployed regardless of context" (p.17). Sternberg (1985) observed that solutions to everyday problems have consequences that matter. These solutions depend on and interact within the problem context. Hanley (1995) indicated that students must

not only develop critical thinking skills but must also be adept at applying the appropriate skills for their particular situation.

The third purpose is the overall nature of the task. Lewis and Smith (1993) noted three different tasks typically associated with critical thinking: problem solving, evaluation or judgment, and a combination of evaluation and problem solving. Halpern (1998) indicated that all individuals use critical thinking skills to make decisions and solve problems. Lewis and Smith (1993) and Rudd (2007) believed that the term critical thinking is too narrow in scope and propose that the processes of problem solving, decision-making, critical thinking, and creative thinking are better described by the term "higher order thinking." They proposed that "higher order thinking occurs when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations" (Lewis & Smith, 1993, p.136). Geertsen (2003) noted "decision-making and problem solving are quite different thinking strategies. Decision-making focuses on making correct decisions using clearly identifiable information, whereas problem solving focuses on generating new solutions when available information is ambiguous or unclear" (p.11).

Kurfiss (1988) proposed that critical thinking is a form of problem solving that involves reasoning about ill-structured problems and the process of developing support for a position. Further, Kurfiss (1988) defined problem-solving as "mental activity leading from an unsatisfactory state to a more desired goal state" (p.45). Sternberg (1985) noted that everyday problems tend to be ill-structured and usually lack complete information and a clear procedure to determine the best solution. King and Kitchener (1994) explained that individuals in the early stages of epistemological development are unable to "distinguish between well- and ill-

structured problems, viewing all problems as though they were defined by a high degree of certainty and completeness" (p.16).

Critical Thinking Components

The critical thinking literature also indicated a difference of opinion on the components of critical thinking. Plemmons (2008) believed that critical thinking consists of knowledge (discipline specific information, facts and concepts), skills (the ability to apply knowledge), and cognitive abilities (the ability to examine and reflect on a problem or issue). Further, he proposed that critical thinking occurs when an individual can effectively assimilate all three components to solve a problem. In his view, skills and cognitive abilities are critical within the critical thinking process, whereas knowledge provides a foundational role. However, Norris (1985) offered a dissenting viewpoint, indicating that well developed critical thinking skills cannot compensate for a lack of knowledge in the subject matter. Ennis (1985) believed that critical thinking consists of both dispositions and abilities; although, his description of abilities is similar to what Plemmons (2008) described as skills. Bensley and Murtaugh (2012), Halpern (1998), Kuhn (1999), and Norris (1985) agreed that both skills and dispositions (or dispositional attitudes) are both important components of critical thinking with Norris (1985) further adding that without the disposition to think critically, even those with well-developed skills will find applying these skills to real world problems difficult. Perkins, Jay and Tishman (1993) contended that good critical thinking skills fail to provide a sufficient basis for action, but rather good thinking results from dispositional behavior. Halpern (1998) and Kuhn (1999) both promoted the role of dispositions and skills in critical thinking and agreed with Plemmons (2008) that a cognitive ability component must be considered within the concept.

A number of researchers (Facione, 1990; Halpern, 1998; Kuhn, 1999; Plemmons, 2008) endorsed that the ability to think critically involves a cognitive component. Evans, Forney, and Guido-DiBrito (1998) acknowledged the role of cognitive-structural theory in determining how individuals develop and change their thinking, reasoning, and meaning making processes. According to Mayer (1992), cognitive development theory posits that "thinking depends on how a person represents the world and in what ways a person can manipulate or act upon this internal representation" (p.286). In addition to the term "cognitive development," research within this area also includes the terms "intellectual development" and "epistemological development". Hofer and Pintrich (1997) noted that epistemology, "the nature and justification of human knowledge" (p.88), has become a significant area of interest within the psychology and education fields, particularly the role in which epistemic beliefs influence the thinking and reasoning processes.

Halpern (1998) used the term metacognition in describing cognitive ability, while Kuhn (1999) preferred the overarching term "meta-knowing" further sub-divided into three categories: metastrategic, metacognitive, and epistemological. She equated metastrategic knowing with procedural knowledge, metacognitive knowing with declarative knowledge, and epistemological knowing with the sources of knowledge. Additionally, she proposed that all three types of meta-knowing are essential for critical thinking, with epistemological understanding the most important area for individual development.

Kitchener (1983) proposed a three-level model of cognitive processing that enable individuals to solve problems: cognition, metacognition, and epistemic cognition. At the lowest level, cognition, individuals develop the ability to build knowledge through tasks such as acquiring language skills, reading, computation, and memorization. Level two includes these level one

tasks, but also includes the ability to apply metacognitive processes to these tasks. Kuhn and Dean (2004) asserted that metacognition, "the awareness and management of one's own thought" (p.270), has grown in importance within cognitive development research. Numerous researchers (Curnow et al., 2009; Facione, 1990; Flavell, 1979) equated metacognition with the term self-regulation. Fox and Riconscente (2008) asserted that metacognition and self-regulation constructs are clearly distinct, but parallel constructs, depending upon the individual's orientation towards thinking about him or herself or about others. Level three, epistemic cognition, involves the individual's view of knowledge and the ability to determine strategies appropriate in solving ill-structured problems. Kitchener (1983) also noted that while both cognitive and metacognitive skills develop during the childhood years, epistemic cognition skills typically develop during the late adolescent and adult years.

Paul and Elder (2007) described critical thinking as a set of skills, abilities and dispositions. They believe that students develop critical thinking skills by consistently applying 10 universal intellectual standards to eight elements of reasoning. Through the development of these skills, individuals increase their dispositions. They also equated the term disposition to intellectual "traits of the mind" or "virtues". Additionally, they recognized the role of knowledge or content in critical thinking, but believe that critical thinking enables the acquisition of knowledge regardless of the domain.

The role of domain knowledge in critical thinking has created a diversity of opinion within the research. Bailan, Case, Coombs, and Daniels (1999), Norris (1985), and Willingham (2007) proposed that the depth of knowledge, experience, and practice within an area of study significantly determines an individual's capability to think critically within that area. McPeck (1984) believed that knowledge and training within a discipline promotes greater transfer to

multiple domains rather than learning a general set of critical thinking skills. On the other hand, van Gelder (2005) and Halpern (1998) promoted the idea that critical thinking should not be domain specific and should apply within a range of domains or contexts. Mulnix (2012) believed that an individual lacking the appropriate domain knowledge but proficient in critical thinking skills has the ability to identify and ask the appropriate questions to obtain the necessary information. Despite the differences of opinion in the critical thinking components and the importance of each in the overall concept, this literature review indicated that critical thinking comprises four different components: a knowledge component, a skill/ability component, a disposition/attitude/trait/virtue component, and a cognitive component.

Critical Thinking Assessment

In order to determine developmental progress within the critical thinking components, students must receive periodic assessment and feedback. Williams (1999) contended that educators must establish appropriate assessment procedures to determine the effectiveness of instructional interventions. Hatcher (2011) and Wilson (1998) believed that educators must first develop a definition of critical thinking, determine the appropriate skills that support that definition, and should then choose the test that best measures those skills. To ensure effective assessment, Bensley and Murtagh (2012) proposed that since critical thinking is a multidimensional construct, multiple measures must be applied in order to capture the dispositions and metacognitions, as well as student thinking skills. Ennis (1993) emphasized that before deciding to use a particular test, individuals must clearly understand the purpose of the assessment. His research of published critical thinking tests revealed that many incorporate critical thinking concepts, but few assess this thinking as their primary concern. His annotated

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list (revised as of 2009) consisted of 18 general content, multi-aspect tests, four general content, aspect-specific tests, and two subject-specific, multi-aspect tests.

Possin (2008) discussed four different methods of assessment: surveys, portfolios, essays, and objective tests. First, self-reporting surveys are a popular method due to their ease of use, but tend to be unreliable in competency measurement. Bensley and Murtagh (2012) added that self-report measures could also be used to supplement other skill assessments by providing information on dispositions and attitudes. Second, portfolios are also an accepted method, but rely heavily on student self-selected work and instructor judgment, raising questions on its reliability. Third, Werner (1991) asserted that written essays allow students to analyze arguments, formulate responses and then defend their logic, creating a more holistic means of assessment. On the other hand, this method lacks standardization, making grading more time consuming and subjective. Finally, objective tests have become a popular means of assessment by providing a greater degree of standardization, facilitating ease of administration and normalization. Bensley and Murtagh (2012) cautioned that both objective and self-report critical thinking tests both lack the ability to evaluate student thought processes as they reason or solve problems. Ennis (1993), Fischer et al. (2009), Hatcher (2011), and Possin (2008), indicated that three of most accepted objective critical thinking skills tests are: the Watson-Glaser Critical Thinking Appraisal (WGCTA), the Cornell Critical Thinking Test (CCTT), and the California Critical Thinking Skills Test (CCTST).

Watson-Glaser Critical Thinking Appraisal (WGCTA). Originally developed by Edward Glaser in 1941 and updated several times, the WGCTA, as described by McMillan (1987), consists of a series of items designed specifically to replicate problems encountered in everyday life. King, Wood, and Mines (1990) asserted that the questions reflect a combination of well- and

ill-structured problems. Possin (2008) noted that the test consists of 80 multiple choice questions evenly distributed among the five sub-tests which measure the skills of inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. Ennis (1993) indicated that the WGCTA is appropriate for students in the ninth grade through adulthood.

The Cornell Critical Thinking Test (CCTT). The Cornell Critical Thinking Test (CCTT) is a copyrighted instrument used to measure critical thinking skills. Developed by Robert Ennis in 1985, the CCTT is a 52 question assessment available in both electronic and paper and pencil formats. Possin (2008) indicated that the test is easy to administer, score, and analyze, is well-constructed, and has a well-documented history. King et al., (1990) emphasized that this test is designed primarily to measure the ability to solve well-structured problems. Fischer et al. (2009) reported that the instrument currently consists of two versions, Level X and Level Z, and measures seven distinct skills: deduction, induction, evaluation, detection of fallacies, credibility of evidence, identification of assumptions, and determination of meaning. Ennis (1993) asserted that Level Z is the most appropriate instrument for advanced high school students, college students, and other adults.

California Critical Thinking Skills Test (CCTST). The CCTST was published in 1990 by Facione and emphasizes the core critical thinking skills developed by a panel of experts as part of the American Philosophical Association Delphi Project. Fischer et al. (2009) reported that the instrument is currently in its third version and consists of 34 multiple choice items that assess the five areas of analysis, inference, deduction, induction, and evaluation. Facione (1991) noted that the CCTST reports an overall critical thinking skill score as well as a score for each of five core skills. The assessment can be administered in either an online or paper and pencil mode and consists of items that use everyday scenarios which require the test taker to determine the best

response from the choices available. Possin (2008) contended that the CCTST is well-respected and widely adopted for use in research, allowing for comparative studies within the three different forms and other objective instruments. He acknowledged that the main disadvantage is that scoring must be accomplished by the publisher, Insight Assessment. Ennis (1993) indicated that the CCTST is most appropriate for college students, but could also be useful for advanced high school students. In addition to the CCTST, Insight Assessment has published a family of instruments, similar in construct, that focus question content for specific professional areas. Specific assessments are currently available for the business (The Business Critical Thinking Skills Test), health (Health Science Reasoning Test), legal (Legal Studies Reasoning Profile) and military (Military and Defense Critical Thinking Inventory) professions (Insight Assessment, 2013). In addition to the measurement of critical thinking skills, the Delphi Project experts acknowledged that an ideal critical thinker must also have the disposition to use these skills. In an attempt to measure these dispositions, Facione developed the California Critical Thinking Disposition Inventory (CCTDI).

    California Critical Thinking Disposition Inventory (CCTDI). Facione, Sanchez, Facione, and Gainen (1995) contended that few researchers have explored the role of dispositions in the use of critical thinking skills, prompting the development of the CCTDI, the first instrument designed to assess these dispositions. From the 19 dispositional phrases described in the American Philosophical Association Delphi Report, Facione determined that seven overall attributes emerged from the factor analysis (Facione, 2000). Possin (2008) noted that the CCTDI consists of 75 items requiring the test taker to self-report their beliefs using a six point agree-disagree scale. Facione et al. (1995) contended that based on the responses, the instrument reports both an overall score and a score for each of the seven dispositions described as follows:

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Inquisitiveness - intellectual curiosity and desires learning even when application of the

knowledge is not readily apparent.

Open-mindedness - tolerance of divergent views and sensitive to the possibility of bias

Systematicity - organized, orderly, focused and diligent in inquiry.

Analyticity - values the application of reasoning and the use of evidence to resolve problems,

anticipates potential conceptual or practical difficulties, and always alert for intervention.

Truth-seeking - eager to seek the best knowledge, courageous to ask questions, and honest

and objective if findings do not support self-interests or preconceived notions.

Self-confidence - trusts the soundness of his/her reasoned judgments and leads others in

rational problem resolution.

Maturity - approaches problems, inquiry, and decision-making with an understanding that

some problems are ill-structured, requiring judgments that preclude certainty. (Facione et al.,

1995, p.6-9)

Giancarlo and Facione (2001) commented that overall scores range from 70 to 420 with a

score of 280 or higher indicating a positive disposition, while a score of 210 or lower indicating a

negative disposition towards critical thinking. Scores for each of the seven dispositional scales

range from 10 to 60. Scores of 40 or higher signify a positive inclination, while scores of 30 or

lower indicate a negative tendency. Facione et al. (1995) suggested that of the seven dispositions,

truth-seeking appears to be the primary attribute in predicting critical thinking skills. Further,

they contended that colleges that embrace student development as an educational goal will

succeed only if they combine teaching critical thinking skills with the cultivation of the

student's disposition towards critical thinking.

Ennis (1993) contended that critical thinking assessment not only provides student feedback on critical thinking skill development, but can also inform instructors in their efforts to teach critical thinking. McMillan (1987) believed that classroom instruction using the appropriate methods and curriculum is a primary means to enhance student critical thinking abilities.

Teaching for Critical Thinking

Tsui (1999) contended that "programs, courses, and pedagogical approaches specifically designed to foster critical thinking, while rarely in place or practiced on college campuses, have constituted the predominant focus of research on critical thinking" (p.188). She further added that courses or programs devised to improve critical thinking differ widely in content as well as delivery and "have for the most part failed to demonstrate positive results" (p.186). Abrami et al. (2008) emphasized that in order to maximize effectiveness; educators must first be willing to incorporate critical thinking into the curriculum and further, must develop explicit strategies and individual skills to appropriately execute these strategies within the classroom. Terenzini et al. (1995) asserted that critical thinking instruction effectiveness must consider the curriculum approach, instructional methods, and instructor skills and behaviors, further noting that curriculum approaches are typically studied separate from both the influences of instructional methods and the role of instructor skills and behaviors in establishing the an appropriate classroom climate to facilitate critical thinking.

Curriculum Approach

Marin and Halpern (2011) contended that the development of critical thinking skills is an important component of formal education and is essential for success in the contemporary world. They contended that while most educators agree with this assertion, they lack consensus on the best approach to achieve this aim. Further, they endorsed two approaches, imbedded instruction

consisting of critical thinking skills integrated into content, and explicit instruction with lessons designed specifically for critical thinking skill acquisition. In their view, the explicit method is preferable due to its effectiveness in transferring these skills to everyday situations. On the other hand, Plemmons (2008) contended that the imbedded approach provides better results.

Ennis (1989) proposed four different approaches to instruction: general, infusion, immersion, and mixed. The general approach attempts to teach critical thinking skills and dispositions separate from specific subject matter. The infusion approach relies heavily on content instruction with the overt infusion of critical thinking skills and dispositions. The immersion approach also relies heavily on content, but critical thinking is immersed covertly. The mixed approach combines the general approach with either the infusion or immersion approaches. Using this framework, Abrami et al. (2008) determined that the mixed method had the largest impact on skill development, whereas the immersion approach produced the least impact. In their view, the best approach is to provide general critical thinking instruction, followed by the explicit application of these skills within the course content. Further, they noted that separate application of both the general and infusion approaches indicate moderate gains in critical thinking skills.

A number of authors view critical thinking curriculum from the two approaches proposed by Hatcher (2006): stand-alone or integrated with other courses. Hatcher (2006), McPeck (1984), and Terenzini et al. (1995) contended that the integrated approach facilitates skill development through practice and reinforcement across a variety of disciplines. Kurfiss (1988) added that student responses to thinking in stand-alone critical thinking courses typically reflect their existing beliefs and assumptions about knowledge. Learning these skills in the absence of subject knowledge makes it difficult to change student beliefs and their role in knowledge construction.

Instructional Methods

In addition to determining the overall curriculum approach to develop critical thinking skills, educators must also determine the appropriate methods necessary to deliver the instruction. Tsui (1999) indicated that while a significant amount of research exists on the impact of either courses or pedagogy, "few research endeavors simultaneously explore the relationship that exists between the two" (p.189). Tsui (1999) further added that pedagogical approach studies have provided inconsistent results on critical thinking effectiveness. Marin and Halpern (2011), Sternberg (1985), and Tsui (1999) promoted the idea that classroom instruction must provide simulations of real experiences or problems, allowing students to discuss the challenges and interact with both peers and faculty members. Tedesco-Schneck (2013) endorsed the role of active learning through the use of interactive techniques which serve to change the power dichotomy within the classroom. Tsui (2008) argued that student-centered instructional techniques allow students to express their ideas as active participants in the learning process, fostering both critical thinking skill development and self-efficacy. Additionally, she advocated that coursework and exercises should focus on the process as well as the product to allow students the opportunity to explain their logic in developing their solutions or conclusions. Brookfield (2012) described critical thinking as a social learning process, which makes group work and discussion an effective method for teaching these skills. Carlson (2013) noted that instruction methods that use active student engagement such as discussions and individual projects tend to enhance student perceptions of critical thinking instruction. Tsui (1999) also endorsed independent projects as well as group projects, student class presentations, and writing assignments to enhance student critical thinking development. Walsh and Seldomridge (2006) concurred with the idea that writing assignments facilitate critical thinking, but recommended

that instructors assign a series of smaller papers throughout the course to allow the students to apply faculty feedback in subsequent assignments. They also recognized that while this is an effective technique, it places a significant demand on faculty time.

Young and Warren (2011) acknowledged that student critical thinking skills must be developed over time through a coordinated effort among different instructors in order to provide multiple opportunities to practice and receive feedback. Tsui (2001) contended that interdisciplinary team teaching facilitates a collaborative environment for ideas on the infusion of critical thinking within different disciplinary fields. Brookfield (2012) also endorsed the concept of team teaching, which facilitates the ability to respond to student differences and model critical thinking processes with different perspectives and skills.

Instructor Skills and Behaviors

Terenzini et al. (1995) emphasized that instructor skills and attitudes towards teaching critical thinking play a critical role in classroom effectiveness, and indicated that instructors who encourage and praise student participation and interaction with other students within the classroom enhance the development of critical thinking skills. They further indicated that interaction with peers and faculty members outside of the classroom had a positive effect on critical thinking ability.

An educator's approach to lesson instruction and assessment can impact student critical thinking development. Shell (2001), Snyder and Snyder (2008), and Walsh and Seldomridge (2006) argued that due to faculty requirements to cover a large amount of content in limited class time, instructors feel the need to use lecture as the primary means of instruction, limiting student opportunities for discussion and problem-solving activities. Haas and Keely (1998) and Shell (2001) indicated that lecture is the most prominent instructional method modeled for current

faculty during their past educational experiences, making for an even more difficult transition for instructors to promote active learning techniques within their classrooms. Snyder and Snyder (2008) contended that the trend for curriculum standardization and emphasis on test scores promote a more instructor-centered learning environment tending to undermine the development of critical thinking within the classroom. Tsui (1999) and Walsh and Seldomridge (2006) believed that this emphasis on test scores promotes an over-reliance on multiple choice examinations which tend to reward recognition and recall rather than encourage critical thinking. Walsh and Seldomridge (2006) endorsed the use of class participation as a means of assessment, noting that "unless class participation is a factor in determining the course grade, most students, particularly in large sections, are reluctant to respond to faculty questions" (p.214).

In order to facilitate critical thinking development, instructors must model these skills and behaviors within the classroom and continue to periodically hone their skills. Nugent (1990) emphasized that faculty must not only be willing to change their methods of instruction, but must be willing to change their view on the subjects that they teach, otherwise, "it is pointless to request students to consider an alternative perspective or to evaluate our belief critically" (p.91). Supon (1998) believed that in order to become an effective critical thinking facilitator, instructors must constantly analyze their own teaching and thinking and make a conscious commitment to develop alternative instructional methods. Onosko (1992) and Walsh and Seldomridge (2006) believed that faculty members must serve as role models for critical thinking, taking every opportunity to share personal examples of how they actively reflect upon and challenge their own assumptions. Brookfield (2012) contended that instructors must explicitly model critical thinking behaviors within the classroom if they expect students to engage in this type of learning environment.

Instructors require education and training on methods to incorporate critical thinking into the classroom. Abrami et al. (2008) asserted that the instructor must first be willing to incorporate critical thinking into the course, and then must receive specialized training in teaching methods that effectively integrate these skills within the classroom. Further, instructors must receive administrative support, performance feedback, and additional training as required for continued development. Tsui (1999) contended that faculty members who value critical thinking within their classrooms typically do not receive adequate professional training to teach these skills. Walsh and Seldomridge (2006) emphasized that "faculty need to be coached in higher-level oral questioning so they challenge students to use more complex reasoning, applying principles rather than regurgitating facts" (p.217). In addition to institutional training, Supon (1998) encouraged instructor self-development opportunities such as reading educational journals and attending seminars that promote the development of student thinking skills.

In addition to incorporating critical thinking into the classroom, instructors must create the proper learning environment to facilitate critical thinking development. Rugutt and Chemosit (2009) asserted that educators must create an optimal learning environment that enhances both student-to-student and student-faculty interaction in order to effectively promote the development of critical thinking skills. Brookfield (2012) endorsed the technique of open-ended questions within classroom discussions to facilitate this interaction and to provoke intellectual discourse. Tsui (2001) argued that in order to create the optimal environment to facilitate the development of student thinking skills, the instructor must have confidence in his or her own teaching abilities as well as the student's potential to perform these skills. Furthermore, faculty who possess instructional efficacy tend to teach with enthusiasm and view teaching as a mutual learning activity, actively using students as a resource to support critical thinking development.

Onosko (1991) and Torff (2005) contended that instructors that have low expectations of student ability to think critically typically resort to teaching factual information, believing that their students lack the capacity for higher order thinking. Nugent (1990) and Supon (1998) emphasized that instructors must create a classroom environment that establishes trust and mutual respect to foster critical thinking. Schrader (2004) promoted the creation of an intellectually safe environment, which she describes as "one in which the professor engages their experience and opinion, and through active engagement and collaboration, constructs a climate of mutual respect in which all knowers are invited to actively construct meaning, to take responsibility for their own learning, to think critically and reflectively, and understand the contextual nature of learning" (p.90). Nugent (1990) added that "If we respect our students, they will ask meaningful questions, consider perspectives other than ours, and present their own views in our classes as well as elsewhere" (p.88). Keeley, Shemberg, Cowell and Zinnbauer (1995) asserted that by creating a safe and trusting environment, instructors increase student self-efficacy facilitating their ability to question and constructively criticize arguments presented by the instructor and their fellow students.

In order to effectively teach critical thinking, educational institutions must emphasize the importance of these skills, and must designate critical thinking as a program learning outcome. The U.S. Army Command and General Staff College's current emphasis on critical thinking began in the early 1990s as the Army transformed its doctrine in response to a changing global environment. Since that time, research has been conducted to determine the applicability of critical thinking within the Army, and how to best incorporate it into existing training and education programs.

Army Critical Thinking Research

According to Halpin (1996), critical thinking importance within the U.S. Army can be traced back to 1993 with the introduction of "Battle Command" into Army doctrine. Lussier and Saxon (1994) contended that the fundamental aspects of Battle Command are leadership and decision-making. They further added that critical thinking is a vital skill within the decision-making aspect. Fallesen (1995) indicated that the Army leadership directed the development of a program of instruction to teach mid-career officers the cognitive skills necessary to enable Battle Command. The program developed by the Army Research Institute, entitled "Practical Thinking", consisted of 17 hours of instruction in eight separate lessons. In their view, practical thinking consisted of both critical and creative thinking, both necessary skills in solving complex problems. These lessons were integrated into the existing Command and General Staff Officer Course elective titled "Battle Command" during the 1994-1995 academic years. Self-report survey results from both instructors and students indicated that students benefited from the instruction and that it should continue to be included in future classes.

Halpin (1996) continued the research, focusing on the human dimension of battle command. He noted that to be effective in battle command, individual cognitive abilities must be developed over a long-term process. In his model of battle command expertise, he proposed that factors that influence individual thinking and decision-making include experience, knowledge, attitudes and skills. Halpin (1996) asserted that despite the importance of complex thinking within battle command, "there seems to be little intentional effort to determine what these skills are or how they can be amplified in the Army's officer population" (p.39).

Research conducted by Cohen, Thompson, Adelman, Bresnik, and Riedel (1999) on behalf of the Army Research Institute was designed to determine these thinking skills, and then develop

and test methods for training these skills to Army staff officers. Their qualitative study of army officers revealed six critical thinking skills associated with military decision-making: consider high level purpose, use time orientation effectively, detect and fill gaps, detect and resolve conflict, detect and evaluate assumptions, and judge when to commit to action. To train these skills, they developed a computer-based interactive training program accessible from either a stand-alone CD or web-based format.

The Army Research Institute sponsored a follow-on study conducted by ANCAPA Sciences in 2000 to continue research on critical thinking training for Army officers. The research determined that eight critical thinking skills were both important and problematic within Battle Command (Fischer, 2001). The eight skills and associated definitions are as follows:

1. Frame the message - Ability to identify essential elements of messages, understand their relationships, and describe high fidelity representation of the message.

2. Recognize gist in material - Ability to sort through details in a message and extract the gist therein.

3. Develop an explanation that ties information elements together in a plausible way - Ability to arrange evidence logically, highlight gaps in knowledge, develop and explanation or multiple explanations based on evidence, and evaluate explanations for plausibility.

4. Generalize from specific instances to broader classes - Ability to recognize and then classify specific facts/incidents/events as part of a general category.

5. Use mental imagery to evaluate plans - Ability to accurately create mental images in one's mind how resources will be applied and events will unfold within a situation.

6. Challenge one's biases - Ability to consistently reevaluate one's current view of situations for prejudice or bias as new information is received.

7. Examine other people's perspectives - Ability to view and interpret circumstances from perspectives of different individuals, cultures, religions, and timeframes.

8. Decide when to seek information based on its value and cost - Ability to evaluate need for new information in terms of its cost in time, resources, and risk. (Fischer, Spiker, & Riedel, 2008, p.9-10)

Based on the findings of the Army Training and Leader Development Panel in 2001, Army leadership directed the Command and General Staff College to transform its curriculum and instructional methods. As part of the curriculum transformation, the eight skills identified by Fischer (2001) were integrated within the Command and General Staff Officer Common Core Course.

The Army Research Institute continued the research by conducting a multi-year study (2004-2006) to first validate the eight skills identified by Fischer (2001), second, evaluate the critical thinking skills training, and third, develop and evaluate a web based critical thinking course. The research results confirmed the validity of the eight high impact critical thinking skills, and based on a self-report survey of eight instructors and instructional developers, concluded that instructors were satisfied with the instruction, believing it to be adequately covered and useful (Fischer et al., 2008). The focus of the web based course developed, *Computerized Training of Critical Thinking*, is "to improve key skills that support critical thinking and thus help Army personnel process information more efficiently and effectively" (Fischer et al., 2008, p.16). Based on self-report surveys from 19 soldiers that completed course, Fischer et al. (2009)

asserted that the course "appears to be generally effective at encouraging critical thinking," and rated by users as "highly relevant and beneficial to their military and civilian work" (p.41).

As a component of a study to evaluate tools to accelerate leader development, Leibrecht, McGilvray, Tystad, and Garven (2009) conducted a student learning assessment on instruction using the web-based critical thinking skills program developed earlier by the Army Research Institute. The study measured student learning before and after the training for three of the eight modules, providing mixed results on critical thinking skill improvement. The researchers concluded that due to the "erratic pattern with which participants completed pre-tests, training lessons, and post-tests, the data are suggestive at best" (Leibrecht et al, 2009, p.44).

Two studies looked specifically at critical thinking from an instructor perspective. First, Dike, Kochan, Reed, and Ross (2006) surveyed 194 educators from three different professional military education institutions to determine if they shared a common definition and concept of critical thinking. The researchers contended that educators at these institutions share a common understanding of critical thinking that incorporates the concepts developed by the American Philosophical Association Delphi study, and further, that most agree that critical thinking includes a developmental and dispositional aspect. Second, Hobaugh (2010) examined the critical thinking skills of instructors teaching medical subjects in a military environment. Her objective assessment using the California Critical Thinking Skills Test reveal "significant differences between the overall scores and subscores of officer and enlisted instructors as well as significant differences associated with advanced degrees at the doctoral level" (p.57). She further concluded that there are no significant differences in scores as a result of subjects taught, military assignment experience, or combat and humanitarian deployment experience.

Two studies considered the effectiveness of critical thinking instruction in a blended learning environment. First, Schumm, Webb, Turek, Jones, and Ballard (2006) surveyed students attending the Command and General Staff Officer Course and the Combined Arms Services Staff School in both traditional and distance learning environments. The self-report survey asked study participants to rate their satisfaction with "how well their instructors promoted critical thinking" (Schumm, 2006, p.43). Results from both student groups indicate that "satisfaction with critical thinking appeared to be the most important predictor variable for all outcome variables" (Schumm, 2006, p.47).

The second study, conducted by Straus et al. (2013), was designed to examine student satisfaction and perceived learning effectiveness as a result of attendance at the Blended Distributed Learning Advanced Operations Course of the Command and General Staff Officer Course. Students completed self-report surveys at the conclusion of the course and again post-graduation. Study findings indicate that students perceive that the course was effective in the acquisition of knowledge, but lacked effectiveness in the development of key skills such as critical thinking.

Army critical thinking research conducted since 1993 focused on determining the critical thinking skills necessary to solve complex military problems, integrating critical thinking into Army training, and evaluating this training in distance and blended learning environments. Critical thinking evaluation consisted primarily of self-report surveys. This study objectively evaluated the effectiveness of resident CGSOC instruction in changing student critical thinking skills and habits of the mind attributes, and further, gained an understanding of CGSOC instructors' perception on the role of curriculum, instructional methods, and instructor skills and behaviors in promoting this change.

Conceptual Framework

The conceptual framework for this study is depicted in figure 2.1. Command and General Staff Officer Common Core Course students began their graduate level professional military education with unique backgrounds, military, and educational experiences. These experiences uniquely impacted their existing critical thinking skills and habits of the mind attributes. Upon arrival, each student was assigned to a staff group, consisting of 16 students each. Each staff group participated in Common Core Course instruction (educational intervention) consisting of 97 different lessons (289 classroom hours) using a standardized curriculum approach. In addition to four lessons of explicit critical thinking instruction, critical thinking was one of the seven Common Core outcomes and was embedded within seven of the nine courses within CGSOC. An interdisciplinary staff group instructor team of five instructors, one from each of the Command and General Staff School departments, conducted the entire Common Core curriculum. Although the instructor group taught the curriculum with a common approach, each instructor had a unique set of skills and behaviors and may employ different instructional methods that could impact student critical thinking skill development. This study first determined if the Common Core Course produced a change in student critical thinking skills and habits of the mind attributes as a result of this educational intervention, and further determined how these instructors perceived the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking throughout the course.

Figure 2.1 Conceptual Framework
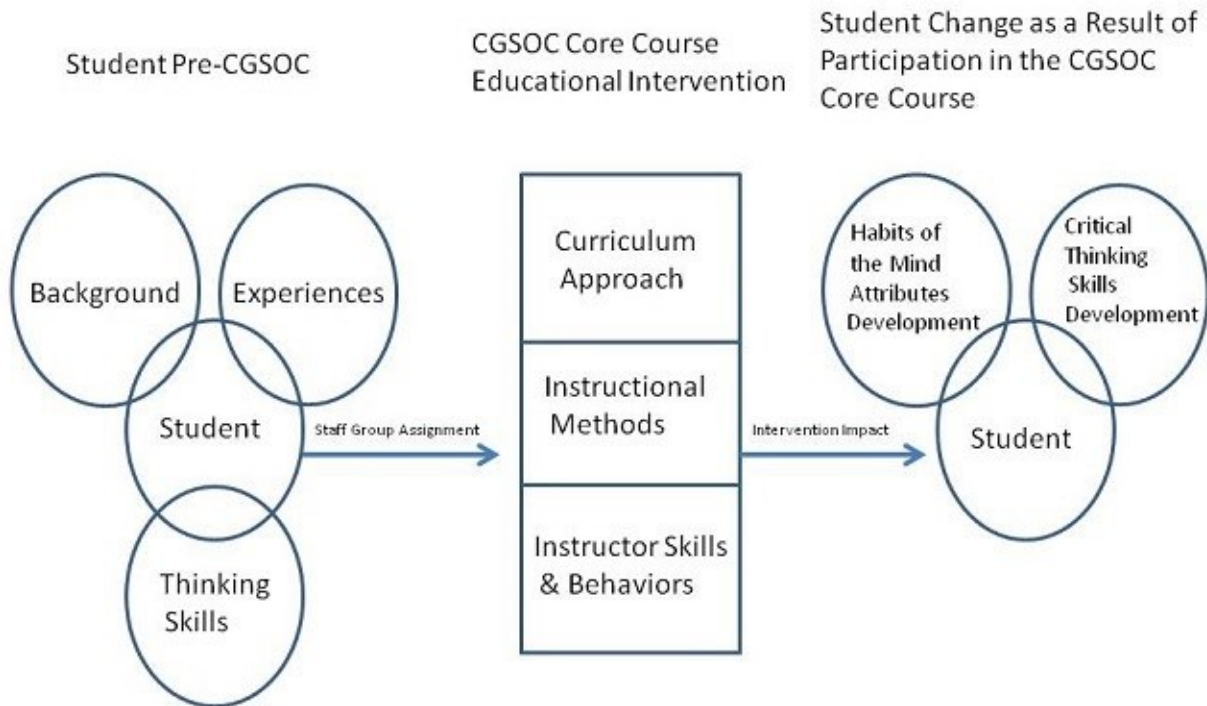
This research was unique in several aspects. First, this study assessed the development of both critical thinking skills and habits of the mind attributes (dispositions). Bensley and Murtagh (2012) acknowledged that few studies consider both critical thinking skills and dispositions simultaneously. Second, this study considered the impact of the curriculum approach, instructional methods, and instructor skills and behaviors to foster critical thinking development within each staff group. Terenzini et al. (1995) indicated that curriculum and instructional approaches are typically studied separately from instructor skills and abilities. Third, this research was the first study to use the Military and Defense Critical Thinking Inventory (MDCTI) to assess critical thinking development. Lastly, this study was the first to quantitatively examine the critical thinking skills and habits of the mind attributes development of a unique

student population, military officers, as a result of their professional military education experience, and add to the body of adult education literature on the critical thinking abilities of adults.

Summary

This chapter provided an overview of the existing critical thinking literature used to frame this study. The literature indicated that the concept of critical thinking lacks a common definition and an overarching theory, based on the diversity of research within the disciplines of philosophy, psychology, and education. Additionally, differences of opinion on the overarching purpose and components of critical thinking have failed to add clarity to the concept. The literature also indicated that there are a variety of methods available to assess critical thinking which can inform students on their progress and instructors on their teaching effectiveness. Next, an educational institution that desires to develop students that can think critically must consider the role of the curriculum approach, instructional methods, and instructor skills and behaviors in instructional effectiveness. With the changing global environment in the early 1990s, The U.S. Army recognized the need to have personnel that could think critically. Army research efforts since that time, focused on the developing these skills within professional military education institutions, such as the U.S. Army Command and General Staff College. Finally, this chapter provided an overview of the conceptual framework used to conduct the study. The next chapter will provide the methodology used to conduct this study.

Chapter 3 - Methodology

Introduction

The purpose of this study was to analyze the effectiveness of the Command and General Staff Officer Common Core Course in developing student critical thinking skills and habits of the mind attributes, and further to determine instructor perceptions on the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking. This chapter describes the methodology used to conduct the study. First, this chapter will identify the research questions used to guide the study. Second, this chapter will describe the overall research design in terms of the population and sample, the instrumentation and interview process used to collect the data, the data collection procedures, and the methods of data analysis.

Research Questions

The following research questions guided this study:

Research Question 1: Which student critical thinking skills change as a result of participating in the U.S. Army Command and General Staff Officer Common Core Course?

> Sub-questions:
>
> 1a. How do student overall critical thinking skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?
>
> 1b. How do student analysis skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?
>
> 1c. How do student inference skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?
>
> 1d. How do student evaluation skills change as a result of participate in the U.S. Army Command and General Staff Officer Core Course?

1e. How do student induction skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1f. How do student deduction skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 2: Which student critical thinking habits of the mind attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

2a. How do student communicative confidence attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2b. How do student professional confidence attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2c. How do student teamwork attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2d. How do student expression attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2e. How do student directness attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2f. How do student intellectual integrity attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2g. How do student mental focus attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2h. How do student mental rigor attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2i. How do student foresight attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2j. How do student cognitive maturity attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 3: Is there a difference between staff group scores of critical thinking skills or habits of the mind attributes for students participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

3a. Is there a difference between staff group overall critical thinking skill scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3b. Is there a difference between staff group analysis scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3c. Is there a difference between staff group inference scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3d. Is there a difference between staff group evaluation scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3e. Is there a difference between staff group induction scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3f. Is there a difference between staff group deduction scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3g. Is there a difference between staff group communicative confidence scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3h. Is there a difference between staff group professional confidence scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3i. Is there a difference between staff group teamwork scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3j. Is there a difference between staff group expression scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3k. Is there a difference between staff group directness scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3l. Is there a difference between staff group intellectual integrity scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3m. Is there a difference between staff group mental focus scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3n. Is there a difference between staff group mental rigor scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3o. Is there a difference between staff group foresight scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3p. Is there a difference between staff group cognitive maturity scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 4: How do these staff group instructors perceive the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking at the Command and General Staff Officer Core Course?

Research Design

This was an explanatory sequential mixed method study using the quantitative research results from the MDCTI instrument scores and then analyzing the data from the qualitative research to explain these results in greater detail (Creswell, 2014). The quantitative research first used a quasi-experimental single-group, pretest-posttest, time-series design with temporary treatment to determine the change in mid-career military officer critical thinking skills and habits of the mind attributes as a result of participation in the U.S. Army Command and General Staff Officer Course in order to answer the first and second primary research questions. Second, this study used a quasi-experimental, nonequivalent group pretest-posttest design to determine if there is a difference between staff group scores in order to answer primary research question three (Gliner et al., 2009).

The qualitative phase of this mixed methods design used the collective case study approach to answer primary research question four. Richards and Morse (2013) contended that collective case studies allow the researcher to compare different cases and identify patterns within the data collected. Creswell (2007) emphasized that the case study approach is appropriate "when the inquirer has clearly identifiable cases with boundaries and seeks to provide an in-depth understanding of the cases or a comparison of several cases" (p.74). The purposeful sample of participants consisted of the instructors from each of the eight staff groups sampled during the quantitative phase of the study. The data collection was conducted by means of focus group interviews with each of the instructor groups. Krueger and Casey (2009) described the focus

group study as a series of discussions that enable the researcher to determine the perceptions of the participants in regards to particular area of interest. Each focus group interview consisted of six open-ended questions designed to examine the group's perceptions on the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking skills and habits of the mind attributes. The six interview questions are located in Appendix A. Each focus group interview was digitally recorded and then holistically analyzed within each individual case and then across the eight cases to enable the researcher to interpret the meaning of the cases (Creswell, 2007).

Population

The study population consisted of military officers and U.S. Government civilian employees attending the Command and General Staff Officer Common Core Course, and instructors assigned by their department to teach during Class 15 from August 2014 to June 2015. The Command and General Staff Officer Course consisted of three distinct segments: the Common Core Course, the Advanced Operations Course, and two-six week Elective terms. This study focused only on the Common Core Course, which began on August 12, 2014 and ended on November 25, 2014. The total population was 1094 students. All Army students were chosen by a centralized U.S. Army board based on merit to attend the course in residence at Fort Leavenworth, KS. Army officers comprised approximately 80% of the CGSOC student body, with the remainder from the other U.S. military services, U.S. government agencies, and international military students from allied nations. Non-Army students were selected to attend based on criteria established by their particular service, agency, or nation. The typical student has served as a commissioned officer or U.S. Government employee for 10 to 12 years. The

CGSS student body averaged 35 years of age. All students earned a bachelor's degree, with approximately 34% completing a master's degree before arrival (USACGSS, 2014a).

Upon completion of the Command and General Staff College in-processing procedures, each student was assigned to a teaching team, with further assignment to one of the team's four staff groups. Staff groups consisted of 16 students and were purposefully clustered by the college in an attempt to obtain equal representation of military branch or service, race and ethnicity, gender, and military experience (USACGSC, 2005). Each staff group participated in the Common Core and Advanced Operations Courses with instruction provided by an interdisciplinary group of five CGSOC instructors that represented each of the college departments. Faculty members were assigned (military) or hired (civilians) as a member of one of the five teaching departments based on their background, education, experience, and qualifications. The Command and General Staff School faculty consisted of both military officers and civilian educators (USACGSC, 2013a). As of October 2014, the military faculty consisted of 147 officers, primarily with the rank of Major and Lieutenant Colonel, from both the U.S. military services and international allied nations. The school employed 221 civilian faculty members consisting of both Department of Defense and Department of State employees (USACGSC, 2014a). Each staff group was led by a faculty Staff Group Advisor, responsible to provide academic advice and synchronize instruction for the students in the staff group.

Sample

The sample consisted of 120 students and 24 instructors from the eight staff groups selected by the Command and General Staff School using cluster random sampling. Fraenkel and Wallen (2006) described cluster random sampling as the selection of groups rather than individuals in which everyone within the cluster is sampled. The Command and General Staff College limited

the study sample to eight staff groups of students and instructors, and further, required selection criteria established by the Command and General Staff School.

Each staff group was purposefully constructed to ensure a diverse mix of students from the army, other military services, government agencies, and allied nations. A typical staff group consisted of 13 Army officers, one Air Force officer, one Navy or Marine Corps officer, and one international officer. Of these 16 officers, the typical gender mix included 14 males and two females, and the typical race mix includes eleven Caucasians, two Black, two Hispanic, and one Asian officer (USACGSC, 2005). The following demographic data were collected from student participants from the sample population: military service or government agency, gender, age, race/ethnicity, and education level. The data were collected anonymously during the student research overview briefing on August 8, 2014, as required by the CGSC IRB permission. The researcher collected the students' staff group designation as part of the MDCTI instrument administration. This information was used only to compare the MDCTI results in order to answer the third research question.

Each of the two selected teaching teams had 12 instructors assigned to conduct Common Core Course instruction. A representative from each of the five teaching departments conducted instruction for the staff group. The following instructor demographic data were collected during the focus interview process: faculty type, academic rank, gender, race/ethnicity, age, highest educational level completed, teaching experience, teaching experience with current staff group, and their education, training, and personal experiences in teaching critical thinking.

Quantitative Instrument

Quantitative data were collected from student pretest and posttest scores using the Military and Defense Critical Thinking Inventory (MDCTI). The Military and Defense Critical Thinking

Inventory (MDCTI) is a form of the California Critical Thinking Skills Test (CCTST) and

California Critical Thinking Disposition Inventory (CCDTI) developed by Facione, Facione and

Gittens in 2010, specifically designed for individuals in the military or in defense related fields

(Insight Assessment, 2014). The MDCTI is a two-part copyrighted instrument used to measure

the core cognitive skills and personal attributes required in reflective problem solving and

decision-making. The instrument did not measure content knowledge, but focused instead on

critical thinking skills, and the mental disciplines and attributes that facilitate good critical

thinking. The MDCTI was administered on-line and in a timed mode. The on-line testing system

allocated 30 minutes for part one and 60 minutes for part two. The system reported the amount of

time each participant spent completing the instrument. The instrument publisher, Insight

Assessment, required the researcher to complete a one hour testing system orientation prior to

instrument administration. The researcher created a unique identifier and password for each

participant. The MDCTI is a reliable instrument with reported Cronbach's Alpha reliabilities for

part one ranging from .69 to .90, and Kuder Richardson coefficient reliabilities for part two

ranging from .72 to .89. The instrument scales have consistently displayed content, construct,

and criterion validity in studies conducted with "active duty military personnel, military trainees,

and college level students in military and defense educational programs" (Insight Assessment,

2014, p.52). MDCTI part one items were developed and tested through California Critical

Thinking Disposition Inventory (CCTDI) research over a 20 year period. MDCTI part two items

were developed and tested through California Critical Thinking Skills Test (CCTST) research

over a 40 year period (Insight Assessment, 2014). No MDCTI published research currently

exists.

Part one of the MDCTI assessed "ten attributes relevant to the exercise and expression of reasoned judgment and to successful professional interaction in decision-making contexts", and consists of 90 items in an agree-disagree likert scale (Insight Assessment, 2014, p.16). In addition to relevant dispositions derived from the CCTDI, part one also included additional measures proven to be associated with successful leadership. The instrument scales addressed habits of the mind attributes including: communicative confidence, professional confidence, teamwork, expression, directness, mental focus, intellectual integrity, mental rigor, foresight, and cognitive maturity (Insight Assessment, 2014). These attributes were defined as follows:

Communicative confidence - confidence in oral and written communication and assesses attitudes about technical writing.

Professional confidence - self-assurance felt by newly assigned, enrolled, hired, or newly promoted individuals regarding their readiness to handle the stress, competitiveness, vocabulary, workload, instructional or orientation methods, and related complexities associated with their new role.

Teamwork - describes a style of interacting that may be collaborative, competitive or a mix of both depending on what is called for in a given situation.

Expression - describes a style of interacting with peers that may be quietly observational, expressively performing, or a mix of both depending on context.

Directness - describes a style of behaving and speaking in relationship to questions or pressure from peers or superiors aimed at seeking their approval, or forthrightly declaring one's views, or a mix of both depending on the situation.

Intellectual integrity - the discipline of striving to be thorough and honest when evaluating differing viewpoints in order to learn the truth or reach the best decision possible in a given

situation.

Mental focus - the discipline or habit of being diligent, systematic, task-oriented, organized, and clear-headed.

Mental rigor - the discipline to work hard in an effort to analyze, interpret and achieve a deep understanding of complex material.

Foresight - the habit of approaching problems in an analytical and orderly way, with a view toward anticipating consequences and outcomes.

Cognitive maturity - relates to cognitive developmental level. (Insight Assessment, 2014, p.18-19)

Individual scores can range from 50-100. The communicative confidence, professional confidence, intellectual integrity, mental rigor, mental focus, foresight, and cognitive maturity attributes are further classified within one of three performance assessment categories: Strongly Manifested (scores from 85-100), Inconsistently Manifested (scores from 65-84), or Not Manifested (scores from 50-64) (Insight Assessment, 2014). The expression, teamwork, and directness attributes are considered styles, and each style has distinct performance assessment categories. Expression scores are classified into: Expressive Performer (scores from 85-100), Situational Observer or Performer (scores from 65-84), or Quiet Observer (scores from 50-64). Teamwork scores are classified into: Lone Competitor (scores from 85-100), Situational Competitor or Collaborator (scores from 65-84), or Consistent Collaborator (scores from 50-64). Directness scores are classified into: Situationally Direct (scores from 85-100), Inconsistently Manifested (scores from 65-84), or Approval Seeker (scores from 50-64) (Insight Assessment, 2014).

Part two of the MDCTI assessed the participant's critical thinking skills, consisting of 35 text and data mini-case items relevant to individuals that work within a military environment, and presented in a multiple choice format. This section addressed five different critical thinking skills which include: analytical thinking, inference, evaluation, inductive reasoning, and deductive reasoning (Insight Assessment, 2014). The skills were defined as follows:

Analysis - enables people to identify assumptions, reasons and claims, and to examine how they interact in the formation of arguments.

Inference - enables us to draw conclusions from reasons and evidence.

Evaluation - enables us to assessing the credibility of sources of information and the claims they make.

Induction - draw inferences about what we think must be true based on analogies, case studies, prior experience, statistical analyses, simulations, hypotheticals, and familiar circumstances and patterns of behavior.

Deduction – decision-making in precisely defined contexts where rules, operating conditions, core beliefs, values, policies, principles, procedures and terminology completely determine the outcome. (Insight Assessment, 2014, p.20)

The MDCTI was scored by Insight Assessment. As part of the test license purchase, the researcher received basic reports consisting of individual total scores, subscale scores, and percentile rankings, as well as group descriptive statistics and demographic descriptive statistics in an electronic data file. The MDCTI purchase agreement is located in Appendix B. Individual scale scores are reported on a continuum of 50-100 with scores between 50-64 considered no skill manifestation, scores between 65-74 considered moderate skill manifestation, scores between 75-84 considered strong skill manifestation, and scores between 85-100 considered

superior skill manifestation. In addition to the five skills, part two also provided a total score, which is the most widely used measure in critical thinking research (Insight Assessment, 2014).

Qualitative Trustworthiness

As in quantitative research, a primary concern of qualitative research is the validity and reliability of the data collection and analysis processes. Fraenkel and Wallen (2006) maintained that validity considers the meaning and value of the researcher's data inferences, while reliability considers the overall consistency of these inferences. In determining the validity and reliability in qualitative research, Guba and Lincoln (1989) preferred an equivalent concept termed trustworthiness. In their view, the three components of trustworthiness consisted of research credibility, transferability, and dependability.

This study employed a number of methods to assist in establishing research trustworthiness. First, the researcher conducted a pilot test of the focus group interview protocol with a representative group of instructors in order to validate the functionality and quality of the video and audio recording procedures and to determine the appropriateness of the interview questions to answer the fourth research question. Second, the researcher used a volunteer assistant to record key discussion topics on the classroom white board during each focus group interview. At the conclusion of the sessions, the participants reviewed the points enabling them to add, modify, or clarify their responses and general categories captured by the recorder on the white board. Guba and Lincoln (1989) and Stake (1995) recommended member checks in order to: assess participant intent, correct interpretations errors, allow participants to confirm responses or add additional information, and enable the researcher to begin the initial analysis of the data. These notes were photographed and later used in the analysis process to compare with the focus group session recordings and transcriptions. Third, the researcher compiled field notes during focus

group sessions and immediately following the sessions. Richards and Morse (2013) asserted that video and audio recordings cannot replace the need to compile field notes in the qualitative research process. Multiple sources of data allowed the researcher to triangulate the evidence from these sources in order to develop a coherent justification for emerging themes (Creswell, 2013; Yin, 2014). Fourth, the use of a focus group rather than an individual interview with open-ended questions allowed the participants to share insights and ideas, as well as provided the researcher with in-depth information from a group perspective in order to assist in explaining their critical thinking teaching approaches (Johnson & Turner, 2003; Krueger & Casey, 2009). Fifth, upon completion of the data analysis, as recommended by Creswell (2007) and Stake (1995), the researcher member checked the results with group members to ensure accuracy and credibility of the findings. Finally, the researcher provided the results to three peer colleagues to cross-check the analysis of themes from the focus group sessions. Creswell (2013) and Guba and Lincoln (1989) promoted the technique of peer debriefing to validate the analysis and to help the researcher better understand the findings from an external perspective.

To insure the trustworthiness of the data, the researcher used member checks of the transcription of the focus group sessions, as well as immediate review of general themes captured during the focus group sessions on the white board. In addition, the researcher compared themes from the sessions with his field notes. These multiple data sources were used to triangulate the qualitative findings.

Overview of the Research Design

The following steps summarize the research design:

1. The Kansas State University IRB application for approval was submitted on May 13, 2014 and approved on May 28, 2014.

2. The Command and General Staff College IRB application for approval was submitted on May 27, 2014 and approved on July, 17, 2014.

3. The proposal was presented and approved by the dissertation committee on June 17, 2014.

4. The on-line MDCTI instrument was pilot tested with two student volunteers from the CGSOC 14-02 class.

5. The Command and General Staff School selected two teaching teams from Class 15 to participate in the study on July 18, 2014. The two teaching leaders were provided an overview of the study and their requirements as participants on July 21, 2014.

6. Instructors from the two teaching teams were provided an overview of the study and their requirements as participants on August 6 and 7, 2014.

7. Student participants from the two teaching teams were assembled in the Arnold Conference Room on August 8, 2014 and provided an overview briefing of the study. Consenting students read and signed the student informed consent forms and provided their demographic data to the researcher.

8. After collecting the informed consent forms, the researcher emailed the on-line instrument pretest link and login information to those students that consented to participate.

9. The MDCTI pretest results were received from the MDCTI publisher and entered into the study database.

10. A pilot study was conducted with a representative, volunteer group of instructors on November 13, 2014 to test the interview protocol and recording procedures.

11. At the completion of the Common Core Course on November 25, 2014, students that completed the MDCTI pre-test were emailed the link and login information (matched with the pretest information) for the MDCTI posttest.

12. The MDCTI posttest results were received from the MDCTI publisher and entered into the study database.

13. The researcher conducted quantitative analysis of the MDCTI results using Statistical Package for the Social Sciences (SPSS) software.

14. The researcher conducted eight focus group interviews and prepared the interview transcriptions.

15. The researcher member checked the interview transcriptions with staff group instructors from March 8, 2015 through March 13, 2015. Three instructors provided corrections that were changed within the interview transcripts.

16. The researcher conducted qualitative analysis of the interview data using QSR NVivo software.

17. The researcher developed cross-case themes from the focus group session transcripts, white board themes, and researcher field notes.

18. The researcher conducted a peer debriefing of analysis results.

IRB Approval

Before proceeding with the study, the researcher gained approval from both the Kansas State University and Command and General Staff Officer College Institutional Review Boards (Appendices C and D). The Kansas State IRB application was approved on May 28, 2014. The Command and General Staff Officer College application was approved on July 17, 2014.

Pilot Study

The quantitative instrument and qualitative focus group interview protocol were piloted. The researcher conducted a pilot study with two student volunteers from the CGSOC 14-02 class to test the functionality of the MDCTI instrument and the testing procedures. The participant MDCTI instructions were modified based on the results of the study. The researcher conducted a focus group interview pilot study with one representative group of instructors to test the interview protocol and recording procedures. The classroom configuration was adjusted and interview questions modified for clarity based on the pilot interview. Participants in both pilot studies were offered refreshments provided by the researcher as an incentive to participate.

Quantitative Methodology

Data Collection Procedures

Once the teaching teams and staff groups were selected by the Command and General Staff School, the researcher provided an overview of the research, explained the administrative procedures, provided an overview of the MDCTI instrument, and explained the focus group interview procedures to all 24 instructors. Staff Group Advisors were asked to have their students attend a research overview briefing conducted at the Lewis and Clark Center, Arnold Conference Room at the conclusion of class activities on August 8, 2014. The advisors were informed that they were prohibited from attending the overview brief to ensure that instructors had no influence on the student decision to participate. Each student was provided two copies of the Student Informed Consent Form (Appendix E), one for the researcher, and one to keep for their records. Each student was provided a Demographic Data Form (Appendix F) and asked to complete and return the form if they consented to participate in the study. The researcher provided an overview of the study, discussed the MDCTI instrument procedures, and articulated

the benefits for both the college and participating students. Students were informed that after completing the instrument, they would be provided on-line feedback to provide self-awareness of their critical thinking attributes and skills. Additionally, each student that completed the pretest and posttest was entered in a drawing for a chance to receive a $25 gift card (four cards were awarded). In addition to signing the consent form, each student was asked to provide a preferred email address to enable the researcher to provide access information for the MDCTI instrument. Upon conclusion of the briefing, the researcher collected the completed consent and demographic data forms and then emailed each consenting participant a link to the on-line MDCTI instrument and a researcher controlled login and password to access the instrument. The login identifier was a unique code generated by the researcher for the purpose of matching the student pretest and posttest scores for data analysis. Ninety of the 120 students present for the briefing consented to participate in the study. The researcher closed the pretest instrument on August 31, 2014, with 50 participants successfully completing both parts of the instrument. The MDCTI publisher provided the researcher with the participants' results. Each participant received immediate on-line feedback for each attribute or skill measured, including an interpretation of the individual score. Student pretest scores were entered into the study database.

Upon the conclusion of the Common Core Course on November 25, 2014, each student that previously consented to participate in the study and completed the instrument pretest was emailed an invitation to complete an instrument posttest. The researcher emailed each of these students a link to the on-line MDCTI instrument and provided a researcher controlled, individually assigned login and password to access the instrument to enable completion of the instrument posttest. The researcher closed the posttest instrument on February 1, 2014, with 41 participants successfully completing both parts. The MDCTI publisher provided the researcher

with the posttest instrument results by code assigned to enable the researcher to compare the difference between the pretests and posttests. Participant posttest results were recorded in the study database to facilitate data analysis.

Data Analysis

The student pretest and posttest scores from the MDCTI instrument were used to gather the quantitative data. Upon the receipt of the instrument results from the MDCTI publisher, the data were entered into the Statistical Package for the Social Sciences (SPSS) to conduct statistical analyses. In order to answer the first two primary research questions and their sub-questions, the researcher used the t-test for dependent samples (also known as paired or correlated samples), direct difference method to determine the difference between the student pretest and posttest scores from the MDCTI instrument. Coladarci, Cobb, Minium, and Clark (2008) and Possin (2008) proposed that this method focuses directly on individual change and reduces the margin of error, and more accurately reflects the extent of the population difference. Field (2009) indicated that the t-test for dependent samples assumes sample distribution normality, and if violated, requires analysis using the Wilcoxon signed-rank test. The results were analyzed to estimate the effect size in order to determine the practical significance of the outcome (Huck, 2012). Gliner et al. (2009) recommended Cohens *d* to measure the effect size for the t-test for dependent samples because it focuses "on the magnitude of difference rather than strength of association" (p.80). Field (2009) recommended Spearman's correlation coefficient to measure the effect size of the Wilcoxon signed-rank test.

In order to answer the third primary research question, the researcher used a one-way analysis of variance (ANOVA) to determine if a difference existed between the eight staff groups involved in the study. Coladarci et al. (2008) asserted that this method is an appropriate analysis

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technique when comparing three or more groups. For this analysis, the independent variable is the educational intervention and the dependent variables are the mean score differences for each group as determined from the pretest and posttest scores from the MDCTI instrument. If either the sample distribution normality or heterogeneity of variance assumptions was violated, the analysis was conducted using the Kruskal-Wallis test. To ensure accuracy, all statistical analyses were reviewed by a statistician, who had a doctoral degree in statistics.

<div align="center">

Qualitative Methodology

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Data Collection Procedures

Upon the conclusion of the Common Core Course on November 25, 2014, the researcher scheduled the eight focus group interviews at the staff groups' instructor convenience during the months of December 2014 through February 2015. Johnson and Turner (2003) and Krueger and Casey (2009) contended that focus group interviews were an appropriate method to enable the researcher to: gain a better understanding of differences between groups, to gain insight into complicated topics and the factors that influence perceptions, to provide synergy within the group in generating ideas during the interview process, and to inform previously collected quantitative data. Each interview was conducted within the Staff Group assigned classroom to create a natural setting for the participants. Creswell (2007) and Fraenkel and Wallen (2006) recommended that researchers conduct interviews in a location free from distractions, within a setting that is both familiar and comfortable for the participants, and facilitates the recording method chosen by the researcher. Each interview was digitally recorded using both video and audio means in the event of a recording malfunction.

For each of the eight faculty group interviews, the researcher provided refreshments as both an incentive to participate and to provide a more inviting and comfortable environment (Kruger

& Casey, 2009). Each instructor was asked to read and sign an informed consent form (Appendix G) prior to the commencement of the interview process. The participants kept one copy and provided a second document to the researcher. Those that consented to participate were asked to complete a demographic data sheet (Appendix H) which included: faculty type (military or civilian), academic rank, gender, race/ethnicity, age, highest education level achieved, teaching experience, teaching experience with current staff group, and their education, training, and personal experiences in teaching critical thinking. These data were used to describe the entire instructor sample, and not used to describe individual staff groups in order to protect the identity of the participants.

The focus group interviews consisted of six open-ended questions designed to solicit instructor perceptions on the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking. The six questions are listed within the interview protocol located in Appendix A. Fraenkel and Wallen (2006) suggested that within a focus group interview, open-ended questions allow for participants to consider their own views about an issue in relation to views of others within their group. The interviews commenced on January 15, 2015 and concluded on February 2, 2015 with all 24 instructors participating in the eight interviews.

Data Analysis

The eight focus group interviews were digitally recorded, professionally transcribed, and then analyzed using QSR NVivo 10 software. The transcriber confidentiality agreement is located in Appendix I. Creswell (2007) endorsed the use of computer programs to aid the researcher in organizing, storing and locating material, and further, "encourages a researcher to look closely at the data, even line by line, and think about the meaning of each sentence and idea" (p.165). The

data were analyzed using a collective case study approach, with each instructor staff group interview considered as a unique case. Richards and Morse (2013) indicated that case study research differs from other qualitative research methods because of its emphasis on study focus and location rather than intellectual and methodological tradition.

Each case was coded to provide a case context and description, and then analyzed for with-in case themes. Upon completion of the eight individual cases, the researcher conducted a cross-case analysis to ascertain similarities and differences among the focus groups in order to develop assertions and generalizations across the cases (Creswell, 2007). The researcher focused primarily on the role of the curriculum, instructional methods, and instructor skills and behaviors as a general strategy to analyze the focus group interview data. Yin (2014) endorsed the strategy of following theoretical propositions to guide the analysis process due to the fact that these propositions guide the data collection plan and develop the analytical priorities.

Mixed Methods Analysis

This study was conducted using a sequential explanatory mixed methods design. Creswell (2014) contended that this method allows the researcher to explain the quantitative results with qualitative data in order to provide a greater understanding of the quantitative results. For this study, a quantitative analysis was conducted to determine if there is a difference between staff group critical thinking skills and habits of the mind attributes scores as a result of MDCTI pretest and posttest. The qualitative analysis of staff group instructor perceptions on the role of the curriculum, instructional methods, and instructor skills and behaviors would assist the researcher in explaining differences between these staff group scores.

Researcher Background

Creswell (2007) advocated that "researchers' interpretations cannot be separated from their own background, history, context, and prior understandings" (p.39). The reader must be made aware of how the researcher's background may have influenced the interpretation of the qualitative data. This researcher is a retired U.S. Army officer with 21 years of service. A 1998 graduate of CGSOC, he also served as a CGSOC military instructor from 2003-2005. Since retiring from the U.S. Army in 2005, he served as civilian Assistant Professor within the DLRO Department, and Staff Group Advisor at the College until 2010. Since 2010, he has served as a Supervisory Assistant Professor (Team Leader) for the College in addition to his DLRO Department teaching responsibilities. The researcher acknowledges that student critical thinking development is an important aspect of the CGSOC Common Core Course curriculum. By quantitatively assessing the effectiveness of the course, and by gaining a better understanding of instructor perceptions through qualitative research, the researcher expects that the study results will assist the Command and General Staff School in understanding the effectiveness of the Common Core Course in developing student critical thinking, and further, provide insight to the teaching faculty and curriculum developers on potential areas of improvement.

Summary

The purpose of this study was to analyze the effectiveness of the Command and General Staff Officer Common Core Course in developing student critical thinking skills and habits of the mind attributes. The study used an explanatory sequential mixed method research design in order to answer the four research questions and test their respective hypotheses. A cluster random sample of eight student staff groups was selected from the CGSOC Class 15 population, and the quantitative data used to conduct the analyses was derived from a pretest and posttest using the

Military and Defense Critical Thinking Inventory (MDCTI), a nationally recognized instrument designed specifically for individuals in the defense and military profession. The qualitative component of the study consisted of focus group interviews conducted with instructors from the eight selected staff groups to examine their perceptions on the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking. The data collected from these interviews were analyzed and will be presented in Chapter 4 using a collective case study approach.

Chapter 4 - Analysis of the Data/Findings

Introduction

This chapter provides an analysis of the data collected from the student Military and Defense Critical Thinking Inventory (MDCTI) pretest/posttest results and the eight instructor focus group interviews. The quantitative data were analyzed using SPSS in order to answer the first three primary research questions and their subsequent sub-questions. The eight instructor focus group interviews were first transcribed, and then coded and analyzed for emerging themes using QSR NVivo 10 in order to answer the fourth primary research question.

Research Questions

The following research questions guided this study:

Research Question 1: Which student critical thinking skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

1a. How do student overall critical thinking skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1b. How do student analysis skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1c. How do student inference skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1d. How do student evaluation skills change as a result of participate in the U.S. Army Command and General Staff Officer Core Course?

1e. How do student induction skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

1f. How do student deduction skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 2: Which student critical thinking habits of the mind attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

2a. How do student communicative confidence attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2b. How do student professional confidence attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2c. How do student teamwork attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2d. How do student expression attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2e. How do student directness attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2f. How do student intellectual integrity attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2g. How do student mental focus attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2h. How do student mental rigor attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2i. How do student foresight attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

2j. How do student cognitive maturity attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 3: Is there a difference between staff group scores of critical thinking skills or habits of the mind attributes for students participating in the U.S. Army Command and General Staff Officer Core Course?

Sub-questions:

3a. Is there a difference between staff group overall critical thinking skill scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3b. Is there a difference between staff group analysis scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3c. Is there a difference between staff group inference scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3d. Is there a difference between staff group evaluation scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3e. Is there a difference between staff group induction scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3f. Is there a difference between staff group deduction scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3g. Is there a difference between staff group communicative confidence scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3h. Is there a difference between staff group professional confidence scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3i. Is there a difference between staff group teamwork scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3j. Is there a difference between staff group expression scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3k. Is there a difference between staff group directness scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3l. Is there a difference between staff group intellectual integrity scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3m. Is there a difference between staff group mental focus scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3n. Is there a difference between staff group mental rigor scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3o. Is there a difference between staff group foresight scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

3p. Is there a difference between staff group cognitive maturity scores for students participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 4: How do these staff group instructors perceive the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking at the Command and General Staff Officer Core Course?

Quantitative Results

The study quantitative data were collected from students from the eight selected staff groups (n=120) during the period of August 8, 2014 through and February 1, 2015. All 120 students were provided an overview of the study and then asked to provide their demographic information, sign an informed consent form, and provide a preferred email address. To meet the criteria set by the Command and General Staff College (CGSC) IRB, the researcher was not allowed to pair the demographic information with the participant's identity. Ninety students completed the demographic form, signed an informed consent form, and provided a valid email address. These 90 students were emailed a link to the online testing site and a unique login and password on August 8, 2014 in order to complete the MDCTI pretest. Fifty students successfully completed both parts of the instrument, and were subsequently emailed a link and a unique login and password on November 25, 2014 in order to complete the MDCTI posttest. Forty-one students completed both the MDCTI pretest and posttest.

Student Sample Demographics

Ninety students completed a demographic form. Of the 90 students, 85.5% were Army officers, 8.8% were Air Force officers, 3.3% were Navy officers, 2.2% were Marine Corps officers, and 1.1% were Interagency students. The gender mix was 86.6% male and 13.3% female. The students were 83.3% Caucasian, 6.6% African American, 5.5% Hispanic, 2.2% Asian, and 3.3% classified themselves as other. For highest post-secondary education attained, 53.3% earned a Bachelor's Degree, 43.3% earned a Master's Degree, and 3.3% earned a Doctorate Degree. The average student age was 36.

MDCTI Change Results

The pretest and posttest results were analyzed to determine the possibility of any false assessments. Insight Assessment recommended that participants completing the habits of the mind attribute section (part one) in less than five minutes or the skills section (part two) in less than 20 minutes could indicate a false assessment (Insight Assessment, 2014). Based on this stipulation, the researcher determined that three participant results should be excluded from the analysis due to insufficient effort on the instrument skills section. The MDCTI part one assessed the following attributes: communicative confidence, professional confidence, expression, teamwork, directness, intellectual integrity, mental focus, mental rigor, foresight, and cognitive maturity. Individual scores can range from 50-100. The communicative confidence, professional confidence, intellectual integrity, mental rigor, mental focus, foresight, and cognitive maturity attributes are further classified within one of three performance assessment categories: Strongly Manifested (scores from 85-100), Inconsistently Manifested (scores from 65-84), or Not Manifested (scores from 50-64) (Insight Assessment, 2014). The expression, teamwork, and directness attributes are considered styles, and each style has distinct performance assessment categories. Expression scores are classified into: Expressive Performer (scores from 85-100), Situational Observer or Performer (scores from 65-84), or Quiet Observer (scores from 50-64). Teamwork scores are classified into: Lone Competitor (scores from 85-100), Situational Competitor or Collaborator (scores from 65-84), or Consistent Collaborator (scores from 50-64). Directness scores are classified into: Situationally Direct (scores from 85-100), Inconsistently Manifested (scores from 65-84), or Approval Seeker (scores from 50-64) (Insight Assessment, 2014). The MDCTI part two assessed the overall reasoning skill as well as separate scores for the skills of analysis, inference, evaluation, induction, and deduction. Individual scores can range

from 50-100, and are further classified within one of four performance assessment categories: Superior Skill Manifestation (scores from 85-100), Strong Skill Manifestation (scores from 75-84), Moderate Skill Manifestation (scores from 65-74), and Skill Not Manifested (scores from 50-64) (Insight Assessment, 2014). Each measured skill and attribute was analyzed in SPSS to determine distribution normality prior to conducting the statistical analysis. Field (2009) advised that when conducting a t-test, the researcher must analyze the differences between scores, and then analyze the sampling distribution of these differences. The researcher analyzed distribution normality using the Shapiro-Wilk Test. The Shapiro-Wilk result was used for this study based on Razili and Wah's (2011) conclusion that the Shapiro-Wilk test is the most powerful test for all distribution types and sample sizes. The researcher then analyzed the data using the t-test for dependent samples (for normal distributions) or the Wilcoxon signed-rank test (for non-normal distributions) for each skill and attribute.

Critical Thinking Skills

In order to answer the first research question, the researcher conducted a t-test for dependent samples or Wilcoxon signed-rank test based on normal or non-normal distributions to determine a change in student critical thinking skills as a result of their participation in the CGSOC Common Core Course. Each of the skills were analyzed separately and the results described below.

Overall

The overall score "describes overall strength in using reasoning to form reflective judgments about what to believe or what to do" (Insight Assessment, 2014, p.20). Overall pretest scores ranged from 62-85 and posttest scores ranged from 62 to 87. Analysis of the pretest-posttest overall score changes indicated that 22 (58%) participants increased, five (13%) decreased, and

11 (28%) had no change. Seven students progressed to a higher level performance category, one

regressed to a lower level performance category, and 30 students remained within the same

performance category, as shown in Table 4.1. The overall score change distribution, D(38) =

.054, p < .05, was normal. The overall score change results were significant (M = 2.16, SE =

.619), t(37) = 3.485, p <.05., as shown in Table J.1. Cohen's effect size value (d=.565) suggested

a moderate to high practical significance.

Table 4.1
Overall skill performance category change results

Overall	85-100 Superior Manifestation (SUP)	75-84 Strong Manifestation (STR)	65-74 Moderate Manifestation (MOD)	50-64 No Manifestation (NOM)
Pretest	3	14	19	2
Posttest	5	16	16	1
Manifestation Change	2 = 1 - STR	12 = 2 + SUP	15 = 1 + SUP 3 + STR	1 = 1 + MOD

= No manifestation change
\+ Manifestation increase
\- Manifestation decrease

Analysis

The analysis skill "enables people to identify assumptions, reasons and claims, and to

examine how they interact in the formation of arguments" (Insight Assessment, 2014, p.20).

Analysis pretest scores ranged from 59 to 95 and posttest scores ranged from 59 to 90.

Examination of the pretest-posttest analysis score changes indicated that 20 (53%) participants

increased, eight (21%) decreased, and 10 (26%) had no change. Twelve students progressed to a

higher level performance category, six regressed to a lower level performance category, and 15

students remained within the same performance category, as shown in Table 4.2. The analysis

change distribution, D(38) = .033, p < .05, was significantly non-normal, requiring the use of the

Wilcoxon sign-ranked test for further analysis. The Wilcoxon test results indicate a significant difference, $z = -2.728$, $p < .05$. The mean of the ranks for score decreases was 10.56, while the mean of the ranks for score increases was 16.08, as shown in Table J.2. Spearman's correlation ($r_s = .754$) suggested a high practical significance.

Table 4.2
Analysis skill performance category change results

Analysis	85-100 Superior Manifestation (SUP)	75-84 Strong Manifestation (STR)	65-74 Moderate Manifestation (MOD)	50-64 No Manifestation (NOM)
Pretest	5	16	8	9
Posttest	13	9	12	4
Manifestation Change	4 = 1 - STR	5 = 8 + SUP 3 - MOD	3 = 1 + SUP 2 + STR 2 - NOM	2 = 1 + STR 6 + MOD

= No manifestation change
+ Manifestation increase
- Manifestation decrease

Inference

The inference skill "enables us to draw conclusions from reasons and evidence" (Insight Assessment, 2014, p.20). Inference pretest scores ranged from 58 to 87 and posttest scores ranged from 58 to 91. Analysis of the pretest-posttest inference score changes indicated that 21 (55%) participants increased, 13 (34%) decreased, and four (11%) had no change. Nine students progressed to a higher level performance category, four regressed to a lower level performance category, and 15 students remained within the same performance category, as shown in Table 4.3. The inference change distribution was normal, $D(38) = .148$, $p < .05$. The inference change results were not significant ($M = 2.05$, $SE = 1.251$), $t(37) = 1.641$, $p < .05$ as shown in Table J.3.

Table 4.3

Inference skill performance category change results

Inference	85-100 Superior Manifestation (SUP)	75-84 Strong Manifestation (STR)	65-74 Moderate Manifestation (MOD)	50-64 No Manifestation (NOM)
Pretest	3	12	12	11
Posttest	3	15	14	6
Manifestation Change	1 =	7 =	3 =	4 =
	1 - STR	1 + SUP	1 + SUP	1 + STR
	1 - MOD	4 - MOD	6 + STR	6 + MOD
			2 - NOM	

= No manifestation change

+ Manifestation increase

- Manifestation decrease

Evaluation

The evaluation skill "enables us to assessing the credibility of sources of information and the claims they make" (Insight Assessment, 2014, p.20). Evaluation pretest scores ranged from 62 to 91 and posttest scores ranged from 62 to 91. Analysis of the pretest-posttest evaluation score changes indicated that 19 (50%) participants increased, 13 (34%) decreased, and six (16%) had no change. Fourteen students progressed to a higher level performance category, eight regressed to a lower level performance category, and 16 students remained within the same performance category, as shown in Table 4.4. The evaluation change distribution, $D(38) = .134$, $p < .05$, was normal. The evaluation change results were not significant ($M = 1.74$, $SE = 1.108$), $t(37) = 1.567$, $p < .05$ as shown in Table J.4.

Table 4.4

Evaluation skill performance category change results

Evaluation	85-100 Superior Manifestation (SUP)	75-84 Strong Manifestation (STR)	65-74 Moderate Manifestation (MOD)	50-64 No Manifestation (NOM)
Pretest	3	25	7	3
Posttest	6	24	7	1
Manifestation Change	3 - STR	15 = 6 + SUP 4 - MOD	1 = 5 + STR 1 - NOM	1 + STR 2 + MOD

= No manifestation change

+ Manifestation increase

- Manifestation decrease

Induction

The induction skill "enables us to draw inferences about what we think must be true based on analogies, case studies, prior experience, statistical analyses, simulations, hypotheticals, and familiar circumstances and patterns of behavior" (Insight Assessment, 2014, p.20). Induction pretest scores ranged from 64 to 88 and posttest scores ranged from 64 to 90. Analysis of the pretest-posttest induction score changes indicated that 22 (58%) participants increased, 10 (26%) decreased, and six (16%) had no change. Thirteen students progressed to a higher level performance category, four regressed to a lower level performance category, and 21 students remained within the same performance category, as shown in Table 4.5. The induction change distribution, $D(38) = .766$, $p < .05$, was normal. The induction change results were significant ($M = 2.13$, $SE = .785$), $t(37) = 2.715$, $p < .05$, as shown in Table J.5. Cohen's effect size value ($d=.440$) suggested a low to moderate practical significance.

Table 4.5
Induction skill performance category change results

Induction	85-100 Superior Manifestation (SUP)	75-84 Strong Manifestation (STR)	65-74 Moderate Manifestation (MOD)	50-64 No Manifestation (NOM)
Pretest	3	21	12	2
Posttest	9	18	10	1
Manifestation Change	2 = 1 - STR	13 = 6 + SUP 2 - MOD	6 = 1 + SUP 4 + STR 1 - NOM	2 + MOD

= No manifestation change
+ Manifestation increase
- Manifestation decrease

Deduction

   The deduction skill enables "decision-making in precisely defined contexts where rules, operating conditions, core beliefs, values, policies, principles, procedures and terminology completely determine the outcome" (Insight Assessment, 2014, p.20). Deduction pretest scores ranged from posttest scores ranged from 53 to 89. Analysis of the pretest-posttest deduction score changes indicated that 21 (55%) participants increased, eight (21%) decreased, and nine (24%) had no change. Eleven students progressed to a higher level performance category, five regressed to a lower level performance category, and 22 students remained within the same performance category, as shown in Table 4.6. The deduction change distribution, $D(38) = .142$, $p < .05$, was normal. The deduction change results were significant ($M = 2.55$, $SE = 1.065$), $t(37) = 2.398$, $p < .05$, as shown in Table J.6. Cohen's effect size value ($d=.389$) suggested a low to moderate practical significance.

Table 4.6

Deduction skill performance category change results

Deduction	85-100 Superior Manifestation (SUP)	75-84 Strong Manifestation (STR)	65-74 Moderate Manifestation (MOD)	50-64 No Manifestation (NOM)
Pretest	5	8	10	15
Posttest	4	12	12	10
Manifestation Change	2 = 3 - STR	7 = 1 + SUP	5 = 1 + SUP 2 + STR 2 - NOM	8 = 7 + MOD

= No manifestation change

+ Manifestation increase

- Manifestation decrease

Critical Thinking Skills Findings

Based on the pretest-posttest results and quantitative analysis using the t-test for dependent samples method or the Wilcoxon signed-rank test, student score changes for the overall, analysis, induction, and deduction skills were significant as shown in Table 4.7. Student score changes were not significant for the inference and evaluation skills as shown in Table 4.7.

Table 4.7

Critical thinking skills change findings

Skill	Significance
Overall	.001*
Analysis	.005*
Inference	.109
Evaluation	.126
Induction	.010*
Deduction	.022*

* Significant at $p < .05$

Habits of the Mind Attributes

In order to answer the second research question, the researcher conducted a t-test for dependent samples or Wilcoxon signed-rank test based on normal or non-normal distributions to determine a change in student habits of the mind attributes as a result of their participation in the CGSOC Common Core Course. All 10 attributes were analyzed separately and the results described below.

Communicative Confidence

Communicative confidence is described as "confidence in oral and written communication" (Insight Assessment, 2014, p.18). Communicative confidence pretest scores ranged from 66 to 88 and posttest scores ranged from 70 to 93. Analysis of the pretest-posttest communicative confidence score changes indicated that 20 (53%) participants increased, 12 (31%) decreased, and six (16%) had no change. Five students progressed to a higher level performance category, three regressed to a lower level performance category, and 20 students remained within the same performance category, as shown in Table 4.8. The communicative confidence change distribution, $D(38) = .628$, $p < .05$, was normal. The communicative confidence change results were significant ($M = 1.58$, $SE = .704$), $t(37) = 2.242$, $p < .05$, as shown in Table J.7. Cohen's effect size value ($d=.363$) suggested a low to moderate practical significance.

Table 4.8

Communicative confidence attribute performance category change results

Communicative Confidence	85-100 Strong Manifestation (STR)	65-84 Inconsistent Manifestation (INC)	50-64 No Manifestation (NOM)
Pretest	7	31	0
Posttest	9	29	0
Manifestation Change	4 = 3 - INC	26 = 5 + STR	

= No manifestation change

+ Manifestation increase

- Manifestation decrease

Professional Confidence

   Professional confidence is described as "self-assurance felt by newly assigned, enrolled, hired, or newly promoted individuals regarding their readiness to handle the stress, competitiveness, vocabulary, workload, instructional or orientation methods, and related complexities associated with their new role" (Insight Assessment, 2014, p.18). Professional confidence pretest scores ranged from 70 to 90 and posttest scores ranged from 71 to 91. Analysis of the pretest-posttest professional confidence score changes indicated that 25 (66%) participants increased, eight (21%) decreased, and five (13%) had no change. Nine students progressed to a higher level performance category, two regressed to a lower level performance category, and 27 students remained within the same performance category, as shown in Table 4.9. The professional confidence change distribution, $D(38) = .532$, $p < .05$, was normal. The professional confidence change results were significant ($M = 2.11$, $SE = .721$), $t(37) = 2.919$, $p < .05$, as shown in Table J.8. Cohen's effect size value ($d=.473$) suggested a low to moderate practical significance.

Table 4.9

Professional confidence attribute performance category change results

Professional Confidence	85-100 Strong Manifestation (STR)	65-84 Inconsistent Manifestation (INC)	50-64 No Manifestation (NOM)
Pretest	8	30	0
Posttest	15	23	0
Manifestation Change	6 = 2 - INC	21 = 9 + STR	

= No manifestation change

+ Manifestation increase

- Manifestation decrease

Teamwork

Teamwork is described as "a style of interacting that may be collaborative, competitive or a mix of both depending on what is called for in a given situation" (Insight Assessment, 2014, p.18). Scores of 50 to 64 are indicative of individuals who "tend to be highly collaborative and they often regard group effort as the ideal approach to problem solving, which results in their being regarded as too focused on the process and not sufficiently concerned with the outcomes and results." Scores of 65 to 84 are indicative of individuals who "exhibit flexibility in their approach to competition and collaboration." Scores of 85 to 100 are indicative of individuals who "tend to be highly competitive, prefer to compete as individuals, are less tolerant of being led by peers, and regard group effort as inherently inefficient" (Insight Assessment, 2014, p.31). Teamwork pretest scores ranged from 63 to 78 and posttest scores ranged from 56 to 81. Analysis of the pretest-posttest teamwork score changes indicated that 14 (37%) participants increased, 16 (42%) decreased, and eight (21%) had no change. Two students progressed to the situational competitor/collaborator style, three regressed to a consistent collaborator style, and 33 students remained within the same style category, as shown in Table 4.10. The teamwork change

distribution, D(38) = .450, p < .05, was normal. The teamwork change results were not

significant (M = -.26, SE = .705), t(37) = -.373, p <.05, as shown in Table J.9.

Table 4.10
Teamwork style category change results

Teamwork	85-100 Lone Competitor (LOC)	65-84 Situational Competitor/Collaborator (SCC)	50-64 Consistent Collaborator (COC)
Pretest	0	35	3
Posttest	0	34	4
Style Change		32 = 3 - COC	1= 2 + SCC

= No style change
+ Style increase
- Style decrease

Expression

Expression is described as "a style of interacting with peers that may be quietly observational,

expressively performing, or a mix of both depending on context" (Insight Assessment, 2014,

p.18). Scores of 50 to 64 are indicative of individuals who "tend to be quietly contemplative even

in social situations with their peers. They are highly selective in the expression of their opinions

and less likely to make suggestions or to propose options." Scores of 65 to 84 are indicative of

individuals who "may present themselves as quiet observers or as expressive performers

depending on the context." Scores of 85 to 100 are indicative of individuals who "tend to be

highly social and expressive, particularly when they are with their peers" (Insight Assessment,

2014, p.30). Expression pretest scores ranged 66 to 88 and posttest scores ranged from 68 to 91.

Analysis of the pretest-posttest expression score changes indicated that 22 (58%) participants

increased, 10 (26%) decreased, and six (16%) had no change. Three students progressed to the

expressive performer style, one regressed to the situational observer/performer style, and 34

students remained within the same style category, as shown in Table 4.11. The expression

change distribution, D(38) = .662, p < .05, was normal. The expression change results were

significant (M = 1.76, SE = .582, t(37) = 3.028, p <.05, as shown in Table J.10. Cohen's effect

size value (d=.491) suggested a low to moderate practical significance.

Table 4.11
Expression style category change results

Expression	85-100 Expressive Performer (EXP)	65-84 Situational Observer/Performer (SOP)	50-64 Quiet Observer (QOB)
Pretest	2	36	0
Posttest	4	34	0
Style Change	1 = 1 - SOP	33 = 3 + EXP	

= No style change
+ Style increase
- Style decrease

Directness

Directness is described as "a style of behaving and speaking in relationship to questions or

pressure from peers or superiors aimed at seeking their approval, or forthrightly declaring one's

views, or a mix of both depending on the situation" (Insight Assessment, 2014, p.18). Scores of

50 to 64 are indicative of individuals who "tend to present themselves to others as having a near-

perfect nature, even if they must lie or exaggerate their own positive characteristics." Scores of

65 to 84 "indicate an ambivalent attitude toward the importance of objectivity, evidence-based

decision-making, and discovering the truth of the situation." Scores of 85 to 100 are indicative of

individuals who "prefer to describe situations exactly as they see them. They tend to speak

forthrightly, occasionally to the point of painful honesty" (Insight Assessment, 2014, p.30).

Directness pretest scores ranged from 54 to 80 and posttest scores ranged from 59 to 80.

Analysis of the pretest-posttest directness score changes indicated that 10 (26%) participants

increased, 23 (61%) decreased, and five (13%) had no change. Three students progressed to the

inconsistently manifested style, seven regressed to the approval seeker style, and 28 students

remained within the same style category, as shown in Table 4.12. The directness change

distribution, $D(38) = .101$, $p < .05$, was normal. The directness change results were significant

($M = -1.55$, $SE = .742$, $t(37) = -2.093$, $p < .05$, as shown in Table J.11. Cohen's effect size value

($d = -.339$) suggested a low to moderate practical significance.

Table 4.12
Directness style category change results

Directness	85-100 Situationally Direct (SID)	65-84 Inconsistently Manifested (INC)	50-64 Approval Seeker (APS)
Pretest	0	34	4
Posttest	0	30	8
Style Change		27 = 7 - APS	1= 3 + INC

= No style change
+ Style increase
- Style decrease

Intellectual Integrity

Intellectual integrity is described as "the discipline of striving to be thorough and honest

when evaluating differing viewpoints in order to learn the truth or reach the best decision

possible in a given situation" (Insight Assessment, 2014, p.19). Intellectual integrity pretest

scores ranged from 71 to 93 and posttest scores ranged from 75 to 95. Analysis of the pretest-

posttest intellectual integrity score changes indicated that 23 (60%) participants increased, nine

(24%) decreased, and six (16%) had no change. Five students progressed to a higher level

performance category, three regressed to a lower level performance category, and 30 students

remained within the same performance category, as shown in Table 4.13. The intellectual

integrity change distribution, $D(38) = .391$, $p < .05$, was normal. The intellectual integrity change

results were not significant ($M = 1.18$, $SE = .752$), $t(37) = 1.574$, $p < .05$, as shown in Table J.12.

Table 4.13
Intellectual integrity attribute performance category change results

Intellectual Integrity	85-100 Strong Manifestation (STR)	65-84 Inconsistent Manifestation (INC)	50-64 No Manifestation (NOM)
Pretest	9	29	0
Posttest	12	26	0
Manifestation Change	6 = 3 - INC	24 = 5 + STR	

= No manifestation change
+ Manifestation increase
- Manifestation decrease

Mental Focus

   Mental focus is described as "the discipline or habit of being diligent, systematic, task-

oriented, organized, and clear-headed" (Insight Assessment, 2014, p.19). Mental focus pretest

scores ranged from 64 to 97 and posttest scores ranged from 61 to 100. Analysis of the pretest-

posttest mental focus score changes indicated that 17 (45%) participants increased, 14 (37%)

decreased, and seven (18%) had no change. Seven students progressed to a higher level

performance category, six regressed to a lower level performance category, and 25 students

remained within the same performance category, as shown in Table 4.14. The mental focus

change distribution, $D(38) = .407$, $p < .05$, was normal. The mental focus change results were not

significant ($M = 1.29$, $SE = 1.071$), $t(37) = 1.204$, $p < .05$, as shown in Table J.13.

Table 4.14

Mental focus attribute performance category change results

Mental Focus	85-100 Strong Manifestation (STR)	65-84 Inconsistent Manifestation (INC)	50-64 No Manifestation (NOM)
Pretest	12	25	1
Posttest	13	24	1
Manifestation Change	7 = 5 - INC	18 = 6 + STR 1 - NOM	1 + INC

= No manifestation change

\+ Manifestation increase

\- Manifestation decrease

Mental Rigor

Mental rigor is described as "the discipline to work hard in an effort to analyze, interpret and achieve a deep understanding of complex material" (Insight Assessment, 2014, p.19). Mental rigor pretest scores ranged from 71 to 89 and posttest scores ranged from 72 to 93. Analysis of the pretest-posttest intellectual integrity score changes indicated that 17 (45%) participants increased, 12 (32%) decreased, and nine (24%) had no change. Four students progressed to a higher level performance category, six regressed to a lower level performance category, and 28 students remained within the same performance category, as shown in Table 4.15. The mental rigor change distribution, $D(38) = .357$, $p < .05$, was normal. The mental rigor change results were not significant ($M = .26$, $SE = .696$), $t(37) = 1.204$, $p < .05$, as shown in Table J.14.

Table 4.15

Mental rigor attribute performance category change results

Mental Rigor	85-100 Strong Manifestation (STR)	65-84 Inconsistent Manifestation (INC)	50-64 No Manifestation (NOM)
Pretest	10	28	0
Posttest	8	30	0
Manifestation Change	4 = 6 - INC	24 = 4 + STR	

= No manifestation change

+ Manifestation increase

- Manifestation decrease

Foresight

Foresight is described as "the habit of approaching problems in an analytical and orderly way, with a view toward anticipating consequences and outcomes" (Insight Assessment, 2014, p.19). Foresight pretest scores ranged from 70 to 95 and posttest scores ranged from 72 to 93. Analysis of the pretest-posttest foresight score changes indicated that 15 (39.5%) participants increased, 15 (39.5%) decreased, and eight (21%) had no change. Five students progressed to a higher level performance category, 10 regressed to a lower level performance category, and 23 students remained within the same performance category, as shown in Table 4.16. The foresight change distribution, $D(38) = .120$, $p < .05$, was normal. The foresight change results were not significant $(M = .37, SE = .791)$, $t(37) = .466$, $p < .05$, as shown in Table J.15.

Table 4.16

Foresight attribute performance category change results

Foresight	85-100 Strong Manifestation (STR)	65-84 Inconsistent Manifestation (INC)	50-64 No Manifestation (NOM)
Pretest	18	20	0
Posttest	13	25	0
Manifestation Change	8 = 10 - INC	15 = 5 + STR	

= No manifestation change

+ Manifestation increase

- Manifestation decrease

Cognitive Maturity

Cognitive maturity "relates to cognitive developmental level" (Insight Assessment, 2014, p.19). Cognitive maturity pretest scores ranged from 66 to 91 and posttest scores ranged from 73 to 91. Analysis of the pretest-posttest cognitive maturity score changes indicated that 14 (37%) participants increased, 17 (45%) decreased, and seven (18%) had no change. Seven students progressed to a higher level performance category, seven regressed to a lower level performance category, and 24 students remained within the same performance category, as shown in Table 4.17. The cognitive maturity change distribution, $D(38) = .468$, $p < .05$, was normal. The cognitive maturity change results were not significant ($M = -.11$, $SE = .762$), $t(37) = -.138$, $p < .05$, as shown in Table J.16.

Table 4.17

Cognitive maturity attribute performance category change results

Cognitive Maturity	85-100 Strong Manifestation (STR)	65-84 Inconsistent Manifestation (INC)	50-64 No Manifestation (NOM)
Pretest	12	20	0
Posttest	12	25	0
Manifestation Change	5 = 7 - INC	19 = 7 + STR	

= No manifestation change
+ Manifestation increase
- Manifestation decrease

Habits of the Mind Attributes Findings

Based on the pretest-posttest results and quantitative analysis using the t-test for dependent samples method, student attribute score changes were significant for communicative confidence, professional confidence, expression, and directness as shown in Table 4.18. Student attribute score changes in teamwork, intellectual integrity, mental focus, mental rigor, foresight, and cognitive maturity were not significant as shown in Table 4.18.

Table 4.18

Habits of the mind attribute change results findings

Attribute	Significance
Communicative Confidence	.031*
Professional Confidence	.006*
Teamwork	.711
Expression	.004*
Directness	.043*
Intellectual Integrity	.124
Mental Focus	.236
Mental Rigor	.708
Foresight	.644
Cognitive Maturity	.891

* Significant at p <.05

MDCTI Staff Group Change Differences

In order to answer research question 3, the MDCTI results were analyzed to determine if there were any differences between the eight staff group scores for each skill and attribute. One Staff Group had a 44% participation rate, one Staff Group had a 38% participation rate, three Staff Groups had a 31% participation rate, and one Staff Group had a 25% participation rate. Due to the lack of participation within two Staff Groups (less than 25% of the group), the researcher excluded these two groups from the statistical analysis. Each measured skill and attribute was analyzed in SPSS using the Shapiro-Wilk test to determine distribution normality and the Levene test to determine that the variance between the groups were equal prior to conducting the statistical analysis. The researcher conducted a one-way analysis of variance (ANOVA) or the

Kruskal-Wallis test if either the distribution normality or heterogeneity of variance assumptions were violated.

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Critical Thinking Skills

</div>

The researcher conducted a one-way ANOVA or Kruskal-Wallis test, based on distribution normality or variance heterogeneity, to determine differences between staff group critical thinking skills as a result of their participation in the CGSOC Common Core Course. All six skills were analyzed separately and the results described below.

Overall

The overall change distribution, $D(32) = .123$, $p < .05$, was normal, and the overall change variances were equal, $F(5,26) = 1.08$, $p < .05$. The overall change group differences were not significant, $F(5,26) = .252$, $p < .05$, as shown in Table J.17.

Analysis

The analysis skill change variances were equal, $F(5,26) = .609$, $p < .05$, however, the analysis change distribution, $D(32) = .033$, $p < .05$, was significantly non-normal, requiring the use of the Kruskal-Wallis test for further analysis. The analysis change group differences were not significant, $H(5) = 3.06$, $p < .05$, as shown in Table J.18.

Inference

The inference change distribution was normal, $D(32) = .254$, $p < .05$, was normal, however, the inference change variances were not equal, $F(5,26) = 2.705$, $p < .05$, requiring the use of the Kruskal-Wallis test for further analysis. The inference change group differences were not significant, $H(5) = 3.39$, $p < .05$, as shown in Table J.19.

Evaluation

The evaluation change distribution, $D(32) = .357$, $p < .05$, was normal, and the evaluation change variances were equal, $F(5,26) = 1.3$, $p < .05$. The evaluation change group differences were not significant, $F(5,26) = .686$, $p < .05$, as shown in Table J.20.

Induction

The induction change distribution, $D(32) = .948$, $p < .05$, was normal, and the induction change variances were equal, $F(5,26) = .881$, $p < .05$. The induction change group differences were not significant, $F(5,26) = .265$, $p < .05$, as shown in Table J.21.

Deduction

The deduction change distribution $D(32) = .008$, $p < .05$, was significantly non-normal, and the deduction change variances were not equal, $F(5,26) = 2.892$, $p < .05$, requiring the use of the Kruskal-Wallis test for further analysis. The deduction change group differences were not significant, $H(5) = 4.35$, $p < .05$, as shown in Table J.22.

Critical Thinking Skills Group Change Findings

Based on the pretest-posttest results and quantitative analysis using a one-way analysis of variance (ANOVA) or the Kruskal-Wallis test, group score changes for the overall, analysis, inference, evaluation, induction, and deduction skills were not significant as shown in Table 4.19.

Table 4.19
Critical thinking skills group change results findings

Skill	Significance
Overall	.953
Analysis	.698
Inference	.642
Evaluation	.638
Induction	.928
Deduction	.500

Habits of the Mind Attributes

The researcher conducted a one-way ANOVA or Kruskal-Wallis test, based on distribution normality or variance heterogeneity, to determine differences between staff group habits of the mind attributes as a result of their participation in the CGSOC Common Core Course. All 10 attributes were analyzed separately and the results described below.

Communicative Confidence

The communicative confidence change distribution, $D(32) = .595$, $p < .05$, was normal, and the communicative confidence change variances were equal, $F(5,26) = .319$, $p < .05$. The communicative confidence change group differences were not significant, $F(5,26) = 2.28$, $p < .05$, as shown in Table J.23.

Professional Confidence

The professional confidence change distribution, $D(32) = .548$, $p < .05$, was normal, and the professional confidence change variances were equal, $F(5,26) = .696$, $p < .05$. The professional confidence change group differences were not significant, $F(5,26) = .680$, $p < .05$, as shown in Table J.24.

Teamwork

The teamwork change distribution was normal, $D(32) = .447$, $p < .05$, , however, the teamwork change variances were not equal, $F(5,26) = 2.996$, $p < .05$, requiring the use of the Kruskal-Wallis test for further analysis. The teamwork change group differences were not significant, $H(5) = .969$, $p < .05$, as shown in Table J.25.

Expression

The expression change distribution was normal, $D(32) = .750$, $p < .05$, however, the expression change variances were not equal, $F(5,26) = 3.299$, $p < .05$, requiring the use of the Kruskal-Wallis test for further analysis. The expression change group differences were not significant, $H(5) = 4.126$, $p < .05$, as shown in Table J.26.

Directness

The directness change distribution, $D(32) = .203$, $p < .05$, was normal, and the directness change variances were equal, $F(5,26) = .774$, $p < .05$. The directness change group differences were not significant, $F(5,26) = .695$, $p < .05$, as shown in Table J.27.

Intellectual Integrity

The intellectual integrity change distribution, $D(32) = .300$, $p < .05$, was normal, and the intellectual integrity change variances were equal, $F(5,26) = .776$, $p < .05$. The intellectual integrity change group differences were not significant, $F(5,26) = .334$, $p < .05$, as shown in Table J.28.

Mental Focus

The mental focus change distribution, $D(32) = .589$, $p < .05$, was normal, and the mental focus change variances were equal, $F(5,26) = 1.409$, $p < .05$. The mental focus change group differences were not significant, $F(5,26) = 1.926$, $p < .05$, as shown in Table J.29.

Mental Rigor

The mental rigor change distribution, $D(32) = .668$, $p < .05$, was normal, and the mental rigor change variances were equal, $F(5,26) = .180$, $p < .05$. The mental rigor change group differences were not significant, $F(5,26) = 1.167$, $p < .05$, as shown in Table J.30.

Foresight

The foresight change distribution, $D(32) = .340$, $p < .05$, was normal, and the foresight change variances were equal, $F(5,26) = .096$, $p < .05$. The foresight change group differences were not significant, $F(5,26) = 1.894$, $p < .05$, as shown in Table J.31.

Cognitive Maturity

The cognitive maturity change distribution was normal, $D(32) = .548$, $p < .05$, however, the cognitive maturity change variances were not equal, $F(5, 26) = 6.750$, $p < .05$, requiring the use of the Kruskal-Wallis test for further analysis. The cognitive maturity change group differences were not significant, $H(5) = 1.613$, $p < .05$, as shown in Table J.32.

Habits of the Mind Attributes Group Change Findings

Based on the pretest-posttest results and quantitative analysis using a one-way analysis of variance (ANOVA) or the Kruskal-Wallis test, group score changes for all 10 habits of the mind attributes were not significant as shown in Table 4.20.

Table 4.20
Habits of the mind attribute group change results findings

Attribute	Significance
Communicative Confidence	.076
Professional Confidence	.643
Teamwork	.965
Expression	.531
Directness	.632
Intellectual Integrity	.888
Mental Focus	.124
Mental Rigor	.352
Foresight	.130
Cognitive Maturity	.900

Critical Thinking Skills and Habits of the Mind Group Change Findings

There was no difference between the staff group scores for critical thinking skills or habits of the mind attributes. With no significant differences between the staff groups, there was no basis for the within-case analysis; therefore the researcher examined the focus group interview data using a cross-case analysis.

Qualitative Results

Upon conclusion of the CGSOC Common Core Course, the three instructors assigned to each of the eight student staff groups were invited to participate in focus group interviews at their convenience to enable the researcher to answer research question 4. All instructors (n=24) consented to participate in the focus groups. The eight focus group sessions were completed

between the period of January 15, 2015 and February 2, 2015. Each instructor completed a demographic data and informed consent form prior to the interview. Interviews were conducted in the instructor assigned classroom, and were digitally recorded using both audio and video recorders. The average session time was approximately 35 minutes. Each focus group interview consisted of six open-ended questions with each instructor provided the opportunity to respond to each interview question. The interview questions are located in Appendix A. The eight focus group responses were professionally transcribed and provided to the researcher on March 2, 2015. Each instructor was provided the opportunity to member check the transcriptions, with three instructors providing revisions.

Faculty Sample Demographics

Twenty-four instructors consented to participate in the eight focus group sessions. Of the 24 participants, 54% were civilian and 46% were military. Academic ranks consisted of 54% Assistant Professors, 42% Instructors, and 4% Professors. The gender mix was 96% male and 4% female. The participants were 84% Caucasian, 4% African American, 4% Hispanic, 4% Asian, and 4% classified themselves as other. For highest postsecondary education attained, 8% earned a Bachelor's Degree, 79% earned a Master's Degree, and 13% earned a Doctorate Degree. Participants averaged 90 months of teaching experience, ranging from five months to 240 months. Participants averaged 35 months of teaching experience within the same Staff Group, ranging from three months to 124 months. The median participant age was 48.5, ranging from 41 to 64 years old.

Within the demographic data form, participants were also asked to respond to the following open-ended question: What education, training, or personal experiences (formal or informal) have enhanced your ability to teach critical thinking? Participants provided 54 responses to the

question which were further classified into six themes: education experiences (24%), military experiences (22.2%), faculty development programs (22.2%), teaching experiences (16.7%), personal experiences (7.4%), and self-development programs (7.4%).

Role of Curriculum, Instructional Methods, and Instructor Skills and Behaviors

The eight faculty focus group sessions were transcribed, coded, and analyzed for themes using QSR NVivo 10 software. Twenty codes were developed and verified by three peer researchers. Thirteen themes emerged from the 20 developed codes. Nine themes were grouped within the areas of curriculum, instructional methods, and instructor skills and behaviors identified by Terenzini et al (1995). Four other themes emerged from the coding: contact time, physical classroom configuration, military/CGSS culture, and student attributes.

Curriculum

Staff group instructors perceived that although critical thinking is not the primary focus of the Common Core Course, certain aspects within the curriculum impact student critical thinking. The aspects named were: to provide a base of knowledge to enable critical thinking, explicit critical thinking lessons to set the foundation for the course, the use of practical exercises to promote critical thinking, and the impact of assessments on critical thinking development.

Provide a base of knowledge to enable critical thinking. The majority of instructors commented that the core curriculum provides opportunities to develop student critical thinking, but that the primary focus is to provide a common base of knowledge on doctrine and processes that students will apply in the Advanced Operations Course later in the academic year. One instructor remarked, "There's not a ton of critical thinking unless you teach it the right way, so I think every single class we teach may or may not lend itself to critical thinking depending on how the instructor teaches it." Another instructor contended that "Most of the curriculum in the

core does not give itself over to critical thinking unless it requires the students to do something, create something, rather than regurgitate information, or understand information, or comprehend information." Several instructors acknowledged students must be provided a base of knowledge, before they can begin to apply critical thinking. One instructor noted that "To try to get to higher level thinking, you need a certain base. They (students) come in here without the base of knowledge to just begin lower level thinking as opposed to getting higher level thinking." Another added, "You're just working with a broad audience that you want to first make sure gets the basic information down before they can do the higher level thinking." A third instructor asserted "I think the core is nothing more than, this is the Army, this is the joint force, (and) this is what you need to know." Even though the college provides standard lesson plans and student reading assignments, most instructors interviewed believe that they have sufficient flexibility, and are provided sufficient options to integrate critical thinking into many of the core curriculum lessons. As one instructor commented, "Core gives us an opportunity to do that by introducing the (critical thinking) concept, (and then) reinforcement of that throughout".

General critical thinking lessons set the foundation for the course. Instructors noted that the general critical thinking lessons in the Foundations (C100) course provided students the basic concepts and tools to apply critical thinking skills throughout the academic year. One instructor remarked that the critical thinking lessons "Set the foundation for the rest of the year, and then of course, we have posters (intellectual standards and elements of thinking) on the wall to help remind the students throughout the year". Another instructor added, "(The critical thinking lessons) introduce them to the concept of critical thinking which some folks have never considered before." Within the lessons, instructors noted that students are introduced to the critical thinking definition, critical thinking elements, Paul and Elder's intellectual standards,

critical thinking obstacles, and then have the opportunity to apply what they have learned in practical exercises specifically designed to emphasize these skills. Instructors emphasized the importance of the Foundations course and the college requirement to team teach lessons within the block in order to appropriately set the conditions and expectations for the remainder of the year. As one instructor stated:

I think that's the most important thing about critical thinking in C100, just setting the environment for it to happen…we get every instructor on the team to teach something during that block, so that you set those conditions up front, and that expectation.

Practical exercises promote critical thinking. Instructors emphasized that practical exercises within their courses fostered student critical thinking. One instructor commented**,** "The more practical exercises in a block or a lesson, the more critical thinking you get, simply because students are being active as opposed to being passive." Another instructor added*,* "I think many of the large application based exercises that we do…probably invokes a fair amount of critical thinking from a healthy percentage of the students." A third instructor remarked "I guess there's some critical thinking there when you're thinking about the process and how it's used." A fourth instructor explained, "We walk them through a series of practical exercises (where students) have their beliefs challenged by other students or by instructors. I think that's a much better model for critical thinking."

Instructors that taught the Army Doctrine and Planning (C400) and Joint Application of Operational Art (C500) courses endorsed that their exercises, focused on applying military planning and decision-making processes, provided faculty with multiple opportunities to develop student critical thinking skills. In applying the processes, students are required to solve complex, current problems, providing instructors an opportunity to "Discuss where critical or creative

thinking goes on within that particular process." One instructor acknowledged that "students like current problems, especially ambiguous current problems where there might not be a right answer." While developing solutions to these complex problems, instructors commented that it was critical for them to ensure that students "Go beyond applying the process" and refrain from giving them "Formats to fill in the blanks." One instructor remarked "Often times there's a balance between training and education…because we're teaching them a process, but embedded in the process is analysis, so you have to hit on both of them." Another instructor asserted "I think our exercises lend themselves to critical thinking as long as we look at them from that construct."

Instructors also commented that instruction must first enable students to understand the process. One instructor remarked "If a student doesn't have a good understanding of the process, I'm not sure you're going to practice a whole lot of critical thinking." Once the student understands the process, instructors assert that multiple repetitions of the process facilitate student critical thinking. One instructor commented that with repetition "They begin to breed some familiarity with the process (and understand) it better…potentially they become more comfortable with critical thinking." Another added "Repetition (allows) them to look at the nuances of the process and figure out where you need to be analytic and think critically." Instructors noted that critical thinking within these exercises could be improved by limiting the amount of background material provided to the students. One instructor emphasized that "Part of getting them to think critically is where you go to find the information and background so that you can start thinking about the problem." Another instructor added, "Some instructors will develop a lot of extra products. They do it because they are assisting the student, or think they are. The problem is…you get at critical thinking and analysis through ambiguity."

A third instructor acknowledged "The products provided…have sufficient detail, maybe too much…I think some of us reduce the ambiguity and make it too easy." A fourth instructor stated "When you look at the (background material) that they're given and the amount of detail in them, it doesn't push them to dig…the answers are there…that's just not reality." A fifth instructor confirmed this notion commenting "I wish they would have changes in the curriculum where we didn't hand them an existing plan. I think we should start from scratch…and they are asked to devise a plan…as opposed to dissecting an existing plan."

Assessments impact critical thinking development. Instructors acknowledged that course assessments impacted their ability to facilitate student critical thinking. Instructors endorsed the use of written assessments that require students to defend a position to enhance critical thinking while on the other hand, criticized the use of objective assessments, which they contended constrains student critical thinking.

Written assessments that require students to defend a position. One instructor reported "The writing assignments they have throughout the course requires (students) to do some critical thinking, look at a certain viewpoint, and give their perspective (and provide) supporting information that strengthens their argument." Another instructor confirmed, "Having students analyze something and write about it is a good indicator (of critical thinking)." A third instructor acknowledged the critical thinking is enhanced through "A written paper that asks them to have a point, to have a perspective, to back up their perspective." A fourth instructor commented, "I am not averse to having them write a critical paper where (students) have to really think about the topic (and) make a logical argument."

A number of instructors specifically addressed their course written assessments. One Developing Organizations and Leaders (L100) instructor endorsed the course written essay

assessment, commenting "They have to identify…the leadership problem, really looking for which one they consider to be the most important…that gives us the opportunity to see how their critical thinking is working." He further clarified "Part of what we are looking for, and it is spelled out in the rubric in fact, is their use of critical thinking in order to come up with solutions." A Strategic Context of Operational Art (C200) instructor contended, (The C207) writing assignment (requires) a good deal of critical thinking…there isn't any right answer…as long as they can pick a position and defend it." A C400 instructor noted, "(In some of the C400) individual assessments…they are presented with a complex problem and have to develop a solution, so they have to apply critical thinking" A C500 instructor commented, " I think the (C500 Operational Art and Design Written Exam) stands out as something that requires a degree of critical thinking." In discussing the Rise of the Western Way of War (H100) essay, an instructor declared, "They have to write a paper and argue a point, write to convince." In describing the five Managing Army Change (F100) written assessments, one instructor declared, "(The assessments) ask them to write an argumentative essay (which) is the only tool that we have that actually makes them pick a side and justify it, therefore causing them to do some critical thinking." Finally, one Ethics of the Combat Leader (E100) instructor endorsed the course written assessment which required students to compose "an ethical philosophy which was creative and also required students to apply some of these (critical thinking) concepts."

   Objective assessments constrain critical thinking. While instructors praised the use of written assessments to enhance student critical thinking, they contended that courses with an objective assessment hampered their critical thinking instructional effectiveness. One instructor argued, "If we're in a course where the major assessment is going to be an objective exam with multiple choice and fill in the blank, then we're not really getting into critical thinking." Another

instructor agreed and commented, "Last year we went to objective exams which is moving in a different direction than critical thinking." While a third instructor concurred, he also acknowledged the impact of the course learning objectives stating, "Our own worst enemy is the assessments, but sometimes those assessments are tied to the learning level." Two instructors confirmed that both learning levels and objective assessments impacted their instructional methods. One instructor declared "I have a learning objective (and) I owe it to (the student) to present some information to you so you can move on to the next steps of this block." He further added, "There's certain things I have to cover or my (students) are not going to pass the test." Another instructor agreed, stating "I think we ask (students) to just comprehend…here is the information, this is important for you to remember, and hopefully you'll remember it long enough to pass the three questions you have on (the exam)."

Instructional Methods

Instructors contended that instructional methods using active, rather than passive teaching techniques facilitated student critical thinking. Instructors advocated the use of case studies to analyze current problems in a historical context, and the use of classroom discussion to challenge student assumptions and points of view.

Use of case studies to analyze current problems in a historical context. Instructors that taught the L100, H100, and C200 courses endorsed the use of case studies within their courses to facilitate student critical thinking development. Leadership instructors emphasized the use of case studies embedded within their lessons which causes the students, as described by one instructor "To move out of your own shoes and put yourself into the shoes of somebody of a different time, in a different place and environment…and how that affects you…and how that leads you to a certain decision." Another instructor endorsed the use of both military and

civilian case studies with "The idea of putting them in unique situations or situations outside of their comfort zone or experience base, and having (them) come up with a solution, an idea." He further added, "Because we use case study methodology, there are definitely elements of (critical thinking) that are required for them to come up with (and) to analyze and synthesize the information in each of the lessons."

History instructors also endorsed case studies to facilitate student critical thinking. One H100 instructor noted "Teaching the history lessons is a case study…designed to present a situation and then walk (the students) through it during class as to why decisions were made, and why it turns out like it does." Another instructor contended "In the history class, we think through problems, the ideas, approach the problems, thinking in terms of what had been done before, what had experience taught, and what are the factors that that enabled organizations to think effectively."

In discussing the C200 Suez Case Study, one instructor noted:

In case studies, you can talk about center of gravity, you can talk about indirect approach or turning movements, but when you talk about Inchon Landings, students can put flesh to the bone through case studies (which) helps critical thinking.

The same instructor described another case study within the course which enabled him to promote critical thinking by asking students "What happened? What decisions were made or not made? How was the problem analyzed or not analyzed? Who was thinking critically? Who was not? What went on in there that facilitated that discussion?" In addition to case studies, instructors emphasized the use of classroom discussion to facilitate student critical thinking.

Use of discussions to challenge student assumptions and points of view. The majority of instructors advocated the use of classroom discussion as a means to develop student critical

thinking. Instructors also noted several techniques that enhanced classroom discussion. First, student assigned reading must offer different perspectives or points of view. Second, instructors must ask the right questions to challenge student assumptions and points of view. Third, instructors must facilitate students to question or defend a point of view. Fourth, instructors must break students down into smaller groups, ideally into groups of four. Finally, instructors must conduct small group work on a whiteboard.

Pre-reading assignments from different perspectives or points of view. One instructor commented:

I think CGSOC as a whole creates the perfect environment (for discussion) in how we teach using the Experiential Learning Model which requires the students to do a large part of the preparation outside of the classroom and be able to come back into the classroom and discuss while we're facilitating the discussion amongst the groups.

He further added, "(This model) minimizes the amount of slides we actually show and just rely on classroom discussions to create new knowledge based on what they read." Another instructor noted "We're taking individual knowledge of what they've learned from home or homework and bring it into the classroom discussion creating new knowledge or group knowledge based on that discussion." One instructor stressed the importance of having "A good reading that backs up a good discussion."

While one instructor declared "There's quite a bit of readings throughout the course that present a point of view," a number of instructors asserted the need to supplement or modify the lesson reading assignments to facilitate group discussion. One instructor reported "You as an instructor need to set it up correctly (by) dividing readings, having them do a closer reading of a small number of pages." Another instructor asserted that it was important to "Supplement

whatever they have to read with (different) points of view." A third instructor acknowledged the need to "Assign (student readings) with different points of view to argue from. (Enabling the students to) put (themselves) in that author's perspective and argue from that against the class." A fourth instructor noted *"I purposely ask (students) to (read) an article from something outside of the military (in order to) get a different perspective."* Finally, a fifth instructor declared "I give them a document that refutes not only the model that I teach them, but offers some very different perspectives on the efficacy and utility of (the model)."

Asking the right questions to challenge assumptions and points of view. While the length and quality of student readings play a part in classroom discussion, focus group participants acknowledged that instructor techniques impact the value discussion has on student critical thinking development. A number of instructors stressed the importance of asking the right questions. One instructor reported:

I think it goes to leading the discussion and asking the right question to facilitate the discussion. Not only from a student but amongst the students, that they can bounce off of each other and build upon, kind of the sum of the parts is greater than the whole because there isn't a student with the answer.

 A second instructor agreed stating "How you ask the question. That's really important in helping them out in their thinking." A third instructor noted:

If you can draw the students out through questions…kind of probing questions, maybe even sometimes playing devil's advocate, challenging some conventional wisdom on things, sometimes it requires the discussions to go past sort of what's politically correct, or the conventional wisdom, or even comfort zones to challenge some assumptions.

A fourth instructor emphasized the importance of asking open-ended questions, commenting "Whenever I've given them something that's fairly open-ended and there's room for interpretation, and give them an opportunity to express how they perceive, and give multiple options for that, has been the best opportunities to get to critical thinking." Finally, one instructor acknowledged that questions must be thought-provoking, by adding "We put them into situations or ask them paradigm challenging questions that they have to quickly come to some type of analysis within their own mind based on the information provided." When asking open-ended questions, one instructor cautioned:

We've got to make it uncomfortable to a certain degree, and instead of us filling the void, we've got to be able to be patient to let the void, the silence expand until it becomes so uncomfortable that somebody is going to say something, which will foster an avalanche of thoughts.

Facilitating students to question or defend a point of view. In addition to asking the right questions, instructors emphasized that facilitation skills are an important aspect of the discussion. One instructor commented that facilitation methods differ between instructors commenting "Everybody has a way to get that dialogue going between students. You just have to figure out what works for you and what you can support." Several instructors articulated some specific techniques they use to facilitate discussion and critical thinking. One instructor commented:

(If) I deliver information as, this is how you do it, without giving them an opportunity to ask questions as to why, whenever I neglect the reason why we do certain things, it sort of closes the door to critical thinking.

Another agreed that the instructor must give students "The opportunity to question (the information) and then counter based on other information they've received from different

places." Instructors also stressed the importance of both valuing student responses and asking students to defend their point of view. As one instructor acknowledged, "The best class is the one where you can get into (a) conversation where someone has to take a position." To reinforce value, one instructor commented, "You stop and say, think about what this guy said on this, let's discuss it. (Then) it becomes valued, and everybody likes to be valued." Another instructor explained his technique, reporting that "I'll write (their thoughts) down, even though I may not agree with them. At least they recognize that their thoughts are being considered and they're willing to talk more." In defending a student point of view, several instructors advocated asking the question "why". As one instructor explained "I use the why and tell me more technique." Another instructor agreed, adding "By encouraging them to express why (they) agree or disagree, (students) take it to the next level of explanation." A third instructor concurred, adding "You don't tell them that's wrong. You ask them to justify their perspective. Tell us why to encourage them to actually back up their statement as opposed to just saying something crazy and just letting it go."

Break students into groups of four. Instructors commented that small group discussions engage more students to exercise critical thinking. One instructor commented "I find that there are many students that when you're in a group of sixteen aren't as engaged as when you break them into (groups of 4 or 8)." Another instructor added "If you keep them in small groups to operate…that helps. The larger group you get, the more they tend to shut down, they're not as open." A third instructor agreed, stating:

> The smaller groups you get them into, the more they'll open up and start having honest and frank discussions with each other. I'll tie that to critical thinking because then they'll be more willing to share their views with each other.

A fourth instructor asserted *"We break the students into four or eight person groups. The smaller group you have, the more opportunity each student has to get his or her ideas in."* A number of instructors mentioned that the ideal group size is four students. As one instructor explained "In groups of four, there's a certain anonymity. This is a group idea, so we can present it and I'm not being judged. This encourages people to want to talk about different (ideas)." Another instructor further explained "I think (group size should be) no more than four people. Sometimes you'll break the room in two and you're really just disorganizing them for no particular reason." A third instructor took this one step further advocating to "Break them into groups of four, giving each group a different question to work on." Several instructors emphasized the importance of listening to the small group conversation. One instructor noted "When you go around and you listen to the small group having a discussion, they'll have some really engaged discussions." Another instructor took this one step further, adding, "(You have to) listen to the conversations and listen to the depth of them."

Use of whiteboard activities in small groups. In addition to advocating small group work, several instructors asserted that group use of the whiteboard facilitated more engagement and discussion from students. One instructor commented:

I get them up on the board (and) ask them a couple of questions. I try to get the students to answer the questions and then try to use their work on the boards and their explanation to start making some connections.

Another instructor concurred, adding:

I think smaller group white board exercises (facilitate discussion). I don't know if it's a peer pressure thing, but when you're with three or four individual (instead of) sixteen, where there's more rapid discussion, you feel like you have to impart your perspective. I think that

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gets you thinking more critically when you do that.

A third instructor added:

As groups work on the boards, I'll push them to think through the broader ideas and broader ramifications in what their thinking and connecting the issues that have been encountered in the past, (and) the issues that are encountered today.

Instructor Skills and Behaviors

While instructional methods provide a means to teach critical thinking, instructors addressed several skills and behaviors that promote a classroom environment to facilitate critical thinking. Instructors endorsed the requirement to establish a safe environment for learning, to equalize power between the instructor and student within the classroom, and instructor critical thinking modeling.

Establish a safe environment for learning. Instructors emphasized the importance of establishing a safe and trusting environment to enable student critical thinking. A number of instructors discussed the criticality of establishing this type of an environment within the first two weeks of the academic year during the C100 Course. One instructor explained:

In C100 you start norming of the group. Part of that norming of the group is the rules by which we will run the classroom, and part of the rules is whatever we say in here stays in here. We don't take this outside of the classroom.

Another instructor commented "Those first few weeks are critical because you build that relationship between instructors and instructed. There's a trust relationship built that you're not going to judge them." A third instructor added "I think part of it is setting the environment from day one that it's a safe environment." A fourth instructor agreed, stating "The instructor or the Staff Group Advisor helps facilitate that and ultimately, it's that storming forming, norming, and

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ultimately that group comes together and says…I trust you, you trust me." A fifth instructor described the Foundations course as:

A safe environment to discuss a lot of different topics. If you don't stick to it, then you create an environment where nobody talks about anything. So I think that's an important part of C100 that goes along with critical thinking.

Finally, one instructor contended that students must "establish up front that, honestly, when the walls are up and the doors are closed, this is a relatively safe environment."

Instructors also acknowledged that once established, instructors must reinforce this safe and trusting environment by managing the group dynamic through appropriate classroom discourse for the remainder of the Common Core Course. One instructor acknowledged "You have to very much manage the student dynamic within the staff group." Another instructor noted, students "Have really got to be really comfortable with each other." A third instructor agreed, emphasizing the importance of creating "An environment where they feel they are able to speak their mind without being ridiculed. Their own worst critics are the other students." In order to set the conditions for appropriate student interaction, one instructor described "What I really try to get them to do is to evaluate the argument that person is hypothesizing. If you want, attack the argument, not the person." A final instructor noted the importance of reducing barriers to discussion, commenting "I always think it's about barriers, trying to reduce those barriers between the students, as well as between the student and instructor."

Instructors contended that a safe classroom environment facilitated open and honest discussion. One instructor commented:

I think it's important to have a safe environment where there is really no wrong answer. You, know, like in the nest. Like we're all in the nest. We're safe in here. You can say things out of

the box that are stupid, and you're not going to be made fun of, at least in a bad way. Another instructor added, in "A non-threatening environment, people can get an opportunity (to discuss) why they think the way they do with someone at least giving them the respect of listening to them." A third instructor declared "If you have a safe environment where there is really no wrong answer, if somebody has something stupid, you'll at least entertain it and talk about it. I think that's important." A fourth instructor noted "I think you have to set an environment where the students feel free to discuss, maybe push the envelope a little bit in the discussions." A fifth instructor concurred, stating "It's just got to be an environment where as many people as you can feel safe to talk." In order to facilitate this safe environment, instructors acknowledged the role of power within the classroom.

Equalize classroom power. Several instructors indicated the importance of decreasing the emphasis of the instructor as an authority figure to create a more student-centered environment. One instructor commented on the role of instructor positioning, noting "Just where you emplace yourself in the classroom. You create an environment to facilitate more discussion where it's not just instructor led, it's more student led." Another instructor added that "Instead of being the center of the class…you just let them start discussing together and just go over to the corner and kind of wait until it naturally hits an end point." One instructor addressed the importance of student input into the conduct of the class, advocating "Ask the students for feedback…now they don't see it as just us to them. It's all of us working together to make the staff group better." Several instructors emphasized that it was important for an instructor to expose their vulnerabilities in order for students to feel comfortable sharing their thoughts or ideas. One instructor declared, "You expose yourself when you're going to render an opinion or try to think deeply about something." Another instructor commented, "If the instructor is willing to say, I'll

swing and miss at this one, then the students might be willing to swing and miss." A third

instructor added, "It's okay (to admit) you don't have all the answers."

Instructor critical thinking modeling. Instructors addressed the need to serve as critical

thinking role models to facilitate student critical thinking development. One instructor

emphasized:

You as the instructor are the focal point and you set the tone for the classroom from the first

day. If the students see you taking your time and being patient and hearing things and reacting

not emotionally or dismissively of what they're saying, dignifying everybody's remarks with

at least paying attention. Then they'll start to act like that. I think they model instructor's

behaviors in a lot of ways.

Another instructor agreed commenting "How you take an idea or thought and what you do with

it is also setting the example of critical thinking." A third instructor added, "You always have to

be aware that regardless of whether you think so or not, as the instructor, you're the most

powerful person in the room." A fourth instructor emphasized:

It can be tenuous sometimes, because some of them will come up with stuff that, in your mind

is just kind of nonsense. But because you're trying to encourage (thinking), and you know

that 15 other people are watching, you have to be sensitive to it. You have to treat it with kid

gloves a little bit.

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Other Themes

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Four additional themes emerged from the eight focus group sessions which did not address

the role of curriculum, instructional methods, and instructor skills and behaviors in developing

student critical thinking. First, instructors felt constrained by a lack of contact time. Second, they

stressed the importance of the physical classroom configuration. Third, they perceived that the

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military/CGSS culture detracts from critical thinking, particularly due to an overreliance on standardization and checklists. Fourth, student attributes impacted their ability to facilitate critical thinking skill development.

Constrained by lack of contact time

Instructors emphasized that contact time constraints impacted their ability to use discussion as a means of developing student critical thinking. One instructor acknowledged:

I think the big problem I notice now is just time. We've gotten rid of a lot of contact hours and had the students do a lot more on their own. Some students can look at a reading and be very critical, other students need to have outside stimulus to look at it creatively or critically.

Another instructor agreed, noting a "Lack of time for us to get into fully developing a topic long enough for them to be able to do some of the analysis, the reflection, to go through the steps of critical thinking." A third instructor concurred, declaring "We are hampered by time because another way you can stifle (discussion) is to get them into the receive mode." A fourth instructor added "It's hard, (with) the hours we're given, you're really limited on how much you can hope to accomplish." Instructors that taught two hour lessons felt particularly constrained by time. One instructor emphasized, "For leadership, we're held to a two hour block which I think inhibits the students from being able to go through and demonstrate critical thinking." He further added:

Because we're typically on a two hour block, if we were doing four hour chunks, we might be able to get to see the level of critical thinking because there would be more time for them to do that development.

Another instructor agreed, stating "We give them a ton of reading for each class and often times you don't have time within a two hour block that you can cover all of the topics that we want to

discuss from the reading." A third instructor added, "A lot of times you'll want to talk about something for 45 minutes, but you probably have 10 (minutes). So eventually you've got to truncate that discussion."

Physical classroom configuration

Instructors maintained that the physical classroom configuration was an important aspect in critical thinking instructional effectiveness. Several instructors addressed the physical classroom layout and instructor positioning in setting an environment conducive for critical thinking. One instructor noted that the classroom must "Have a physical layout so everybody can see everybody. Look them in the eye." Another instructor agreed, adding "The physical set-up of the classroom, U-shaped. I don't park myself at the front and just either stand or sit."

Military/CGSS culture detracts from critical thinking

Instructors perceive that their ability teach critical thinking is impacted by the military and CGSS culture. While they endorse that military leaders want critical thinkers within the force, they did not believe that military organizations and institutions adequately set the conditions or encourage critical thinking. As one instructor remarked:

I believe most organizations and institutions want people to think critically. I'm not convinced that they set the conditions well for people to do that. The desire's there, and their intentions are well intended; however, there's a sense of letting go of certain control in order for critical thinking to occur, being okay with not being in control.

Another instructor noted "This may be our kind of military culture or school culture. If the students are allowed to go into producing deliverables (such as) Power Point slides, critical thinking will shut down."

Several instructors commented that as a military school, the CGSS culture does not necessarily foster student critical thinking. One instructor contended "If you were to ask the students themselves whether or not they think they're exercising critical thinking…they would tell you…the school doesn't necessarily either set the conditions or encourage critical thinking." Another instructor declared "I think if you asked most students, they would tell you the school doesn't, the school talks about it…but as a practical matter, the school doesn't necessarily encourage it." A third instructor added, "Although we say we want them to think critically, or to challenge certain things, our behavior is often the opposite. When I say our behavior, I would say the institution as a whole." A fourth instructor explained "It's been said that our video doesn't necessarily match our audio."

Overreliance on standardization and checklists. A number of instructors commented that the Army's cultural overreliance on standardization and checklists hinder student critical thinking. One instructor declared "We (the army) live and die by the checklist, which most certainly does not lend itself to any sort of critical thinking." Another instructor affirmed "I know this school struggles with it, I assume the military as a whole. Even if (students) are making the attempts to become better critical thinkers, (they are) probably struggling with it because of that checklist mentality."

Student attributes

A number of instructors emphasized that student attributes impact the effectiveness of critical thinking instruction. Instructor comments focused on student motivation, student capacity for critical thinking, differing levels of student critical thinking skills, and student cognitive development levels.

Students are motivated to do well. Several instructors commented that student motivation impacts their ability to develop critical thinking skills. Once instructor asserted:

There's the motivation factor. I think most of them come in understanding that there's a value to this. Many of them come in wondering how much this is a requirement to jump through, how much they're really supposed to get through in a year, and how well do I really need to do here.

Another instructor agreed, stating:

There's a motivation level. They're told to come here. Many of them are motivated and that it's important to do well and develop themselves. Others see it as just one more thing they've got to get through before the go back.

A third instructor remarked:

I'm not entirely sure that critical thinking is happening for at least half of the staff group. Generally speaking, half of the staff group will just be happy to be there, the other half will be leading and doing the actual thinking.

A fourth instructor declared "That's not true for all of them, but, by and large, they're in a satisficing mode. The 70% solution is good enough, our Leavenworth B."

Students with higher capacity for critical thinking. Several instructors discussed student capacity for critical thinking. One instructor was optimistic about his students, reporting "There's a critical thinker inside just about anybody. It's sort of how to unleash that as opposed to teaching somebody how to think critically." Another instructor described his students' capacity as a normal distribution stating:

When you're dealing with a student population in any staff group that looks like a bell curve, where you've got some at the high end of the curve, maybe 20 % have the capacity to do

higher work. You have another 10-20% at the back end of the curve that are wholly incapable of critical thinking. Then you have the great unwashed middle.

Varying levels of critical thinking skills. A number of instructors identified that students begin the Common Core Course at different critical thinking levels, which impacts the critical thinking instruction integration. As one instructor asserted:

It's an inescapable product of throwing people together mid-career when they've had different tracks, different experiences, different academic background, and different demands of them. Some students already have it when they're here, some students don't. You've got an uneven population. You can't take off with the students who already have it, without leaving the other ones behind. On the other hand, if you try to do some remedial stuff in class, you might frustrate the people who are ready to do the higher level thinking.

Another instructor agreed that students begin at different level declaring "Because much like anything else, every student in here has a different starting point."

Cognitive development level will impact critical thinking ability. Several instructors alluded to the impact of student cognitive maturity in developing critical thinking skills. One instructor commented, "They say, what does right look like. We would like them to be able to operate in more of a gray environment, not black and white. A lot of them, in my view, want a handrail." A second instructor agreed, declaring, "As practitioners, they're uncomfortable with it. Their default setting is, tell me what right looks like. If you can give them an example of something, they're happy." A third instructor concurred, noting that "A preponderance, 60-70 percent of them, have an insatiable appetite for you to give them the school solution to things." A fourth instructor affirmed "When you look at problem sets, they want to know what's the school solution?"

Summary

The role of curriculum, instructional methods, and instructor skills and behaviors as perceived by this faculty group had varying themes. The faculty identified themes that both enhanced and detracted from their ability to develop student critical thinking abilities. Themes identified within the role of curriculum that enhanced student critical thinking were: providing the appropriate base of knowledge to enable critical thinking, the conduct of general critical lessons early in the Common Core Course, the use of practical exercises to promote critical thinking throughout the Common Core Course, and the use of written assessments that require students to defend a position. Themes identified within instructional methods that enhanced student critical thinking included the use of case studies to analyze current problems in a historical context, and the use of discussions to challenge student assumptions and points of view. Within the use of discussions theme, the faculty identified several sub-themes that encouraged critical thinking. These included: pre-reading assignments from different perspectives or points of view, asking the right questions to challenge assumptions and points of view, facilitating students to question or defend a point of view, breaking students into groups of four, and use of whiteboard activities in small groups. Themes identified within instructor skills and behaviors that facilitated student critical thinking included: establishing a safe environment for learning, equalizing power within the classroom, and instructor critical thinking modeling. The faculty also identified that the classroom physical configuration can enhance critical thinking instruction effectiveness.

The faculty identified several themes and sub-themes that detracted from their ability to develop student critical thinking skills. Within the role of curriculum, instructors emphasized that Common Core Course objective assessments constrained their ability to facilitate critical thinking. Second, faculty perceived that a lack of contact time hampered their ability to integrate

critical thinking within their lessons. Third, the faculty perceived that the military/CGSS culture detracted from their ability to encourage student critical thinking, in particular, the cultural overreliance on standardization and checklists. Finally, they identified several student attributes that impacted their ability to facilitate student critical thinking which included: student motivation, student capacity for critical thinking, varying levels of critical thinking skills, and student cognitive development level.

Chapter 5 - Summary and Discussion

Introduction

The previous chapter provided an analysis of the quantitative and qualitative data collected for this study. This chapter consists of a summary of the study, an analysis, interpretation, and synthesis of the findings, the implications for practice, recommendations for further research, and conclusions. This study evaluated the effectiveness of the Command and General Staff Officer Common Core Course to improve student critical thinking skills and habits of the mind attributes, and further examined instructor perceptions of the curriculum, instructional methods, and instructor skills and behaviors that impact student critical thinking development.

Summary of the Study

The Command and General Staff Officer Course (CGSOC) integrated critical thinking into the Common Core Course curriculum in 2003. Since that time, various assessments and reports on the effectiveness of the Common Core Course in developing student critical thinking skills have provided mixed results. This study was designed to objectively assess the effectiveness of the CGSOC Common Core Course in developing student critical thinking skills and habits of the mind attributes using the Military and Defense Critical Thinking Inventory (MDCTI), a critical thinking instrument designed specifically for use with military professionals.

This was a mixed methods study that used both quantitative and qualitative research methods to assess Common Core Course effectiveness in developing student critical thinking skills and habits of the mind attributes. The framework for the critical thinking skills and habits of the mind attributes is based on the work of Facione (1990) as a result of his participation in the American Philosophical Association Delphi Project's expert consensus on the role of critical thinking in educational instruction. This study also acknowledged that critical thinking instruction

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effectiveness must consider the curriculum approach, instructional methods, and instructor skills and behaviors as proposed by Terenzini et al. (1995). Eight instructor focus group interviews provided the qualitative data in order to examine the impact of the instructional intervention on critical thinking skills and habits of the mind attributes.

Analysis of the student pretest and posttest score change results indicated statistically significant changes in analysis, induction, deduction, and overall critical thinking skills, and in the communicative confidence, professional confidence, expression, and directness habits of the mind attributes. Further analysis indicated that there was no statistically significant change differences in critical thinking skills or habits of the mind attributes between the staff groups.

Analysis of the qualitative data revealed nine themes that were categorized within the theoretical framework of curriculum, instructional methods, and instructor skills and behaviors. Themes identified within the role of curriculum that enhanced student critical thinking were: providing the appropriate base of knowledge to enable critical thinking, the conduct of explicit critical lessons early in the Common Core Course, the use of practical exercises, and the use of written assessments. Themes identified within instructional methods that enhanced student critical thinking included the use of case studies and classroom discussions. Themes identified within instructor skills and behaviors that facilitated student critical thinking included: establishing a safe environment for learning, equalizing power within the classroom, and instructor critical thinking modeling. Four additional themes emerged which did not address the role of curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking. These themes included: lack of contact time, the importance of the physical classroom configuration, the military/CGSS culture, and student attributes. The following primary research questions guided this study:

Research Question 1: Which student critical thinking skills change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 2: Which student critical thinking habits of the mind attributes change as a result of participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 3: Is there a difference between staff group scores of critical thinking skills or habits of the mind attributes for students participating in the U.S. Army Command and General Staff Officer Core Course?

Research Question 4: How do these staff group instructors perceive the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking at the Command and General Staff Officer Core Course?

Analysis, Interpretation, and Synthesis of the Findings

Student Critical Thinking Skills Change

In order to answer the first research question, the researcher conducted a pretest and posttest of student critical thinking skills using the MDCTI part two. The MDCTI part two assessed the overall reasoning skill as well as separate scores for the skills of analysis, inference, evaluation, induction, and deduction (Insight Assessment, 2014). Pretest results indicated that students began the Common Core Course at different critical thinking levels, which coincides with several instructor interview comments ("*Every student in here has a different starting point*" and "*Some students already have it when they're here. Some students don't. You've got an uneven population*"). Pretest results also revealed that the majority of students (66%) began the Common Core Course with moderate or no manifestation of deduction skills, and the majority (61%) began the Common Core Course with moderate or no manifestation of inference skills. Perhaps the Army should place greater emphasis on developing deduction and inference skills

earlier within the professional military education system. Pretest results also indicated that the majority of students (74%) began the Common Core Course with a superior or strong manifestation of evaluation skills, demonstrating that this skill possibly receives greater emphasis during earlier student education and military job experiences. Data analysis revealed statistically significant increases in overall, analysis, induction, and deduction skills indicating that the CGSOC Common Core Course effectively improves student critical thinking skills in these domains. Although the majority of students increased their scores in the evaluation and inference skills, the change was not statistically significant indicating that the educational intervention insufficiently emphasized these skills throughout the Common Core Course.

The results also indicated that while the majority of student participants increased their scores in each of the critical thinking skills measured by the MDCTI, the changes were not homogenous. McMullen and McMullen (2009) acknowledged that researchers expect a homogeneous change in student growth when evaluating an educational intervention using a pretest-posttest design. Their findings indicated that student skill growth occurred heterogeneously rather than homogeneously, which they determined to be consistent with prior research.

The results also indicate that students with low pretest skills (moderate to no manifestation) demonstrated greater improvement than those students with high pretest skills (strong to superior manifestation). These findings confirm the assertions of McMillan (1987), McMullen and McMullen (2009), and Zimmerman, Short, Hendrix and Timson (2011) that students with lower scores tend to benefit the most from an educational intervention, while high scorers are less likely to improve their scores.

Habits of the Mind Attribute Change

A number of researchers emphasized that critical thinking consists of both skills and dispositions (or dispositional attitudes/habits of the mind/intellectual traits or virtues) (Bensley and Murtaugh, 2012; Ennis, 1985; Facione, 1990; Halpern, 1998; Kuhn, 1999; Onosko, 1992; Paul and Elder, 2007; Perkins et al., 1993). Bell and Loon (2015) and Huber and Kuncel (2015) asserted that critical thinking dispositions are attitudinal, and typically require longer time to develop than critical thinking skills. Based on this assertion, one could expect limited student habits of the mind attribute changes within the narrow timeframe of this study (approximately one semester). Huber and Kuncel (2015) added that "the attitudinal disposition toward critical thinking is more likely to apply across domains than specific critical thinking skills, and a disposition toward critical thinking should at least encourage acquisition of additional knowledge and reservation of judgment" (p.5). With the exception of the C100 course, the CGSOC Common Core Course instruction focused primarily on domain specific critical thinking, rather than general critical thinking skills. Facione (2000), Facione, Facione, and Giancarlo (1997), and Tsui (2008) emphasized that habits of the mind require nurturing rather than training, and the best way to nurture them is by instructor modeling and promoting a culture of inquiry. This suggests that instructor skills and behaviors play a greater role in developing habits of the mind than curriculum and instructional methods.

In order to answer the second research question, the researcher conducted a pretest and posttest of student habits of the mind attributes using the MDCTI part one. The MDCTI part one assessed "ten attributes relevant to the exercise and expression of reasoned judgment and to successful professional interaction in decision-making contexts" (Insight Assessment, 2014, p.29). Data analysis revealed statistically significant increases in communicative confidence,

professional confidence, directness, and expression attributes, indicating that the CGSOC Common Core Course effectively improves or impacts these habits of the mind attributes.

Communicative confidence pretest scores indicated that all students entered the Common Core Course with some degree of attribute manifestation. This could be expected from students that have served in several military leadership positions at this point in their career, and the Army's focus on communication as a key leader competency. Several factors may account for the statistically significant increase in this particular habits of the mind attribute. Effective communication is an important learning objective within the CGSOC Common Core Course. The C100 course included two hours of instruction to introduce effective communication. Four additional courses included the learning objective of "communicate effectively". Students completed 11 writing assignments and actively participated in extensive group practical exercises, case studies, and discussions throughout the Common Core Course. One could expect student communicative confidence to improve with extensive written and oral communication opportunities.

Professional confidence pretest scores indicated that all students entered the Common Core Course with some degree of attribute manifestation. This could be expected from students that are at the mid-point of a military career and were competitively selected to attend the Common Core Course. Data analysis revealed a statistically significant increase in this particular habits of the mind attribute. Several factors may account for this increase. CGSOC instructors emphasized the use of active learning strategies throughout the Common Core Course ("*The more practical exercises in a block or lesson, the more critical thinking you get, simply because students are being active as opposed to being passive*"), and the need to create a safe, student-centered environment for learning ("*In a non-threatening environment people can get the opportunity to*

discuss why they think the way they do with someone at least giving them the respect of listening to them" and "*I'll write their thoughts down, even though I may not agree with them. At least they recognize that their thoughts are being considered and they're willing to talk more*"). Tsui (2008) acknowledged the following:

A common pursuit of active learning techniques and a student-centered approach by faculty seems to boost students' sense of self-efficacy, which in turn provides students with the self-confidence to practice their critical thinking skills in front of others, including their peers. (p.211)

Directness pretest and posttest results indicated that none of the students began or ended the Common Core Course with a situationally direct style. Situationally direct individuals are forthright in their communications and actions. This style can be seen as a sign of strength for experienced leaders, but can be detrimental to team functioning (Insight Assessment, 2014). Data analysis revealed a statistically significant score decrease towards the approval seeker style. Approval seeking individuals tend to be overly concerned with how their superiors or peers view their communications and actions. Several factors could explain a decrease in this style. First, since the staff group is a student cohort for most of academic year, students may be reluctant to be forthright within the classroom in order to maintain the appropriate group dynamic over time as one instructor described ("*It's that storming, forming, norming, and ultimately that group comes together*"). Second, a number of CGSOC instructors stressed the importance of equalizing power within the classroom by decreasing the emphasis of the instructor as an authority figure ("*Instead of being the center of the class...you just let them start discussing together and kind of wait until it naturally hits an end point*"). The study results indicated that while equalizing power may be important for the instructors interviewed, they may not have been successful in creating

this type of classroom environment. Since the majority of CGSOC instructors have a higher

military rank than their students, the hierarchical nature of military culture may also have a role

in an instructor's inability to equalize classroom power. Third, CGSOC instructors perceived that

group work facilitated forthright communication between students:

(The smaller groups you get them into, the more they'll open up and start having honest and

frank discussions with each other. I'll tie that to critical thinking because then they'll be more

willing to share their views with each other).

Study results indicated that during small group activities, students preferred teamwork and peer

accommodation rather than being more direct in their views and perspectives.

Expression pretest and posttest results indicated that no students began or ended the Common

Core Course with a quiet observer style. Insight Assessment (2014) commented that quiet

observers "may experience difficulties in settings that require one to articulate full explanations

and to describe problems, options and decisions in detail" (p.30). As in the communicative

confidence attribute, this could be expected from students that have served in several military

leadership positions at this point in their career, and the Army's focus on communication as a

key leader competency. Data analysis revealed a statistically significant score increase towards

the expressive performer style. This finding suggests that the learning environment may have

enabled these students to feel comfortable during classroom discussions, group work, and

practical exercises and openly express their points of view or perspectives, particularly among

their peers ("*An environment where they feel they are able to speak their mind without being*

ridiculed. Their own worst critics are other students").

Teamwork pretest and posttest results indicated that no students began or ended the Common

Core Course with a lone competitor style. Insight Assessment (2014) commented that "these

individuals are highly competitive, prefer to compete as individuals, are less tolerant of being led by peers, and regard group effort as inefficient" (p.31). This could be expected from mid-career military students based on the importance of teamwork within the military profession. Data analysis revealed mixed results for this style. Student score decreases (42%) indicated that these students gained an appreciation for the benefits of group work and collaboration in their learning, while student score increases (37%) indicated that these students perceived group work to be less efficient and hindered their learning. Although instructors interviewed perceived that group work was beneficial in engaging more students in active learning ("*I find that there are many students that when you're in a group of sixteen aren't as engaged as when you break them into groups of 4 or 8*" and "*If you keep them in small groups to operate…that helps. The larger group you get, the more they shut down, they're not as open*"), instructors must be cognizant that some students may consider group work less conducive for their learning.

Study results for the attributes of intellectual integrity, mental focus, mental rigor, and foresight were not statistically significant, and the majority of students remained in their pretest performance category within each domain. Except for one student, participants demonstrated some manifestation in each of these attributes. From all habits of the mind attributes measured, these four attributes directly relate to student performance in military planning and decision-making processes, and require increased time and individual motivation to improve. Several factors may account for the limited improvement within these attributes. First, CGSOC instructors acknowledged that a Common Core Course focus was to provide instruction to ensure student understanding of the military planning and decision-making processes ("*If a student doesn't have a good understanding of the process, I'm not sure you're going to practice a whole lot of critical thinking*") and that students required multiple process repetitions to develop critical

thinking ("*Repetition allows them to look at the nuances of the process and figure out where you need to be analytic and think critically*"). This suggests that time allotted to student application of these processes within the Common Core Course is insufficient to enable greater individual development within these attributes. Second, student motivation has a significant impact in the development of these attributes. Several instructors indicated that some students lacked an appropriate level of motivation to apply themselves in mentally challenging education environments. ("*There's a motivation factor. I think most of them come in understanding there's value to this*" and "*There's a motivation level. They're told to come here. Many of them are motivated and that it's important to do well and develop themselves*").

The cognitive maturity attribute directly relates to Kitchener's (1983) epistemic cognition concept which involves the individual's view of knowledge and the ability to determine strategies appropriate in solving ill-structured problems. Pretest and posttest scores indicated that all students entered and ended the Common Core Course with some degree of attribute manifestation. Although the cognitive maturity change results were not statistically significant, this attribute was unique from the other attributes due to an overall decrease in posttest scores. Decreasing scores indicated that these individuals tend to see issues in black and white, accept the knowledge and perspectives of an authority figure, and equate education as the accumulation of factual knowledge (Insight Assessment, 2014). Several factors may account for these findings. First, CGSOC instructors perceived that the amount of background material provided to the students during the conduct of group practical exercises may have contributed to student decreases in this attribute ("*When you look at the background material that they're given and the amount of detail in them…the answers are there... that's just not reality*" and "*Some instructors will develop a lot of extra products. They do it because they are assisting students, or think they*

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are. The problem is…you get at critical thinking and analysis through ambiguity"). Second, this also suggests that instructors were unsuccessful in equalizing power within the classroom causing students to accept the knowledge and perspectives of the authority figure. Third, the use of objective assessments encourages the acquisition of factual knowledge, rather than the development of critical thinking skills ("*If we're in a course where the major assessment is going to be an objective exam with multiple choice and fill in the blank, then we're not really getting into critical thinking*"). In particular, objective assessments hinder the cognitive development of those students that are uncomfortable with ill-structured problems ("*They say, what does right look like. We would like them to operate in more of a gray environment, not black and white*" and "*As practitioners, they're uncomfortable with it. Their default setting is, tell me what right looks like. If you can give them an example of something, they're happy*").

The findings from the MDCTI part one pretest and posttest indicated a statistically significant change in student communicative confidence, professional confidence, directness, and expression habits of the mind attributes as a result of the CGSOC Common Core Course educational intervention. Although not statistically significant, student change in the teamwork, intellectual integrity, mental focus, mental rigor, foresight, and cognitive maturity attributes provided some insights. An analysis of the curriculum, instructional methods, and instructor skills and behaviors from the literature and instructor interviews revealed a number of factors that may have contributed to these changes.

Staff Group Score Differences

Based on the MDCTI pretest-posttest results and the comparison of score changes between the student staff groups, the findings indicate no significant change differences in critical thinking skills and habits of the mind attributes between the staff groups. This implies that

instruction across the Common Core Course is relatively consistent. Several factors may have an impact on this uniformity. First, CGSS developed a common faculty development program for all department instructors. Instructors are required to be recertified every five years. Additionally, each teaching department conducted faculty development sessions for their respective course(s). Haas and Kelley (1998) noted that well designed faculty development programs can create an environment that supports both instructor development and encourages teaching methods that promote critical thinking skills. Second, CGSS departments develop standardized lesson plans and learning objectives that provide a common framework for classroom instruction. While instructors have some latitude in teaching individual lessons, Common Core Course learning objectives must be met. While a number of the experienced instructors interviewed for this study indicated that they made some adjustments to the lessons and homework readings to better accommodate critical thinking, inexperienced instructors alluded to a strict adherence to the published lesson plan. Third, CGSS departments develop common assessments that must be administered without deviation within all nine courses. Common assessments appropriately designed to foster critical thinking could serve as a mechanism to facilitate consistent development across an educational institution.

Role of Curriculum in Developing Critical Thinking

The CGSOC Common Core Course curriculum contained four lessons (10 contact hours) at the beginning of the course to introduce the fundamentals of critical thinking. Critical thinking was also a stated learning objective within seven of the courses. Abrami et al. (2008) emphasized that "making critical thinking a clear and important part of course design is associated with larger instructional effects" (p.1121). Each course within the curriculum has designated terminal learning objectives with established learning levels that correspond to Bloom's (1956) taxonomy.

The C100, E100 and L100 courses were at the synthesis learning level, the C200, C500, F100, and H100 courses were at the analysis learning level, the C400 course was at the application level, and the C300 course was at the comprehension learning level. With seven courses designed at the analysis or synthesis level, the significant student change in the analysis skill should be expected. Since none of the courses were designed at the evaluation level, the lack of significant student change in the evaluation skill is not surprising. Duron, Limbach and Waugh (2006) noted:

> Critical thinking is deemed to take place when students are required to perform in the analysis, synthesis, and evaluation levels of Bloom's Taxonomy. To provide the greatest benefit to students, teachers should provide many opportunities for students to engage in the upper levels of Bloom's taxonomy where critical thinking takes place. (p.160)

Using the framework proposed by Ennis (1989), the CGSOC Common Core Course teaches critical thinking using the mixed method approach, the combination of general critical thinking instruction with the infusion approach. The infusion approach relies heavily on content instruction with the overt infusion of critical thinking skills. Abrami et al. (2015) contended that infusion "requires deep, thoughtful, and well understood subject matter instruction in which students are encouraged to think critically in the subject" (p.282). Abrami, et al. (2008), Hatcher (2006), Kurfiss (1988), McPeck (1984) and Tiruneh et al. (2014) agreed that the mixed approach effectively enhanced student critical thinking skills.

While CGSOC instructors acknowledged that the curriculum provides opportunities to develop student critical thinking skills, many perceived that the primary focus was to provide a base of knowledge on military doctrinal concepts and planning processes ("*I think the core is nothing more than, this is the Army, this is the joint force, (and) this is what you need to know*").

Instructors asserted that students must first have the appropriate base of knowledge in order to apply critical thinking ("*To try to get to higher level thinking, you need a certain base*"). Rotherham and Willingham (2010) emphasized that "skills and knowledge are not separate, however, but intertwined. To think critically, students need the knowledge that is central to the domain" (p.18). Brookfield (2012) endorsed this idea stating "before you can think critically about something you need to have studied that something enough so that you have sufficient information and understanding to begin to make critical judgments about it" (p.77-78). Norris (1985) and Silva (2009) concurred that well developed critical thinking skills cannot compensate for a lack of appropriate domain knowledge.

Instructors acknowledged the importance of general critical thinking lessons within the C100 course which enabled them to set the proper environment to develop student critical thinking skills throughout the remainder of the Common Core Course:

(I think that's the most important thing about critical thinking in C100, just setting the environment for it to happen…we get every instructor on the team to teach something during that block, so that you set those conditions up front, and that expectation).

Instructors perceived that Common Core Course practical exercises promoted student critical thinking skills ("*The more practical exercises in a block or a lesson, the more critical thinking you get, simply because students are being active as opposed to being passive*"). The C400 course included a 39 hour problem solving exercise designed for students to understand and apply the Military Decision-making Process. The C500 course included a 36 hour problem solving exercise designed for student to understand and apply the Joint Operational Planning Process. Using these processes, students were required to solve current, complex problems. Tsui (2008) contended that activities that emphasized process over product provided students greater

responsibility in their education. Abrami et al. (2015), Marin and Halpern (2011), Norris (1985), Sternberg (1985), and Tsui (1999) emphasized that solving authentic problems play a role in facilitating student critical thinking skills. These exercises can be considered an example of problem-based learning. Jones (2008) and Karge, Phillips, Dodson, and McCabe (2011) commented that problem-based learning encouraged students to question assumptions, communicate effectively, learn how to work together as a team, and become self-directed learners. Yuan, Williams, and Fan (2008) contended that the process of "identifying the problem, assessing the need for further information and knowledge, considering the alternative explanations or solutions" (p.661) facilitated student critical thinking.

In addition to Common Core Course practical exercises, instructors commented on the role of assessments in promoting student critical thinking. Several researchers emphasized the role of assessments in critical thinking development. Mulnix (2012) asserted that courses must design assessments to enable students to practice and reinforce their critical thinking skills. Walsh and Seldomridge (2006) endorsed the use of class participation as a means of assessment to induce discussion from those students reluctant to respond to faculty or fellow students. Unlike most educational institutions where individual instructors develop assessments for their respective courses, the CGSOC teaching departments develop common program assessments for each course. The C100, C200, C500, E100, H100, and L100 courses each have one written assignment that instructors endorsed as exercising student critical thinking skills. The F100 course required students to prepare five written assignments, each no longer than two pages. Walsh and Seldomridge (2006) contended that "a series of smaller papers might be a more effective way to develop critical thinking skills but would place significant demands on faculty time" (p.215).

CGSOC instructors specifically endorsed written assessments that required students to ("*Look at a certain viewpoint, give their perspective, and provide supporting information that strengthens their argument*"). Several researchers discussed the importance of written assessments. Tsui (2002) declared that quantity and type of written assessments impact student critical thinking skills. Tsui (2002) added written assignments must be structured to enable students to "demonstrate a synthesis of material, evaluation of arguments, and deduction of conclusions" (p.757). She further added that success in developing student critical thinking skills relies upon incorporating writing assignments across all courses. Brookfield (2012) emphasized that in assessing student writing assignments, instructor feedback must specifically address student thoughts in terms of critical thinking skills. Instructors interviewed did not discuss the importance of assessing student critical thinking and providing student feedback on the course written assessments.

While instructors endorsed written assessments as a means to facilitate student critical thinking, C300 and F100 instructors acknowledged that course objective assessments hindered their ability to develop student critical thinking skills ("*If we're in a course where the major assessment is going to be an objective exam with multiple choice and fill in the blank, then we're not really getting into critical thinking*"). Snyder and Snyder (2008) and Tsui (1999) asserted that curriculum standardization and emphasis on test scores promoted a more instructor-centered learning environment and an over-reliance on multiple choice exams. Walsh and Seldomridge (2006) advocated that "the use of multiple choice examinations tends to reward recognition and recall, rather than encouraging critical thinking" (p.214). Walsh and Seldomridge (2006) also added that objective assessments caused instructors to refrain from using active learning strategies, such as class discussions, in order to focus more on course material ("*There's certain*

things I have to cover or my (students) are not going to pass the test"). Objective assessments specifically hinder student development in the cognitive maturity habits of the mind attribute.

The curriculum is an important aspect in developing student critical thinking skills. First, critical thinking must be a stated learning objective within the course, and lesson learning levels should be designated at the higher levels of Bloom's Taxonomy to facilitate critical thinking. Second, critical thinking should be integrated into the curriculum using a mixed method approach, combining general critical thinking instruction with the overt infusion of critical thinking within the lesson content. Third, the curriculum should also consider the appropriate amount of domain knowledge instruction required to enable students to think critically. Fourth, the curriculum should include practical exercises that require students to solve current, complex problems. Finally, the curriculum should incorporate written assessments across all courses, and minimize or eliminate the use of objective assessments.

Role of Instructional Methods in Developing Critical Thinking

The majority of instructors implied that active learning events were instrumental in developing student critical thinking skills. This finding supported the work of other researchers. Carlson (2013), Duron et al. (2006), Kim, Sharma, Land and Furlong (2012), Nelson and Crow (2014), Tedesco-Schneck (2013), Tsui (2002), and Waitkus (2006) endorsed active learning as a means to facilitate student critical thinking by encouraging them to solve authentic problems, to verbalize and try out new ideas, and to reflect on the meaning of information and concepts covered in class readings or lectures. The first active learning technique emphasized by the instructors was the use of case studies.

Instructors that taught within the C200, H100, and L100 courses concluded that case studies within their lessons enabled students to exercise their critical thinking skills. Case studies

provided students the opportunity ("*To analyze and synthesize the information in each of the lessons*"). Several researchers supported the use of case studies. Popil (2011), Snyder and Snyder (2008), Staib (2003), and Zimmerman et al. (2011) reported that case studies put students into complex, real life situations enabling them to apply their knowledge, to examine actions from multiple perspectives, and facilitate problem solving abilities. The use of both military and civilian case studies put students in "*Unique situations or situations outside of their comfort zone or experience base and having them come up with a solution*" as one instructor stated. The second active learning activity advocated by the majority of instructors was classroom discussion.

Instructors emphasized the use of classroom discussion as a means to challenge student assumptions and points of view. This finding was consistent with other research. Abrami et al. (2015), Onosko (1992), Tsui (2002), and Williams (2013) contended that classroom discussions promote student critical thinking by encouraging discourse and reflection, considering other points of view, incorporating feedback from others, and allowing students to offer reasons to support their conclusions. CGSOC Instructors emphasized that facilitation skills are critical in guiding class discussion. Terenzini et al. (1995) asserted that student critical thinking improvement was associated with "the extent to which faculty members encouraged, praised, or used student ideas; the amount and cognitive level of student participation in class; and the amount of interaction among the students in a course" (p.24). Tsui (2002) concurred, adding that instructors must motivate students to challenge student and faculty assertions, and allow students to respond to peer questions. Supon (1998) recommended that instructors constantly reflect on and adjust their practices in order to improve the facilitation of classroom discussion. In facilitating classroom discussion, many instructors articulated the need to ask the right questions.

CGSOC Instructors advocated that questions must be open-ended, probing, and thought-provoking. ("*Whenever I've given them something that's fairly open-ended and there's room for interpretation, and give them an opportunity to perceive, and give multiple options for that, has been the best opportunities to get to critical thinking*"). Several researchers supported this finding. Duron et al. (2006) and Popil (2011) maintained that instructors must be adept in questioning techniques to effectively encourage student participation in classroom discussion. Snyder and Snyder (2008) added that instructor questioning techniques must "require students to analyze, synthesize, and evaluate information to solve problems and make decisions rather than merely repeat information" (p.91). Brookfield (2012) endorsed the use of open-ended questions in order to help students "generate as many different understanding, interpretations, or explanations as possible" (p.200). In order to better facilitate discussion and questioning, instructors recommended that the student staff groups be further broken down into groups of four.

CGSOC instructors asserted that smaller group discussions, facilitated by the use of the classroom whiteboards, encouraged more students to actively participate in the learning activity ("*The smaller groups you get them into, the more they'll open up and start having honest and frank discussions with each other*"). Other research supports these findings. Abbeglen and Conger (1997), Brookfield (2012), Tsui (2002), and Williams (2013) endorsed smaller peer group discussions as a means to actively involve more students in conversation with less personal risk. Onosko (1992) maintained that in small group formats, "students can more safely find out if their ideas make sense to classmates, and learn of other ways to think about the issues" (p.25). In order to better facilitate small group discussion, instructors stressed the importance of pre-reading assignments that enhanced a good dialogue.

Teaching departments designate common reading assignments for each CGSOC lesson. Some instructors discussed the need to supplement or modify the reading assignments to provide different points of view to facilitate critical thinking within their class discussion ("*I give them a document that refutes not only the model that I teach them, but offers some very different perspectives on the efficacy and utility of the model*"). Haas and Keeley (1998) and Kurfiss (1988) affirmed that most textbooks and class readings are organized to cover content and tend to reinforce dualistic thinking, rather than relativistic thinking. Kurfiss (1998) added that readings that "present controversies within a discipline challenge students to investigate diverse points of view" (p.80).

Instructional methods are a key component in developing student critical thinking skills. Instructors should make maximum use of active learning strategies, such as the use of case studies and group discussion as identified by the instructors interviewed and prior research. These case studies should be designed to put students into real life situations that challenge their perspectives and facilitate problem solving abilities. Classroom discussions should be facilitated by open-ended and thought-provoking questions from the instructor that encourage student thought and participation. Instructors should conduct discussions in smaller groups to actively involve more students in the conversation. Finally, instructors should carefully choose student reading assignments that provide different points of view in order to facilitate discussion within the classroom.

Role of Instructor Skills and Behaviors in Developing Critical Thinking

Instructors acknowledged their role in establishing a safe environment to facilitate open and honest discussion within the classroom ("*Those first few weeks are critical because you build that relationship between instructors and instructed. There's a trust relationship built that you're*

not going to judge them"). This finding supports other research findings. In order to establish a classroom of trust, Supon (1998) declared that instructors must develop a learning environment based on mutual respect by first demonstrating respect towards students. Schrader (2004) maintained that "students want to feel known, acknowledged, cared for, respected, treated with equal value, challenged but not intimidated, and comfortable" (p.97). Haas and Keeley (1998), Keeley et al. (1995), Nugent (1990), and Onosko (1996) emphasized that in order to create a safe and respectful environment to facilitate discussion, instructors must acknowledge student experiences, allow for mistakes, and encourage students to constructively criticize ideas from both students and instructors. Onosko (1996) added that instructors must consistently remind students during classroom discussions that their ideas are being challenged, not their person. ("*What I really try to do is evaluate the argument that the person is hypothesizing. If you want, attack the argument, not the person*"). Onosko (1991) and Snyder and Snyder (2008) contended that initial student resistance to critical thinking can be overcome by creating a nurturing environment that provides support, encouragement, and constructive feedback to students. In order to create a safe learning environment, CGSOC instructors deemed it important to equalize power within the classroom.

In order to equalize power within the classroom, instructors advocated the importance of decreasing their position as an authority figure. This is particularly important for military instructors, who typically have a higher rank than CGSOC students. Schrader (2004) commented that students prefer a non-domineering, approachable instructor that is open and flexible enough to allow students the freedom to openly explore and express their ideas. Tedesco-Schneck (2013) maintained that the use of active learning strategies facilitated the instructor's ability to change the power dichotomy within the classroom. In this research, instructors contended that exposing

their own vulnerabilities, their positioning within the classroom, and actively soliciting feedback from students assisted their ability to equalize power with the classroom. Instructors also endorsed the capability to serve as role models for their students.

Many instructors expressed the requirement to serve as a critical thinking role model in order to enable students to think critically:

(*If the students see you taking your time and being patient and hearing things and reacting not emotionally or dismissively of what their saying, dignifying each person's remarks with at least paying attention. Then they'll start to act like that. I think they model instructors' behaviors in a lot of ways).*

Walsh and Seldomridge (2006) acknowledged:

Faculty are well positioned to role model higher level thinking for their students but may not make the best use of this opportunity. By reflecting on their own thinking and sharing aloud how various connection were made, faculty can externalize multiple critical thinking skills. (p.217)

Brookfield (2012), Onosko (1996), Schrader (2004), and Snyder and Snyder (2008) emphasized that instructor modeling must be explicit, personal, and honest, and should allow students to witness how the instructor personally navigates through the critical thinking process. Halx and Reybold (2005) and Supon (1998) asserted that successful instructors model critical reflection on a consistent basis.

Instructor skills and behaviors are an important component in developing student critical thinking skills within the classroom. First, instructors must establish a safe learning environment based on trust and mutual respect, enabling students to constructively criticize ideas from both students and instructors. Second, instructors should attempt to equalize power within the

classroom by exposing their own vulnerabilities, and by actively soliciting feedback from students. Finally, instructors must serve as a critical thinking role model for their students.

Role of curriculum, instructional methods, and instructor skills and behaviors summary

The faculty involved in this research supported many of the ideas from previous research. The following graduate-level education methods should be incorporated to improve critical thinking abilities:

1. Critical thinking should be included as a course learning objective.

2. Course learning levels should be designated at the analysis, synthesis, or evaluation levels of Bloom's Taxonomy.

3. Critical thinking should be taught using the mixed method approach, combining general critical thinking instruction with the overt infusion of critical thinking into the course content.

4. General critical thinking lessons should be team taught to enable instructors to set the proper environment for the remainder of the program.

5. Instructors should incorporate practical exercises (problem-based learning) into courses to promote student critical thinking, communication skills, self-direction, and teamwork.

6. Instructors should conduct written assessments across the program that enable students to provide their perspective, evaluate arguments, and deduce conclusions.

7. Instructors should refrain from the use of objective assessments which inhibits the use of active learning strategies and hinders student cognitive maturity development.

8. Instructors should integrate case studies that incorporate real life situations within courses to enable students to apply knowledge, consider alternate perspectives, and solve problems.

9. Instructors should maximize the use of small group discussion facilitated by open-ended, probing, and thought-provoking questioning to encourage student participation and critical thinking.

10. Instructors should provide reading assignments that challenge students to think critically and consider multiple perspectives.

11. Instructors should create a safe learning environment based on trust and mutual respect to facilitate open and honest discussions between students and between instructors and students.

12. Instructors should attempt to equalize power between themselves and their students by soliciting student feedback and exposing their own vulnerabilities.

13. Instructors should explicitly model critical thinking within the classroom to enable students to observe how the instructor personally navigates through the critical thinking process.

Other themes that inhibit critical thinking

The instructors identified three additional themes not covered within the Terenzini et al. (1995) framework of curriculum, instructional methods, and instructor skills and behaviors that inhibit critical thinking. These three themes included: contact time constraints, the military/CGSS culture, and student attributes.

First, instructors acknowledged that a lack of classroom contact time can inhibit their ability to develop student critical thinking through discussion and other active learning strategies ("*A lack of time for us to get into fully developing a topic long enough for them to be able to do some of the analysis, the reflection, to go through the steps of critical thinking*"). Duron, Limbaugh and Waugh (2006), Shell (2001), and Snyder and Snyder (2008) confirmed that inadequate class

time may limit opportunities to use instructional techniques that facilitate student critical

thinking. Haas and Keeley (1998), Onosko (1991), and Snyder and Snyder (2008) contended that

instructors with constrained contact time tend to place a higher priority on teaching lesson

content, leaving little time to allow students to ask questions, analyze, and reflect on the

information ("*Often times you don't have time within a two hour block that you can cover all of*

the topics that we want to discuss from the readings"). On the other hand, Onosko (1992) and

Tsui (2002) advocated that instructors must find the appropriate balance between subject breadth

and depth in order to facilitate student thinking skills. Tsui (2002) added that "students are more

likely to comprehend and retain ideas if they participate in a dialogue or debate on them"

(p.755).

Second, instructors perceived that although the military and the school want leaders to think

critically, the culture does not necessarily encourage it ("*I believe most organizations and*

institutions want people to think critically. I'm not convinced that they set the conditions well for

people to do that"). Halx and Reybold (2005) acknowledged that "culture plays an important role

in the development and application of critical thinking" (p.312). Allen and Gerras (2009) and

Fischer et al. (2009) asserted that the Army culture tends to discourage critical thinking due to its

hierarchical nature and cultural processes and norms. Allen and Gerras (2009) contended that

diversity within the Army and the use of standardized planning and decision-making processes

facilitate critical thinking. Fischer et al. (2009) disagreed, stating that these standardized

processes tend to inhibit critical thinking. Fastabend and Simpson (2004) and Yingling (2010)

commented that the military systems rewards conformity and group think, the antithesis of

critical thinking. Pierce (2010) contended that the Army culture "is characterized by an

overarching desire for stability and control, formal rules and policies, and competitiveness"

(p.101). ("*There's a sense of letting go of certain control in order for critical thinking to occur, being okay with not being in control*").

Third, instructors identified that the student attributes of motivation, critical thinking skill level and capacity, and cognitive development inhibited critical thinking skill instructional effectiveness. Instructors indicated that CGSOC student motivation is heterogeneous, rather than homogeneous:

> *(There's a motivation level. They're told to come here. Many of them are motivated and that it's important to do well and develop themselves. Others see it as just one more thing they've got to get through before they go back)*.

This may be somewhat unique to the CGSOC education environment, since students are selected and assigned to attend the Common Core Course, rather than attending on their own accord. Several researchers acknowledge the role of student motivation in critical thinking instruction effectiveness. Riggs and Hellyer-Riggs (2014) assert that student motivation is essential in developing the ability to think critically. Shell (2001) and Tsui (2001) acknowledged that a lack of student motivation discourages the use of teaching methods that facilitate critical thinking. Instructors also commented that differing student critical thinking skill and capacity levels influenced their ability to effectively enhance student critical thinking ("*Some students already have it when they're here, some students don't. You've got an uneven population*"). (Onosko 1991, 1992), Torff (2005), and Tsui (2001) maintained that instructor perceptions of student capacity significantly impacted teaching practices and student performance. Tsui (2001) further added, "While faculty confidence in students' abilities to acquire critical thinking skills is not sufficient in itself to produce cognitive growth, it is a prerequisite" (p.8). Finally, instructors addressed student cognitive development as a factor in their ability to develop student critical

thinking skills ("*A preponderance, 60-70 percent of them, have an insatiable appetite for you to give them the school solution to things*"). This instructor statement indicates that he perceived the majority of students believe that right answers exist, which coincides with a dualistic view of knowledge within the Perry scheme (Evans et al., 1998). Kurfiss (1988) contended that students with dualistic views typically display resistance towards critical thinking instruction. Based on the cognitive maturity scores, only 26% of student participants were strongly manifested on the cognitive maturity habits of the mind attribute at the beginning of the Common Core Course, and only 29% at the end of the Common Core Course.

The instructor focus group interviews revealed three themes that inhibit student critical thinking skills. First, a lack of classroom contact time affects an instructor's ability to employ active learning strategies, limiting opportunities for students to analyze and reflect on the lesson content. Second, the profession or school culture plays a role in encouraging, or possibly discouraging as indicated in this study, the practice or application of critical thinking. Finally, student attributes, such as motivation, critical thinking skill capacity and level, and cognitive development can impact teaching practices and student performance.

Other themes that enhance critical thinking

Instructors identified that the physical classroom configuration was an important component in developing student critical thinking. CGSS classrooms were specifically designed to accommodate a staff group of no more than 16 students. Instructors indicated that desks organized in a "U" shaped manner best facilitated student interaction and discussion. The importance of classroom configuration was also referenced in the literature. Abegglen and Conger (1997), Schrader (2004), Tedesco-Schneck (2013), and Tsui (2002) confirmed that class seating in a circular or semi-circular pattern encouraged student questions, improved student

confidence in class discussion contributions, and enhanced the safety of the learning environment.

Analysis, interpretation, and synthesis summary

This study demonstrated that when graduate students are exposed to a curriculum focused on critical thinking taught by faculty who have been through critical thinking development sessions, students have a greater potential to increase their ability. While the majority of the participants increased in all measured skills, this growth occurred heterogeneously, rather than homogeneously. Instructor skills and behaviors help facilitate the development of habits of mind attributes. Dedicated critical thinking curriculum needs to be included in a graduate degree program where critical thinking is the desired outcome. In addition, there must be time spent in the courses where instructors demonstrate critical thinking and dedicated time discussing critical thinking in order for students to improve their abilities. The student also needs to be motivated to embrace the development of critical thinking. A culture of trust and mutual respect needs to be cultivated for critical thinking to thrive.

Implications for Practice

The results of this study provide several implications for practice that graduate institutions and educators should consider in developing student critical thinking skills and habits of the mind attributes. The implications align with five general areas: curriculum, student cohorts, team teaching, common assessments, student motivation, and cognitive development.

Critical thinking instruction

Critical thinking is a key learning objective within the CGSOC Common Core Course and is embedded in seven of the nine program outcomes. Within the C100 Foundations course, each student is provided a common critical thinking definition and introduced to Facione's critical

thinking skill framework. Part one of The Military and Defense Critical Thinking Instrument (MDCTI) assessed the same critical thinking skills introduced to the students in C100. Unfortunately, habits of the mind attributes as measured by the MDCTI part two were not included in the C100 course. Perhaps this framework could be introduced to students in concert with critical thinking skills instruction. Hatcher (2011), Possin (2008), and Wilson (1998) emphasized that in order to accurately measure critical thinking, institutions must first provide a common definition, determine the skills to study, and then assess those skills with an instrument that matches those skills. Critical thinking was then infused into the remainder Common Core Course curriculum in order to facilitate student critical thinking within the framework of the course content. Abrami et al. (2008) advised that curricula must be purposefully designed to develop both critical thinking skills and provide critical domain knowledge and concepts. Huber and Kuncel (2015) and Norris (1985) emphasized that domain specific, rather than domain general critical thinking instruction and assessment can affect the quality of student performance.

Student cohorts

The CGSOC Common Core Course instruction is conducted within a student staff group, a cohort of sixteen students. A cohort is a group of students who complete an entire program together. In this study, they were closed cohorts, meaning that membership remained the same throughout the program. Beachboard, Beachboard, Li, and Adkison (2011) acknowledged that student cohorts improve student communication, problem-solving, and the integration of interdisciplinary content, further adding "the group dynamics of particular cohorts are likely a key to their success or failure" (p.868). While cohorts can enhance student performance within the classroom, some students may choose to conform to the group norms, hindering their ability to further improve their critical thinking skills or habits of the mind attributes. Graduate

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programs who use closed cohorts might want to conduct a critical thinking pretest and explore how to enhance the development of the more advanced students to prevent less group conformity.

Team teaching

Each student staff group is taught by an interdisciplinary teaching team of five instructors. Instructors discussed the importance of working together to create a group dynamic conducive to critical thinking, and the requirement to establish and maintain a safe environment to facilitate open and honest discussion throughout the Common Core Course. Numerous researchers (Brookfield, 2012; Tsui, 2002; Young and Warren, 2011) contended that team teaching promotes faculty collaboration by sharing ideas and teaching techniques, responding to differences in student learning styles and personalities, and providing wider range of talents and skills to reduce student resistance. Brookfield (2012) added that by watching experienced instructors model critical thinking, those with less experience learn how to better promote critical thinking within the classroom.

Common lesson plans, practical exercises, and assessments

The study results indicate that common lesson plans, practical exercises and assessments, appropriately designed and executed, can assist instructors in effectively developing student critical thinking skills and habits of the mind attributes. These aspects can also assist in facilitating consistent results across student staff groups and possibly across the school. Duron et al. (2006) advocated that well-written lesson plans must include well-designed, open-ended questions that allow students to respond in a manner that facilitate the development of critical thinking skills. Instructors also alluded to classroom contact time constraints in facilitating student critical thinking. As CGSS considers reducing classroom contact hours, it will be

imperative that lesson plans are carefully scrutinized in order to maintain an appropriate balance between content and the active learning strategies that enhance student critical thinking, such as case studies and discussion as articulated by the instructors interviewed. Additionally, CGSS should consider combining two hour lessons into one four hour class in order to provide those instructors a better opportunity to enhance critical thinking activities.

Common assessments also impacted the study results, particularly the consistency among the sampled staff groups. Both interviewed instructors and the literature advocated the importance of written assessments and the disadvantages of objective assessments in critical thinking instructional effectiveness. Faculty must understand the impacts that objective assessments have on the classroom environment and consider efforts to minimize, or possibly eliminate objective assessments from the Common Core Course when a course objective is to promote critical thinking skills. As discussed by a number of instructors, written assessments must require students to pick a position and provide sufficient evidence to support their position. Brookfield (2012) and Tsui (2002) advocated that critical thinking can be further improved by providing students the opportunity to rewrite assignments after receiving feedback from peers or instructors. CGSS should consider this proposal as an option to include in future Common Core Course writing assignments.

Increase student motivation

Instructors acknowledged the impact of student attributes on staff group dynamics and their ability to effectively integrate critical thinking into classroom instruction. Student motivation is an important aspect in the development of critical thinking particularly, within the intellectual integrity, mental focus, mental rigor, and foresight habits of the mind attributes as indicated in the study results. Instructors alluded to the idea that the selection and assignment of students to

CGSOC resident Common Core Course at Fort Leavenworth, may not provide students with the appropriate level of motivation to make the most of a learning environment that relies primarily on active learning strategies. Since it is highly unlikely that the Army will change its selection criteria, instructors must make a concerted effort to identify students with motivational issues, and as advocated by Riggs and Hellyer-Riggs (2014), assist these students in recognizing their capacity for critical thought and the importance critical thinking has on their motivation. By enhancing motivation, these students can make the most of their educational opportunity. Onosko (1991, 1992) and Tsui (2002) cautioned that instructor views of student capacity can impact their practices and ultimately student performance.

Diverse cognitive development levels

Student Staff Group composition is developed by CGSS to obtain equal representation of military branch or service, race and ethnicity, gender, and military experiences. The group composition does not account for student academic preparedness for graduate level study, critical thinking skill or cognitive development levels. Evans et al. (1998) commented that groups with more students with higher levels of thinking skills and cognitive development can assist instructors in developing those students entering the Common Core Course at a lower level of thinking. CGSS should consider assessing student critical thinking using an instrument such as the MDCTI and cognitive development using an instrument such as the Learning Environment Preferences, and use these results as a factor in assigning students to their respective staff groups.

Instructors contended that many students lacked an appropriate level of cognitive development which impacted their ability to think critically. Many instructors attributed this to an Army culture that relies heavily on standardization and checklists. Unfortunately, the MDCTI score results for the cognitive maturity domain indicated an overall score decrease. Wilson

(1998) asserted that exercises and activities that present student with ill-structured problems must be integrated in the course to enable student cognitive development growth. Instructors also confirmed that course materials to support practical exercises contain far too much information and further added that a number of instructors supplemented these material to further reduce the ambiguity of the problem presented. Course lesson authors and educators must design practical exercises with adequate information to solve ill-structured problems, but must refrain from providing too much information that tends to reduce the problem ambiguity.

Implications for CGSS

The following are implications from this research that CGSS should consider:

1. Increasing the emphasis on evaluation and inference skills within the faculty development program and Common Core Course lesson plans.

2. Reviewing Common Core Course learning levels in an effort to achieve learning at the analysis, synthesis, or evaluation level.

3. Combining two hour lessons into one four hour class in order to provide those instructors a better opportunity to enhance critical thinking activities.

4. Introducing habits of the mind attributes into the C100 Foundations course and reinforcement of these attributes throughout the remainder of the Common Core Course.

5. Scrutinizing Common Core Course lesson plans in order to maintain an appropriate balance between content and active learning strategies that enhance critical thinking.

6. Providing opportunities for students to rewrite assignments after receiving feedback from peers or instructors.

7. Reducing the amount of background materials provided to students during the conduct of practical exercises to create more ambiguity.

8. Continuing emphasis on written and oral communications skills through written assessments, practical exercises, case studies, and class discussions which facilitate student communicative confidence.

9. Providing students the opportunity to conduct multiple repetitions of military planning and decision-making processes.

10. Eliminating objective assessments from the Common Core Course.

11. Continuing the combination of general critical thinking instruction at the beginning of the Common Core Course and the overt infusion of critical thinking throughout the remainder of the course.

12. Continuing to emphasize team teaching within the C100 course to enable instructors to set the proper environment for critical thinking throughout the remainder of the program.

13. Designing lesson plans that provide instructors open-ended, probing, and thought-provoking questions to facilitate student discussion.

14. Designing lesson plans that provide opportunities for students to work in small groups.

15. Designing lesson plans that include reading assignments that provide different points of view.

16. Emphasizing the importance of instructor role modeling and the equalization of power within the classroom in the faculty development program.

17. Developing a culture that encourages critical inquiry and collaboration, and discourages formal rules and policies.

18. Assessing student critical thinking using an instrument such as the MDCTI and cognitive development such as the Learning Environment Preferences, and use these results as a factor in assigning students to their respective staff groups.

Recommendations for Future Research

This study was limited to eight staff groups of volunteer students and instructors (approximately 11% of the CGSOC class), conducted at the Fort Leavenworth Campus, and conducted only for the CGSOC Common Core Course. The researcher recommends several areas for further study:

1. Due to college research restrictions on student and faculty participation, study participants were selected by teaching team using cluster random sampling. A similar study with a larger sample size chosen by random sampling would allow the results to be more generalizable to the CGSOC population.

2. This study was limited to an assessment of the CGSOC Common Core Course. Instructors interviewed inferred that the Advanced Operations Course was more conducive to developing student critical thinking skills. A similar study to include a posttest assessment at the end of the Advanced Operations Course may provide more useful results given a longer treatment period, and additional practical exercises and student directed learning activities.

3. This study was limited to an assessment of students and instructors at the Fort Leavenworth Campus. A similar study conducted at the three satellite campuses, at several Army School System (TASS) locations, or the distance education venue would be useful to determine if similar or different results occur at these venues.

4. A similar study to assess the critical thinking instruction effectiveness of other Army education programs that have critical thinking as a learning outcome, such as the Basic Officer Leadership Course and the Captain's Career Course as recommended by

Fastabend and Simpson (2004). These programs directly impact the development of officers selected to attend CGSOC.

5. A similar study to assess the critical thinking instruction effectiveness of the Air Force, Marine Corps, and Navy programs equivalent to CGSOC. Dike (2006) contended that comparisons with other joint professional military education schools in the area of critical thinking would be beneficial.

6. A longitudinal study that assesses CGSOC graduates over their next several military assignments to determine if skill and attribute scores continue to increase or possibly decrease as a result of their experiences within subsequent military organizations.

7. Additional research to assess the validity of discipline specific instruments such as the MDCTI, the Health Science Reasoning Test, the Business Critical Thinking Skills Test, and the Legal Studies Reasoning Profiles within those specific disciplines as advocated by Seldomridge and Walsh (2006).

8. A similar study to compare this study's results to other graduate programs that do not include critical thinking as a stated learning outcome.

9. A study that conducts comparison interviews with graduate faculty at other education institutions on their practices to promote student critical thinking.

10. Research that examines instructor feedback given to graduate students on written assessments in order to promote critical thinking improvement.

11. A qualitative study that triangulates faculty perceptions, student perceptions, and observations within the classroom.

12. A study that compares MDCTI results between students with or pursuing a Master's Degree, to those with a Bachelor's Degree.

Conclusions

This limited study attempted to assess the effectiveness of the CGSOC Common Core Course in developing student critical thinking skills and habits of the mind attributes as measured by the Military and Defense Critical Thinking Instrument (MDCTI), using a pretest-posttest design. Bensley and Murtagh (2012) contended that few studies consider the development of critical thinking skills and dispositions simultaneously. This was the first study to use the MDCTI to assess critical thinking development within a graduate educational program. The study results revealed statistically significant change in the domains of analysis, deduction, induction, and in overall critical thinking skills as a result of the educational intervention. While not statistically significant, at least half of the students increased their scores in the inference and evaluation domains. The study results also revealed statistically significant student change in the communicative confidence, professional confidence, directness, and expression habits of the mind attributes as a result of the education intervention. While not statistically significant, a majority of the students increased their scores in the intellectual integrity domain. Additionally, the study revealed no statistically significant differences in critical thinking skills and habits of the mind attributes between the staff groups.

The qualitative portion of this study addressed the perceptions of CGSOC instructors on the role of curriculum, instructional methods, and instructor skills and behaviors in critical thinking instructional effectiveness as advocated by Terenzini et al. (1995). These researchers also added that curriculum and instructional methods are usually studied separate from instructor skills and behaviors. Instructor perceptions were obtained through eight separate staff group instructor focus group interviews which were transcribed, coded and analyzed for emerging themes. Nine of themes identified could be grouped within the framework of curriculum, instructional methods

and instructor skills and behaviors. Instructors identified four additional themes to consider: classroom contact time, the physical classroom configuration, the military and CGSS culture, and student attributes. First, several researchers (Duron et al., 2006; Shell, 2001; Snyder and Snyder, 2008) confirmed that lack of classroom contact time impacted critical thinking instruction effectiveness. Second, several researchers (Abegglen and Conger, 1997; Schrader, 2004; Tedesco-Schneck, 2013; Tsui, 2002) acknowledged that the physical classroom configuration can be a factor in fostering an appropriate environment for critical thinking. Third, instructors perceived that the military and school culture does not necessarily encourage critical thinking. The impact of the military culture on critical thinking is well-documented (Allen and Gerras, 2009; Fastabend and Simpson, 2004: Fischer et al., 2009; Pierce, 2010, Yingling, 2010). Lastly, instructors identified that student attributes, particularly motivation, differing levels of critical thinking skills and cognitive development, and overall capacity for development impacted critical thinking instruction effectiveness. Tiruneh et al. (2014) and Tsui (2002) proposed that student attributes influence critical thinking instructional interventions.

This study was specifically designed to assess the effectiveness of the CGSOC Common Core Course in developing student critical thinking skills and habits of the mind attributes. Fastabend and Simpson (2004) argued that "Army leaders must create an environment where critical thinking is the norm and reasoned debate replaces unspoken dissent" (p.21). Fastabend and Simpson (2004) also advocated that the Army education system is critical in changing the Army culture, recommending that the system be assessed for its effectiveness in promoting critical thinking. In addition to assessing the effectiveness of the CGSOC Common Core Course, this study provides insights on the development of critical thinking skills and habits of the mind for students participating in educational instruction at the graduate level. Drennan (2010) and

Seldomridge and Walsh (2006) indicated that few studies have been published that examine critical thinking skills and dispositions using standardized instruments in graduate level education programs. Furthermore, this was the first study to use the MDCTI as a means of measuring the critical thinking skills and habits of the mind attributes of a unique student population as a result of their professional military education experience. Seldomridge and Walsh (2006) contended that discipline specific measures of critical thinking can provide increased emphasis of the skills necessary for that particular profession. Behar-Horenstein and Niu (2011) acknowledged that few studies provide detailed information about how educators present instruction, facilitate learning, and assess learning objectives within an educational intervention. CGSOC instructor perceptions on the impact of curriculum, instructional methods and instructor skills and behaviors in instructional effectiveness provide insights on how educational institutions and educators can better incorporate critical thinking skills instruction into their curricula and within the classroom. Haas and Keeley (1998) and Abrami et al. (2008) emphasized that student critical thinking skills do not naturally occur within an educational intervention, but require explicit strategies and skills to do it effectively.

This research demonstrated that critical thinking must be explicitly incorporated into the curriculum, and instructors must learn how to facilitate critical thinking skills and habits of the mind attributes within the classroom in order to facilitate student growth in the ability to think critically. A graduate-level educational program must not only focus on discipline specific content, but must also continue to hone student critical thinking skills and habits of the mind attributes developed during previous educational and life experiences. Educators should make maximum use of active learning strategies and create a learning environment that facilitates

mutual trust and respect within the classroom to enhance critical thinking instruction

effectiveness.

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Appendix A - Focus Group Interview Protocol

Preliminary Activities: (Distribute two copies of Informed Consent Form to each instructor)

First, thank you for taking time out of your busy schedule to participate in this interview. This

research is designed to assess the Core Course effectiveness in developing student critical

thinking. As you are aware, your students participated in the research by completing a pre and

posttest of the Military and Defense Critical Thinking Inventory. This portion of the research is

designed to gain a better understanding of your perceptions as an instructor group on factors that

potentially facilitate or inhibit your role in developing students' ability to think critically. I have

provided each of you two Informed Consent Forms. At this time, if you do not wish to

participate in the interview you may leave the classroom. If at any point during the interview you

choose to withdraw your consent and depart, you are free to do so. If you are willing to

participate in this interview, please read and sign the Informed Consent Form provided. The

second copy is for you to retain for your records. (Allow time for the participants to read and

complete Informed Consent Forms/collect completed forms)

(Collect Informed Consent Forms and distribute demographic information sheet)

At this time, I'll ask you to complete a demographic data sheet which will allow me to describe

some key characteristics about your group within the study. (Collect upon completion)

I will be video recording this session and will also use an audio recording device in case of video

malfunction. As we proceed through the interview, my assistant will record the major points

discussed on the white board. At the conclusion of the interview, we will review the points

recorded to allow you to add, modify, or clarify your responses.

I will ask you to respond to a series of open-ended questions in order to ascertain your group perceptions on critical thinking instruction within the Core Course. Before we begin recording, do you have any questions?

(Activate both audio and video recorders)

Probes to use:

Can you explain that in greater detail?

Can you give me an example?

Does anyone have a different perspective on that point?

Interview Questions:

A. Curriculum:

    1.   What specific Core Course curriculum aspects do you believe facilitate an instructor's ability to develop student critical thinking?

    2.   What specific Core Course curriculum aspects do you believe inhibit an instructor's ability to develop student critical thinking?

B. Instructional Methods:

    1.   Based on your experience as an instructor, what type of learning activities facilitate and encourage students to think critically?

    2.   Describe some specific techniques you use to teach critical thinking to your students.

C. Instructor Skills and Behaviors:

    1.   How do you create a classroom environment that is conducive for developing student critical thinking?

    2.   What indicators do you look for to determine that your students are applying critical

thinking skills?

Conclusion: Thank you for your candid responses. At this time, I'd like to review the key points recorded on the white board to ensure we have properly interpreted your responses and perceptions. Feel free to add to or modify these points if appropriate.

(Review complete)

That concludes the interview, thank you again for participating in the research. Upon completion of the interview transcription, each of you will be provided the opportunity to validate the accuracy of the transcription.

(Turn off both recording devices)

Appendix B - MDCTI Purchase Agreement

Insight Assessment
1735 N 1st Street, Suite 306
San Jose, CA 95112-4511

Voice: 650-697-5628
Fax: 650-692-0141

Quoted To:
Mr. Timothy Civils
Civils, Timothy H. Jr. (Doc)
633 Hillcrest Circle
Lansing, KS 66043

Quotation

Quote Number: 2109424
Quote Date: 06/18/2014

Customer ID	Valid Thru	Payment Terms
CIVILSTIMOTHYHJRDOC	07/18/2014	Net 30 days

Quantity	Item	Description	ListPrice	UnitPrice	Amount
168.00	MDCTI online prepaid	Prepaid per use: On-line use of the Military and Defense Critical Thinking Inventory Part 1 and Part 2. Prepaid assessment use licenses are valid for up to one year from date of purchase and include results reporting.	70.00	17.80	2,990.40
		Subtotal			2,990.40
		Tax			0.00
		Shipping and Handling			0.00
		Total			2,990.40

Appendix C - Kansas State University IRB Approval

KANSAS STATE UNIVERSITY | University Research Compliance Office

TO: Royce Ann Collins
Educational Leadership
22201 W Innovation dr, Olathe KS 66061

Proposal Number: 7194

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 05/28/2014

RE: Proposal Entitled, "An Assessment of the Command and General Staff Officer Course Effectiveness in Developing Student Critical Thinking"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written — and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 1, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

203 Fairchild Hall, Lower Mezzanine, Manhattan, KS 66506-1103 | 785-532-3224 | fax: 785-532-3278 | k-state.edu/research/comply

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Appendix D - CGSC IRB Approval

DEPARTMENT OF THE ARMY
U.S. ARMY COMMAND AND GENERAL STAFF COLLEGE
QUALITY ASSURANCE OFFICE
100 STIMSON AVENUE
FORT LEAVENWORTH, KANSAS 66027-2301

REPLY TO
ATTENTION OF

ATZL-SWA-QA

17 July 2014

MEMORANDUM FOR: Timothy H. Civils and Dr. Royce Ann Collins, KSU

SUBJECT: Proposed Research Protocol – Exempt: "An Assessment of the Command and General Staff Officer Course Effectiveness in Developing Student Critical Thinking"

1. I have reviewed your research request and concur with the exempt criteria as determined by the KSU IRB. The conditions set forth by the KSU IRB application are acceptable. Your request to conduct this research within CGSC is:
   ☐ Approved
   ■ **Approved with Conditions (see below in bold)**
   ☐ Denied (see below)
2. This research project will use a pretest-posttest design with temporary treatment (CGSC Core Course instruction) to determine a change in student critical thinking skills as a result of this instruction. This research will use the Military and Defense Critical Thinking Inventory (MDCTI) as a means of gathering the data for analysis.
3. The intended study sample is eight staff groups of students (n=128) selected by the Command General Staff School by cluster random sampling from the 15-01 CGSOC Class Core Course conducted from August through December 2014. The second component of the research will consist of focus group interviews with the selected staff group instructors to identify their perceptions on the role of the curriculum, instructional methods, and instructor skills and behaviors in developing student critical thinking. **Researcher will collect signed consent forms from all participants. Student names and Staff Group designation will not be linked to the data. Instructor names and staff group designation will not be linked to the data. Informed consent forms, instrument results, and audio/video recordings will be maintained by the researcher in a locked cabinet within a locked room, accessible only to the researcher. These records will be maintained for a period of 3 years and subsequently destroyed. Video recordings transcriber will sign a transcriber confidentiality agreement prior to transcribing the recordings.**
4. **Students may not participate during or be excused from CGSC educational activities or requirements.**
5. **You must submit a closure report upon completion of your research.**
6. Results of the research may have benefit for CGSC and the Army. Thus, the final research document is requested for the CGSC Dean of Academics.
7. Should you have questions concerning the above, please contact Dr. Maria Clark, Human Protections Administrator (HPA), in the CGSC Quality Assurance Office, room 4521 Lewis & Clark, maria.clark1@us.army.mil or (913) 684-7332.

Maria L Clark, Ph.D.
LD&E Human Protections Administrator

Appendix E - Student Informed Consent Form

KANSAS STATE UNIVERSITY

STUDENT INFORMED CONSENT

PROJECT TITLE: AN ASSESSMENT OF THE COMMAND AND GENERAL STAFF

OFFICER COURSE EFFECTIVENESS IN DEVELOPING STUDENT CRITICAL THINKING

APPROVAL DATE OF PROJECT: May 27, 2014   **EXPIRATION DATE OF PROJECT**:

May 26, 2015

PRINCIPAL INVESTIGATOR: Dr. Royce Ann Collins

CO-INVESTIGATOR: Timothy H. Civils Jr.

CONTACT NAME AND PHONE FOR ANY QUESTIONS/PROBLEMS: Dr. Royce Ann

Collins, racollins@ksu.edu, (913)307-7353

IRB CHAIR CONTACT/PHONE INFORMATION:

Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall,

Kansas State University, Manhattan, KS 66506, (785) 532-3224.

Jerry Jaax, Associate Vice Provost for Research Compliance and University Veterinarian, 203

Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.

PURPOSE OF THE RESEARCH: The project investigates the Command and General Staff Officer Core Course effectiveness in student critical thinking skill development.

PROCEDURES OR METHODS TO BE USED: The researcher will administer an on-line pretest prior to course commencement and posttest upon completion of the Core Course, using the Military and Defense Critical Thinking Inventory (MDCTI) instrument to measure student critical thinking development.

LENGTH OF STUDY: Approximately 2 hours.

BENEFITS ANTICIPATED: This study will assist the Command and General Staff School in understanding the effectiveness of the Core Course in developing student critical thinking, and further, provide insight to the teaching faculty and curriculum developers on areas of improvement. The instrument will provide each student feedback on their results upon instrument completion. These results will enhance student self-awareness (pretest) and enable the student to self-assess skill development (posttest).

EXTENT OF CONFIDENTIALITY: Your name will not be associated in any way to the results presented in this study. Your instrument data will be assigned a unique identification code. This code will be the only reference to individual data within the study. Your name will be held on record as proof of consent and to verify the legitimacy of the results. Your name will not be released to any third parties.

INSTRUMENT ACCESS: The Military and Defense Critical Thinking Inventory (MDCTI) is a copyrighted on-line instrument with access controlled by the researcher. If you consent to participate in the research you will be provided with an email prior to and at the conclusion of the Core Course that provides a link to access the site, and a login and password to complete the instrument. Please provide your preferred email address in the space below:

_____

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and may stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled. I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

Check the one that applies:

_____I volunteer to participate.

_____I do not agree to participate in this study.

PARTICIPANT NAME: _____

PARTICIPANT SIGNATURE: _____   **Date**: _____

Appendix F - Student Demographic Form

Student Demographic Form

1. Service: ____Army ____ Air Force ____Navy _____Marine Corps _____Interagency

2. Gender: ____Male ____Female

3 Race/ethnicity: ____Caucasian ____ Hispanic ____African-American _____Asian

    ____American Indian _____Other (please specify) _____

4. Age: _____

5. Highest Education Level Completed: _____Associates ____Bachelors _____Masters

    _____Doctorate

Appendix G - Instructor Informed Consent Form

KANSAS STATE UNIVERSITY

INSTRUCTOR INFORMED CONSENT

PROJECT TITLE: AN ASSESSMENT OF THE COMMAND AND GENERAL STAFF

OFFICER COURSE EFFECTIVENESS IN DEVELOPING STUDENT CRITICAL THINKING

APPROVAL DATE OF PROJECT: May 27, 2014   **EXPIRATION DATE OF PROJECT**:

May 26, 2015

PRINCIPAL INVESTIGATOR: Dr. Royce Ann Collins

CO-INVESTIGATOR: Timothy H. Civils Jr.

CONTACT NAME AND PHONE FOR ANY QUESTIONS/PROBLEMS: Dr. Royce Ann

Collins, racollins@ksu.edu, (913)307-7353

IRB CHAIR CONTACT/PHONE INFORMATION:

Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild Hall,

Kansas State University, Manhattan, KS 66506, (785) 532-3224.

Jerry Jaax, Associate Vice Provost for Research Compliance and University Veterinarian, 203

Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224.

PURPOSE OF THE RESEARCH: The project investigates the Command and General Staff Officer Core Course effectiveness in student critical thinking skill development.

PROCEDURES OR METHODS TO BE USED: Upon conclusion of the Core Course the researcher conducts a focus group interview with instructors from each of the eight staff groups selected to participate in the study.

LENGTH OF STUDY: Approximately 1-2 hours.

BENEFITS ANTICIPATED: This study will assist the Command and General Staff School in understanding the effectiveness of the Core Course by analyzing instructor perceptions on the role of the curriculum approach, instructional methods, and instructor skills and behaviors in developing student critical thinking. The study results will provide insight to the teaching faculty and curriculum developers on potential areas of improvement. Each instructor group will be debriefed on the study results.

EXTENT OF CONFIDENTIALITY: Your name or staff group title will not be associated in any way to the results presented in this study. Your name will be held on record as proof of consent and to verify the legitimacy of the results. Your name will not be released to any third parties.

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and may stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled. I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

Check the one that applies:

_____I volunteer to participate.

_____I do not agree to participate in this study.

PARTICIPANT NAME: _____

PARTICIPANT SIGNATURE: _____   **Date:** _____

Appendix H - Instructor Demographic Form

Instructor Demographic Form

1. Faculty Type: _____Military ____Civilian

2. Academic Rank: _____Instructor ____Assistant Professor

    _____Associate Professor _____Professor

3. Gender: ____Male ____Female

4. Race/ethnicity: ____Caucasian ____ Hispanic ____African-American _____Asian

    ____American Indian _____Other (please specify)

5. Age: _____

6. Highest Education Level Completed: _____

7. Teaching experience: _____(years/months)

8. Teaching experience with current Staff Group: _____(years/months)

9. What education, training, or personal experiences (formal or informal) have enhanced your ability to teach critical thinking?

Appendix I - Transcriber Confidentiality Agreement

Transcriber Confidentiality Agreement

Project Title: An Assessment of the Command and General Staff Officer Core Course Effectiveness in Developing Student Critical Thinking

I, _ANN M. CHAPMAN_ understand that by signing this agreement, all information that I will transcribe from audio or video recorded interviews will remain completely confidential. I will not disclose any of the recording contents to anyone, and I will deliver all recordings and all documented information to **Timothy H. Civils Jr**. upon completion of my services. I will not copy or keep any evidence of the transcription.

Transcriber's Name: _ANN M. CHAPMAN_

Ann M. Chapman

Signature

My signature indicates that I agree to the statement as outlined above.

Date: _13 Jan 15_

Researcher's Name: **Timothy H. Civils Jr.**

Researcher's Signature: _____

Date: _13 JAN 15_

Appendix J - Statistical Analysis Tables

Table J.1
Paired samples test for pre-MDCTI and post-MDCTI overall scores

| | | Paired Differences | | | | | | | |
| | | | | | 95% Confidence Interval of the Difference | | | | |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	*t*	df	Sig. (2-tailed)
Overall	Posttest - Pretest	2.158	3.817	.619	.903	3.412	3.485	37	.001

Table J.2
Wilcoxon signed-rank test for pre-MDCTI and post-MDCTI analysis scores

		N	Mean Rank	Sum of Ranks	Z	Sig. (2 tailed)
Posttest - Pretest	Negative Ranks	8[a]	10.56	84.50	-2.728	.005
	Positive Ranks	20[b]	16.08	321.50		
	Ties	10[c]				
	Total	38				

[a] Posttest Analysis < Pretest Analysis
[b] Posttest Analysis > Pretest Analysis
[c] Posttest Analysis = Pretest Analysis

Table J.3
Paired samples test for pre-MDCTI and post-MDCTI inference scores

| | | Paired Differences | | | | | | | |
| | | | | | 95% Confidence Interval of the Difference | | | | |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	*t*	df	Sig. (2-tailed)
Inference	Posttest - Pretest	2.053	7.711	1.251	-.482	4.587	1.641	37	.109

Table J.4

Paired samples test for pre-MDCTI and post-MDCTI evaluation scores

| | | Paired Differences | | | | | | | |
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	t	df	Sig. (2-tailed)
Evaluation	Posttest - Pretest	1.737	6.833	1.108	-.509	3.983	1.567	37	.126

Table J.5

Paired samples test for pre-MDCTI and post-MDCTI induction scores

| | | Paired Differences | | | | | | | |
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	t	df	Sig. (2-tailed)
Induction	Posttest - Pretest	2.132	4.839	.785	.541	3.722	2.715	37	.010

Table J.6

Paired samples test for pre-MDCTI and post-MDCTI deduction scores

| | | Paired Differences | | | | | | | |
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	t	df	Sig. (2-tailed)
Deduction	Posttest - Pretest	2.553	6.562	1.065	.396	4.710	2.398	37	.022

Table J.7

Paired samples test for pre-MDCTI and post-MDCTI communicative confidence scores

| | | Paired Differences | | | | | | | |
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	t	df	Sig. (2-tailed)
Communicative Confidence	Posttest - Pretest	1.579	4.341	.704	.152	3.006	2.242	37	.031

Table J.8

Paired samples test for pre-MDCTI and post-MDCTI professional confidence scores

| | | Paired Differences | | | | | | | |
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	t	df	Sig. (2-tailed)
Professional Confidence	Posttest - Pretest	2.105	4.447	.721	.644	3.567	2.919	37	.006

Table J.9

Paired samples test for pre-MDCTI and post-MDCTI teamwork scores

| | | Paired Differences | | | | | | | |
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper	t	df	Sig. (2-tailed)
Teamwork	Posttest - Pretest	-.263	4.348	.705	-1.692	1.166	-.373	37	.711

Table J.10

Paired samples test for pre-MDCTI and post-MDCTI expression scores

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	*t*	df	Sig. (2-tailed)
Expression	Posttest - Pretest	1.763	3.590	.582	.583	2.943	3.028	37	.004

Table J.11

Paired samples test for pre-MDCTI and post-MDCTI directness scores

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	*t*	df	Sig. (2-tailed)
Directness	Posttest - Pretest	-1.553	4.572	.742	-3.055	-.050	-2.093	37	.043

Table J.12

Paired samples test for pre-MDCTI and post-MDCTI intellectual integrity scores

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	*t*	df	Sig. (2-tailed)
Intellectual Integrity	Posttest - Pretest	1.184	4.637	.752	-.340	2.708	1.574	37	.124

Table J.13

Paired samples test for pre-MDCTI and post-MDCTI mental focus scores

		Paired Differences							
				Std. Error Mean	95% Confidence Interval of the Difference				
		Mean	Std. Deviation		Lower	Upper	*t*	df	Sig. (2-tailed)
Mental Focus	Posttest - Pretest	1.289	6.604	1.071	-.881	3.460	1.204	37	.236

Table J.14

Paired samples test for pre-MDCTI and post-MDCTI mental rigor scores

		Paired Differences							
				Std. Error Mean	95% Confidence Interval of the Difference				
		Mean	Std. Deviation		Lower	Upper	*t*	df	Sig. (2-tailed)
Mental Rigor	Posttest - Pretest	.263	4.291	.696	-1.147	1.674	.378	37	.708

Table J.15

Paired samples test for pre-MDCTI and post-MDCTI foresight scores

		Paired Differences							
				Std. Error Mean	95% Confidence Interval of the Difference				
		Mean	Std. Deviation		Lower	Upper	*t*	df	Sig. (2-tailed)
Foresight	Posttest - Pretest	.368	4.874	.791	-1.234	1.970	.466	37	.644

Table J.16
Paired samples test for pre-MDCTI and post-MDCTI cognitive maturity scores

| | | | Paired Differences | | | | | |
| | | | | 95% Confidence Interval of the Difference | | | | |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Cognitive Maturity	Posttest - Pretest	-.105	4.695	.762	-1.648	1.438	-.138	37	.891

Table J.17
ANOVA for group overall change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.738	5	4.148	.252	.935
Within Groups	428.762	26	16.491		
Total	449.500	31			

Table J.18
Kruskal-Wallis test for group analysis change differences

	Staff Group	N	Mean Rank	Chi-Square	df	Sig.
Analysis Change	1	5	15.60	3.013	5	.698
	2	5	19.00			
	3	6	20.17			
	4	7	13.00			
	5	5	18.00			
	6	4	13.25			
	Total	32				

Table J.19

Kruskal-Wallis test for group inference change differences

	Staff Group	N	Mean Rank	Chi-Square	df	Sig.
Inference	1	5	15.30	3.375	5	.642
Change	2	5	18.30			
	3	6	12.25			
	4	7	14.79			
	5	5	20.90			
	6	4	19.63			
	Total	32				

Table J.20

ANOVA for group evaluation change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	158.252	5	31.650	.686	.638
Within Groups	1199.748	26	46.144		
Total	1358.000	31			

Table J.21

ANOVA for group induction change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	31.804	5	6.361	.265	.928
Within Groups	623.164	26	23.968		
Total	654.969	31			

Table J.22

Kruskal-Wallis test for group deduction change differences

	Staff Group	N	Mean Rank	Chi-Square	df	Sig.
Deduction	1	5	14.60	4.352	5	.500
Change	2	5	16.40			
	3	6	17.17			
	4	7	15.07			
	5	5	23.50			
	6	4	11.75			
	Total	32				

Table J.23

ANOVA for group communicative confidence change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	184.927	5	36.985	2.284	.076
Within Groups	420.948	26	16.190		
Total	605.875	31			

Table J.24

ANOVA for group professional confidence change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	75.140	5	15.028	.680	.643
Within Groups	574.579	26	22.099		
Total	649.719	31			

Table J.25

Kruskal-Wallis test for group teamwork change differences

	Staff Group	N	Mean Rank	Chi-Square	df	Sig.
Teamwork	1	5	17.30	.969	5	.965
Change	2	5	14.30			
	3	6	15.42			
	4	7	16.07			
	5	5	19.60			
	6	4	16.75			
	Total	32				

Table J.26

Kruskal-Wallis test for group expression change differences

	Staff Group	N	Mean Rank	Chi-Square	df	Sig.
Expression	1	5	23.40	4.126	5	.531
Change	2	5	13.00			
	3	6	16.50			
	4	7	15.00			
	5	5	13.90			
	6	4	18.13			
	Total	32				

Table J.27

ANOVA for group directness change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	82.911	5	16.582	.695	.632
Within Groups	619.964	26	23.845		
Total	702.875	31			

Table J.28

ANOVA for group intellectual integrity change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	41.621	5	8.324	.334	.888
Within Groups	647.848	26	24.917		
Total	689.469	31			

Table J.29

ANOVA for group mental focus change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	390.778	5	78.156	1.926	.124
Within Groups	1055.190	26	40.584		
Total	1445.969	31			

Table J.30

ANOVA for group mental rigor change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	109.185	5	21.837	1.167	.352
Within Groups	486.690	26	18.719		
Total	595.875	31			

Table J.31

ANOVA for group foresight change differences

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	186.327	5	37.265	1.894	.130
Within Groups	511.548	26	19.675		
Total	697.875	31			

Table J.32

Kruskal-Wallis test for group cognitive maturity change differences

	Staff Group	N	Mean Rank	Chi-Square	df	Sig.
Cognitive Maturity Change	1	5	19.30	1.613	5	.900
	2	5	17.00			
	3	6	14.33			
	4	7	18.64			
	5	5	14.20			
	6	4	14.75			
	Total	32				